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PMI | Africa IRS (AIRS) Project

Indoor Residual Spraying (IRS 2) Task Order Six

ETHIOPIA
2016 END OF SPRAY REPORT

SPRAY CAMPAIGN: JUNE 28 – AUG 5, 2016

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AIRS ETHIOPIA
2016 END OF SPRAY REPORT

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ACRONYMS

AIRS	Africa Indoor Residual Spraying
CB IRS	Community-based IRS
CDC	Centers for Disease Control and Prevention
DB IRS	District-based IRS
DCV	Data Collection Verification
DDT	Dichlorodiphenyltrichloroethane
DEC	Data Entry Clerk
DOS	Directly Observed Spraying
EC	Environmental Compliance
EE	Error Eliminator
FMOH	Federal Ministry of Health
GEMS	Global Environmental Management Support
HEW	Health Extension Worker
HLC	Human Landing Catch
IEC	Information, Education and Communication
IRS	Indoor Residual Spraying
IT	Information Technology
M&E	Monitoring and Evaluation
MFP	Malaria Focal Person
MOH	Ministry of Health
MSP	Mobile Soak Pit
NMCP	National Malaria Control Program
ORHB	Oromia Regional Health Bureau
PMI	President's Malaria Initiative
PPE	Personal Protective Equipment
PSC	Pyrethrum Spray Collection
PSECA	Pre-season Environmental Compliance Assessment
SBCC	Social Behavioral Change Communication
SL	Squad Leader
SNNPR	Southern Nations Nationalities and People Region
SOP	Spray Operator
SQL	Structured Query Language
TL	Team Leader
TOT	Training of Trainers
USAID	United States Agency for International Development

USG	U.S. Government
WHO	World Health Organization

EXECUTIVE SUMMARY

Abt Associates, through the President's Malaria Initiative (PMI) Africa Indoor Residual Spraying (AIRS) Project funded by USAID supports the implementation of indoor residual spraying (IRS) in Ethiopia. The objective of the project is to limit exposure to malaria vectors and reduce the incidence and prevalence of malaria. AIRS Ethiopia conducted IRS in 36 districts using Actellic 300 CS (an organophosphate) from June 28 – August 5, 2016.

A total of 708,258 structures were targeted for IRS using district-based (30 districts) and community-based (6 districts) IRS models. District and regional government staff, seasonal supervisors and AIRS Ethiopia staff provided supportive supervision in both models. The project also provided technical and logistics support to 24 districts, which graduated from PMI support in 2011.

The following are project achievements and key highlights of the 2016 spray campaign (Table 1), which lasted 32 operational days:

- A total of 715,541 structures were sprayed out of 717,396 structures found by spray operators in the target districts, accounting for a coverage rate of 99.7%. In total, 1,688,745 residents were protected, including 230,690 (13.7%) children under five years old and 23,011(1.4%) pregnant women.
- A total of 2,749 individuals were trained using USG funds to support IRS activities in the 36 districts. Of these, 1,523 were spray operators (1,503 males and 20 females), 494 were squad leaders (241 males and 253 females), 379 were porters (178 males and 201 females), 96 were clinicians (77 males and 19 females), 34 were pump technicians (32 males and 2 females), and 223 were supervisors (205 males and 18 females). Overall, 18.7% (n=513) of all trained IRS personnel for the 2016 spray round were female.
- A total of 271,196 bottles of Actellic 300 CS were used to spray 715,541 structures in 36 IRS districts, with a utilization ratio of approximately 1:2.6 (bottles to structures sprayed) leaving a balance of 15,988 bottles at the end of the spray round.
- The level of IRS acceptance using Actellic 300 CS in all 36 districts was high as shown by the spray coverage.
- All IRS insecticide-contaminated wastes, including used masks, will be incinerated at the AIRS Project incinerator in Addis Ababa. Other solid wastes, including empty bottles, used gloves, worn-out boots, and paper cartons will be recycled.
- Wall bioassays conducted within one week of spraying to assess the quality of spraying in the target districts recorded 99.7% mortalities for susceptible *An. arabiensis*. The average mortality at one, two and three months post spray was 98.6%, 95.7% and 82.4%, respectively.

TABLE 1. 2016 IRS CAMPAIGN SUMMARY RESULTS

Insecticide Used	Organophosphates (Actellic 300 CS)
Number of districts covered by PMI-supported IRS	36
Number of structures found by SOPs	717,396
Number of structures sprayed by PMI-supported IRS	715,541
2016 spray coverage	99.7%
Population protected by PMI-supported IRS	Total Population: 1,688,745 Children under 5: 230,690 Pregnant women: 23,011
Dates of PMI-supported IRS campaign	June 28 – Aug 5, 2016
Length of campaign (total days)	32 days
Number of people trained with U.S. Government funds to deliver IRS	2,749 (2,236 Males; 513 Females)

1. INTRODUCTION

Malaria transmission in Ethiopia occurs up to 2000m elevation but has been reported to affect areas up to 2300m elevation occasionally under abnormal weather conditions. The levels of malaria risk and transmission intensity in Ethiopia show marked seasonal and spatial variability. 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 from 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 2014 – 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.[1]

In 2016, AIRS Ethiopia conducted spraying in 36 districts supported by the President's Malaria Initiative (PMI) and provided limited support to 24 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 approximately 2,749 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 decay rate monitoring in experimental huts to determine the residual life of pirimiphos-methyl, propoxur and bendiocarb.
- Conducted insecticide resistance (IR), wall bioassays, vector density, and behavioral studies.
- Supported the disposal of DDT from PMI supported project districts.

[1] Federal Democratic Republic of Ethiopia, Ministry of Health: National Malaria Strategic Plan 2014 – 2020.

2. PRE-SEASON ACTIVITIES

2.1 IRS TARGET DISTRICTS

AIRS Ethiopia supported 36 high-burden malaria districts in six zones of Oromia region (nine districts in East Wollega zone; four districts in Ilu Aba Bora zone; six districts in Jimma zone; five districts in Kellem Wollega zone; five districts in West Shewa zone; and seven districts in West Wollega zone). These same districts have received full PMI support in the last four-to-six years. The selection of the districts was previously done in collaboration with ORHB, 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 2016.

FIGURE 1. MAP OF PMI FULLY AND PARTIALLY SUPPORTED DISTRICTS IN 2016

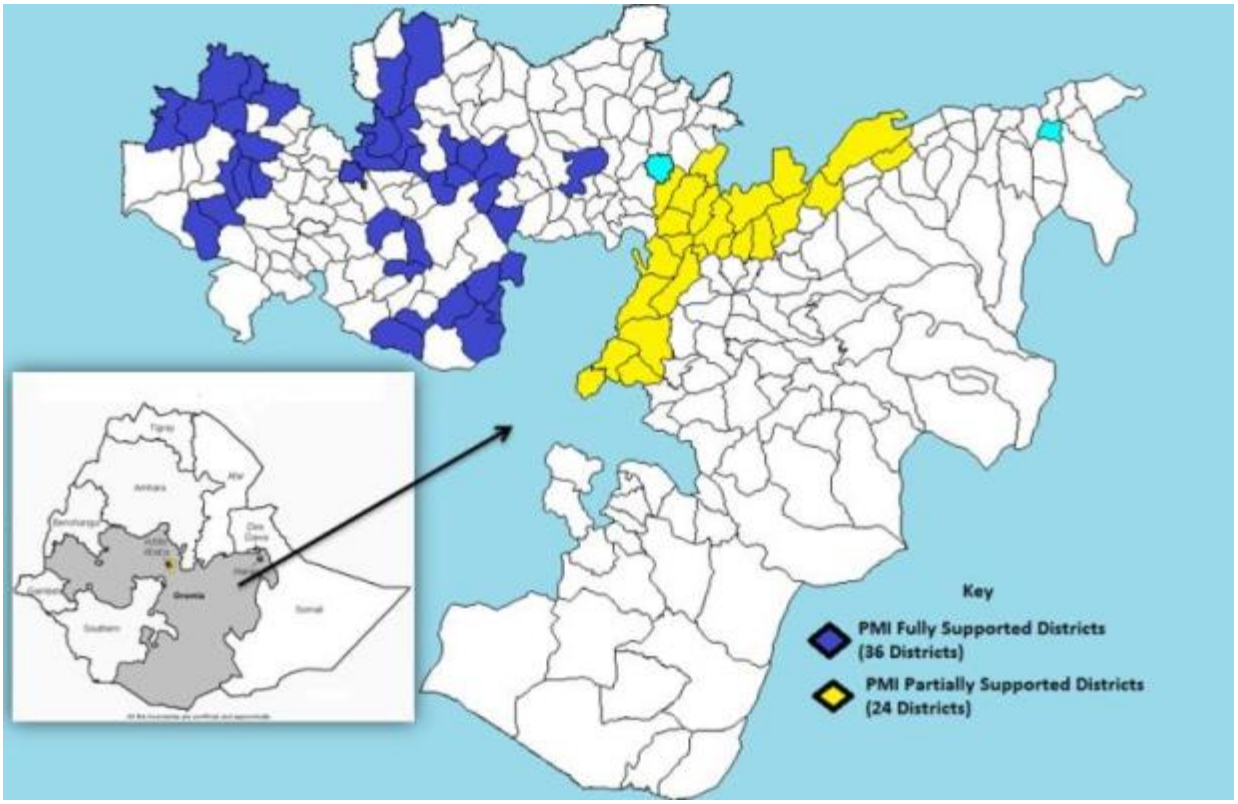


TABLE 2. IRS TARGET DISTRICTS 2016

Zone	Number of Districts	Number of Target Structures	Total Population Targeted	Pregnant Women Targeted	Children <5 Targeted
East Wollega	9	141,827	315,797	4,226	41,477
Ilu Aba Bora	4	81,882	173,860	4,490	29,013
Jimma	6	155,256	403,197	4,291	55,178
Kellem Wollega	5	106,629	200,351	3,213	28,268
West Shewa	5	86,478	217,669	2,357	27,948
West Wollega	7	136,186	354,941	4,507	48,482
Grand Total	**36**	**708,258**	**1,665,815**	**23,084**	**230,366**

2.2 INSECTICIDE SELECTION

Pirimiphos-methyl was used in the 2016 campaign in all 36 districts. The selection was based on data obtained from insecticide susceptibility tests conducted in 2014 and 2015 which showed that the main malaria vector, *An. gambiae* s.l., is fully susceptible to pirimiphos-methyl in all sites where the testing was done. The vector was, however, shown to be susceptible to bendiocarb in six sites, possibly resistant in one site and resistant in one site. The vector was shown to be susceptible to malathion in two sites, possibly resistant in two sites and resistant in three sites. The vector was resistant to DDT and all pyrethroids tested.

NGenIRS is a UNITAID-funded partnership between the Innovative Vector Control Consortium (IVCC), PMI, and its IRS implementing partners Abt Associates Inc., Global Fund, PATH/Malaria Control and Elimination Partnership in Africa (MACEPA) and NMCPs. The objective is to accelerate and expand access and affordability of new, third generation formulations of IRS insecticides (3GIRS) for malaria vector control to mitigate insecticide resistance and increase the effective susceptible lifetime of IRS insecticides. The goal of the NGenIRS project is sustainable and rational deployment of effective malaria vector control tools in insecticide resistance management programs to save lives and improve health.

Ethiopia was chosen to be a recipient country for the NGenIRS project and as a result, the quantity of pirimiphos-methyl purchased and used for the 2016 spray round was made possible through a copayment mechanism. With the copayment, AIRS Ethiopia was able to procure and use pirimpiphos-methyl in all 36 districts in 2016.

2.3 TECHNICAL SUPPORT TO THE FMOH

AIRS Ethiopia participated in technical meetings as a member of the Technical Advisory Committee to the National Malaria Control Program (four meetings) and the national vector control working group (two meetings). AIRS contributed to the development of the insecticide resistance management strategy that was officially launched in 2016. The project also participated in scientific meetings organized by the NMCP and partners. AIRS Ethiopia supported the participation of FMOH staff at the AIRS regional entomology training and environmental compliance training held in Zimbabwe and Senegal, respectively. Two AIRS staff supported the national training on planning and management of malaria control organized by the FMOH in Adama (5 May – 4 June 2016) for district and zonal health staff as facilitators.

The project also participated and contributed in meetings on forecasting/procurement of insecticides for IRS in Ethiopia. The project also provided $5,000 support towards communication activities during the World Malaria Day activities held in April 2016.

2.4 IRS TRAINING AND PLANNING

In 2016, 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 spray operator performance. To achieve this, a focused IRS training (boot camp) was conducted in April 2016 for district IRS Managers and AIRS supervisors (42 district and zonal MFPs, five temporary supervisors and seven AIRS staff) with a focus on two main areas:

- ***Training on managing IRS operations*** (boot camp) aimed at strengthening project managers' ability to plan, implement, supervise, and evaluate IRS operations at district and zonal levels (April 4 – 7, 2016);
- ***Coaching and facilitation training*** (boot camp) aimed at strengthening project managers' technical and facilitation (training) skills for improved spray operator performance (April 8 – 11, 2016).

In addition, the project conducted a five-day training of 20 "**Master Trainers**" from April 20 to April 24, 2016 to build a critical mass of facilitators to manage both theory and practical training sessions on spray techniques during the training of trainers (TOTs). With this approach, the trainer to trainee ratio of 1:5 was achieved.

The project also held two sessions of comprehensive IRS trainings in May 2016 for TOTs with focus on practical training to enhance spraying techniques. A total of 223 health personnel from the 36 IRS target districts and 6 zones attended. Participants included malaria focal persons (MFPs), IEC coordinators, Environmental Health Officers and zonal representatives. The training of trainers (TOT) was conducted in two sessions:

- May 4-8, 2016, Nekemte: 127 participants from East Wollega Zone (53), West Wollega Zone (43), and Kellem Wollega Zone (31) attended.
- May 10-14, 2016, Jimma: 96 participants from Jimma Zone (40), Ilu Aba Bora Zone (25), and West Shewa Zone (31) 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 a six-day training for SOPs and porters (reserve SOPs), and squad leaders in their respective districts with emphasis on spray techniques. They also conducted orientations for mobilizers (Health Extension Workers), 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 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 44 data entry clerks (DECs) and hired 40 of them, with the remaining four kept as reserve. The breakdown of all trainings, by type of training, sex and number of participants is shown in Table 3.

A total of 2,749 spray actors[2], out of which 18.7% (n=513) were females, were trained to deliver IRS in 2016 (Table 4) with USG funds, a PMI indicator. All seasonal actors were examined for fitness before training with a well-structured checklist (Annex B-1).

TABLE 3. IRS TRAININGS CONDUCTED IN 2016 TO IMPROVE SPRAY QUALITY

Type of Training	Participants Trained	Key Topic areas covered	Dates
District Manager boot camp (EnCompass training)	54 district MFPs/ AIRS staff/ zonal/ MOH staff	IRS planning, implementation, supervision, mobilization, environmental compliance and spray techniques	April 4 – 7, 2016
		Coaching and training skills	April 8 – 11, 2016
Training of IRS master trainers	20 MOH staff	IRS planning, implementation, supervision, mobilization, environmental compliance and spray techniques	April 20 – 24, 2016
Training of trainers: MFPs, team leaders and supervisors	223 MOH staff	IRS planning, implementation, supervision, mobilization, environmental compliance and spray techniques	May 4 – 14, 2016
Training of squad leaders, spray operators and porters	2,396 SLs, SOPs and porters	Spray techniques, pump maintenance, Safe handling of insecticides and environmental safety issues in IRS, community mobilization	June 20 – 25, 2016
Training IEC mobilizers	Kebele IEC mobilizers (1,041 HEWs) in 504 Kebeles	Community mobilization including IRS key messages – before, during, and after	June 15 – 27, 2016
Storekeepers and Store assistants	36 Storekeepers	Store management and inventory tracking	May 4 – 14, 2016
Spray pump maintenance	34 pump technicians	Spray pump component parts and function; handling and operation of the spray pump; pump calibration	May 25 – 26 2016
Health workers/ Poison management	96 health workers	Management of emergencies and insecticide poisoning in IRS	May 6, 2016
Data clerks	44 data clerks	IRS data collection and management, integrity, and security; IRS data entry and practice	June 24 – 25, 2016

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

Type of Training	Males	Females	Total
IRS delivery TOT	205	18	223

[2] Supervisors, Team Leaders, Squad Leaders, Spray Operators, Pump Technicians, Clinicians

Spray operations	1,954	476	2,430
Clinicians	77	19	96
Total	**2,236**	**513**	**2,749**

Further training initiatives conducted in 2016 included:

- Environmental compliance training in Dakar, Senegal attended by one malaria control expert from ORHB and the AIRS Ethiopia Environmental Compliance Officer.
- Basic malaria entomology training conducted for participants from six universities to support entomological and insecticide resistance monitoring (Addis Ababa, Arbaminch, Gondar, Jigjiga, Jimma and Mekelle Universities).
- Regional entomology training for NMCP counterparts in PMI countries in Harare, Zimbabwe attended by one FMOH staff.

FIGURE 2. TRAINING OF TRAINERS PRACTICAL SESSION IN JIMMA 2016

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 2015 spray round, to develop the logistics and procurement plan. In developing this plan, the following were considered:

- Available stock of materials, consumables, and equipment;
- Transport arrangements for distribution of equipment, materials, and supplies.
- Estimation of insecticide, 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 2016. A full list of all PPE and materials procured for the 2016 IRS campaign is found in Table A-1in 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 49 long bases (4WD) with capacity of transporting 12 persons were procured. The procurement was conducted through a competitive bidding process. Two local companies were selected to provide transport services for spray actors during IRS. The project further contracted the services on one company for the supply of 72 trucks to transport insecticide and other IRS supplies to the districts, and also collect empty pirimiphos-methyl bottles from the districts.

2.6 HUMAN RESOURCE REQUIREMENTS

AIRS Ethiopia used the number of structures found in the 2015 spray campaign as a baseline to determine the number of seasonal workers needed for 2016 IRS activities. As in previous IRS campaigns, team leaders (TLs), squad leaders (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 2016. 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 shows the number of spray actors recruited and trained for the 2016 spray campaign. In order to improve the quality of cascade trainings, overall IRS implementation and supervision, the project, in consultation with ORHB, received support from 4 experienced seasonal supervisors, 3 of whom are current zonal malaria coordinators in non-PMI supported zones. The seasonal supervisors attended the boot camp training and were trained as master trainers to improve their practical skills on spray techniques and familiarize them with the BMP standards.

Overall, implementation of IRS operations in 2016 was conducted with the support of MFPs (36), TLs (64), SLs (494), SOPs (1,523), porters (379), mobilizers (1,041), washers (71), security guards (194), water fetchers (65), store assistants (36), data clerks (40 of 44 trained), and drivers (101). Women accounted for 36.6% (n=1,600) of all personnel engaged in the 2016 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 AND TEMPORARY WORKERS TRAINED IN 2016

Categories of Persons Trained	Training on IRS Delivery								Other Trainings																Total		
	Training of Trainers		Spraying Operations		Pump Technician Training		Poison Management		National Training on Basic Entomology		Data Capture and Reporting		EC, Washing, Fire Safety and Operation Site Security		Store Management and Safety		SBCC, Mobilization and Enumeration		Transport Safety and Security		Training of IRS Managers (Boot Camp)		Training of Master Trainers				
	M	F	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									26	0															**26**	**-**	**26**
Zonal Supervisors	8	0																			5	0	4	0	**17**	**-**	**17**
District Supervisors	109	7																			33	3	16	0	**158**	**10**	**168**
District MFPs	32	3																							**32**	**3**	**35**
Team Leaders	56	8																							**56**	**8**	**64**
Regional Supervisors																					1	0			**1**	**-**	**1**
AIRS temporary Supervisors																					5	0			**5**	**-**	**5**
AIRS Technical staff																					7	0			**7**	**-**	**7**
Data Entry Clerks											36	8													**36**	**8**	**44**
Clinicians							77	19																	**77**	**19**	**96**
IEC Mobilizers																	74	967							**74**	**967**	**1,041**
Squad Leaders			241	253																					**241**	**253**	**494**
Spray Operators			1,503	20																					**1,503**	**20**	**1,523**
Porters*			178	201																					**178**	**201**	**379**
Washers													6	65											**6**	**65**	**71**
Drivers																			101	0					**101**	**-**	**101**
Security Guards													164	30											**164**	**30**	**194**

District Pump technicians					32	2																			**32**	**2**	**34**
District Storekeepers															**31**	**5**									**31**	**5**	**36**
District Store Assistants															**27**	**9**									**27**	**9**	**36**
TOTAL M/F	**205**	**18**	**1,922**	**474**	**32**	**2**	**77**	**19**	**26**	**0**	**36**	**8**	**170**	**95**	**58**	**14**	**74**	**967**	**101**	**0**	**51**	**3**	**20**	**0**	**2,772**	**1,600**	**4,372**
TOTAL/Training	**223**		**2,396**		**34**		**96**		**26**		**44**		**265**		**72**		**1,041**		**101**		**54**		**20**		**4,372**		

*Porters attend the same training as SOPs and serve as reserve SOPs during the campaign.

2.7 TECHNICAL ASSISTANCE TO 24 GRADUATED DISTRICTS

AIRS Ethiopia organized a two-day (March 10 - 11, 2016) IRS planning meeting for district MFPs, district health managers, zonal MFPs, and zonal health office heads with a total of 57 health staff and managers participating (Table 6). The 24 graduated districts are comprised of 749 villages (kebeles) with a total population of approximately 3.2 million, out of which 606 kebeles are malaria endemic with a population of 2.5 million at risk of contracting the disease.

The meeting objectives included:

- Identifying target areas for 2016 spray operation based on morbidity data.
- Estimating the number of unit structures to be sprayed based on resource availability; and
- Identifying any resource gaps that AIRS Ethiopia could support.

The following key factors were identified and action taken:

- Conduct pre-season environmental compliance assessment in the 24 graduated districts. AIRS conducted PSECA in collaboration with the district MFPs and Environmental Officers and a report on gaps and action was generated and shared with the stakeholders.
- At least 478 villages with 558,461unit structures with a population of 1,837,602 persons were selected for the 2016 spray campaign and district specific implementation plans developed.

- The total insecticide requirement was estimated to be 95,463 sachets of bendiocarb and 378,039 sachets of propoxur, to be supplied by the government. AIRS provided a total 12,784 sachets of bendiocarb to West Arsi zone which were distributed to three graduated districts (Shashemene, Shalla and Arsi Negele districts) to fill their insecticide gap and also ensure that the bendiocarb balance with Jan 2017 expiry date was fully utilized.
- AIRS Ethiopia was tasked to provide a number of PPE to ORHB as per the procurement plan shown in Annex A.

The AIRS ECO conducted a training of the district MFP and other IRS supervisors in the target graduated district to ensure adherence to best management practices. AIRS will also provide supervisory support to ensure compliance during the September - October 2016 spray round. Used sachets and other wastes will be collected from the district for incineration at the project's incineration facility in Addis Ababa.

TABLE 6. IRS PLANNING MEETING PARTICIPANTS FOR GRADUATED DISTRICTS

Areas	MFP			Health Office Head/ Deputy			Total		
	M	F	Total	M	F	Total	M	F	Total
Districts	21	3	24	23	0	23	43	3	46
Zones	5	0	5	3	0	3	9	0	9
ORHB*	0	0	0	2	0	2	2	0	2
Total	**26**	**3**	**29**	**28**	**0**	**28**	**54**	**3**	**57**

*Representative from the Oromia Regional Health Bureau

2.8 GENDER AND IRS IN ETHIOPIA

The PMI AIRS Project is focusing on creating a more gender equitable project where spray campaigns and spray operational sites are more gender inclusive and accommodating. The project seeks to increase the number of women hired as seasonal employees and increase the roles these women play in spray campaigns. The gender norms and income use research study was continued in 2016 to better understand whether working on an explicitly gender equitable project changes a seasonal worker's perceptions of gender norms and equality. Baseline data on gender norms was collected before the IRS campaign and at the end of the spray campaign. There were 631 matched surveys (138 female respondents, 493 male respondents), a dramatic increase from the 155 matched surveys analyzed during last year's campaign. The data from these surveys are 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 being able to work on an IRS campaign, further recruit and retain women, and train supervisors and NMCP staff on gender equality. In the 2017 spray campaign, AIRS Ethiopia will engage with the district health offices at the zonal and district level on the importance of hiring women and share data that shows female SOPs spray just as many structures as men.

3. Information, Education and Communication

Information, Education and Communication activities are vital for IRS implementation to ensure successful spray campaigns by promoting community acceptance of the intervention. In 2016, the district MFPs and IEC/BCC experts organized and led one day orientation sessions in all 36 target districts for community mobilizers. IRS key messages (pre-spray, 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. Based on gaps in mobilization identified in the 2015 spray round, the project engaged mobilizers to ensure that households were adequately informed of actual spray dates, and that eligible structures were adequately prepared in advance of arrival of spray operators. The use of Actellic 300 CS for the first time in 28 of the 36 districts presented the need to engage mobilizers to provide specific messages to households on safety precautions to ensure acceptance and a successful spray round.

The district IEC focal persons coordinated all mobilization activities through the kebele administration and other channels including kebele meetings, churches/ mosques. HEWs received orientation on how to conduct community outreach and on specific key IRS messages to be delivered to beneficiaries in their respective kebeles. Table 7 shows the number of communication outreach sessions and population reached. In some instances door-to-door mobilization was conducted, and mobilizers were embedded on IRS teams. Through these approaches, the campaign witnessed high IRS coverage and acceptance levels and structure readiness for IRS.

TABLE 7. IEC/ BCC MEETINGS AND PARTICIPANTS MOBILIZED

Location	Outreach Sessions	Number of Kebeles	Population Mobilized		
			Males	Female	Total
6 CB IRS districts	232	118	171,469	152,845	324,314
30 DB IRS districts	1,712	386	497,181	479,334	976,515
Total 36 districts	1,944	504	668,650	632,179	1,300,829

AIRS Ethiopia participated in the FMOH annual review meeting and the launching of the health sector transformation plan hosted by Oromia Regional State in Adama town. The project participated in the exhibition by implementation partners organized as part of the workshop (Figure 3). More than 25 government and other stakeholders participated in the exhibition. PMI/AIRS project presented posters and fliers showing the contribution of PMI support to the reduction of malaria-associated morbidity and mortality and shared different success stories including community based piloting and gender inclusion in IRS.

FIGURE 3. AIRS REPRESENTATIVES AT THE EXHIBITION

4. Implementation of Spray Activities

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. The number of spray operation teams was based on the number of structures found during the 2015 IRS campaign. 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 36 districts. Five AIRS Ethiopia staff and four IRS seasonal supervisors were deployed to the zones during implementation to provide supportive supervision, each in charge of 6–9 districts, working closely with zonal and district MFPs.

IRS supervision was conducted by a team from AIRS Ethiopia staff, ORHB, Zonal MFPs, district staff and PMI. Standard AIRS paper and electronic based supervision checklists were used by supervisors to ensure an objective assessment on spray quality, environmental compliance, M&E data and store management, etc. As part of the mHealth system, all zonal and district MFPs (42), AIRS (6) and IRS seasonal supervisors (4) were supplied with android smart phones installed 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 8).

The project used two IRS models to deliver the IRS operation to the 36 project districts: DB IRS and CB IRS. In the DB IRS model, spray teams were organized at district level and stayed in camps. Each district had 1 - 3 operation sites with soak pits and a temporary store in some cases. Team leaders and district MFPs with support from AIRS supervisors developed mobilization and spray calendars. Team leaders managed daily operations at the operational sites with the MFPs providing overall management oversight. Team leaders deployed the spray teams to the target villages on a daily basis. One SL was in charge of four SOPs and one porter. SOPs supported in carrying of insecticide to the field with each assigned (3-4 bottles). TLs supervised four squads equivalent to 16 SOPs and 4 porters.

The CB IRS model was organized at the health post level in each kebele. The Health Extension Workers at the health post served as squad leaders with each HEW being in charge of four SOPs and one porter to mobilize and lead the campaign in the kebele. Trained TOTs from the district health office 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 8. MOBILE SPRAY SUPERVISION PERFORMANCE 2016

Supervision Forms	Completed
Spray Operator Morning Mobilization + Transportation Vehicle Inspection	122
Storekeeper Performance	130
End of Day Cleanup	125
Homeowner Preparation and Spray Operator Performance	492
DCV - Data Collection Verification	244
All Forms	**1,133**

In 2016, AIRS developed a cluster based supervision plan ahead of the operation with zonal MFPs, AIRS staff and IRS seasonal supervisors assigned a cluster of districts. Based on an agreed supervision plan, continuous follow-up of activities over the course of the IRS operation was 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 squad leaders for each SOP under their supervision, and twice weekly by team leaders 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 the quality of the SOP's spraying improved. A total of 32,615 supervision observations were conducted using the DOS checklist. Table D-5 in Annex D presents the use of the form and the checklist.

4.2 COMMUNITY-BASED IRS

The project held a five-day district-level training to refresh the skills of HEWs in the six selected districts to serve as SLs. The CB model of IRS was implemented in one district from each of the six zones with a total of 118 villages targeted for IRS. The trained HEWs, in collaboration with their village leaders, then selected five literate community members (total 588) and trained them for six days on spray operations and mobilization. Four of the community members worked as SOPs and one served as a porter or SOP replacement in their villages. Table 9 shows the 2016 spray performance for each CB IRS district.

The length of spray operations in the six CB IRS districts varied based on number of structures per kebele, with spray duration ranging from 10 – 32 days. Only one vehicle was provided to the district to provide logistical and supervision support. Motorbikes provided by the district health office were used for supervision.

TABLE 9. SPRAY OPERATION PERFORMANCE IN CB IRS AREAS

Zones	District	Structures Found	Structures Sprayed	Spray Coverage (%)	Total Population Protected	Pregnant Women Protected	Children <5 Protected
East Wollega	Sasiga	18,108	18,103	100.0	46,954	563	6,951

Ilu Aba Bora	Chewaka	37,670	37,667	100.0	86,004	1,933	14,747
Jimma	Kersa	28,643	28,620	99.9	73,726	835	9,952
Kellem Wollega	Hawa Galan	37,056	37,045	100.0	100,041	2,521	14,372
West Shewa	Bako Tibe	19,691	19,656	99.8	45,477	686	5,665
West Wollega	Manasibu	40,566	40,566	100.0	82,822	758	8,856
	TOTAL	**181,734**	**181,657**	**100.0**	**435,024**	**7,296**	**60,543**

4.3 LOGISTICS AND STOCK MANAGEMENT

AIRS Ethiopia rented a spacious warehouse in Addis Ababa to accommodate the bulky Actellic consignment for 2016. Each of the district level storage facilities served as distribution centers for IRS materials, equipment, and insecticide during the IRS operations (Figure 4). The district storage facilities were managed by a storekeeper and assistant who ensured distribution and close supervision of supplies and materials at the operation sites storage facilities. Insecticide, other materials, and equipment stocks were carefully tracked and managed from the central warehouse to the district storage facility and subsequently to the operation sites storage facilities. All stock records were documented on ledger books and stock cards. Empty insecticide bottles were tracked daily at the operation site and district stores. They were accounted for by recording how many insecticide bottles each TL had received and used. 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 (Figure 4).

FIGURE 4. INSECTICIDE STORE WITH ACTELLIC 300 CS IN KERSA DISTRICT

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 SL to minimize any chance of insecticide loss. At the end of each spray day, porters or 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 program staff of discrepancies between the stock and the records. AIRS and the seasonal supervisors conducted routine insecticide reconciliation at the district and operation site stores. The storekeepers also recorded daily minimum and maximum temperatures readings. A total of 101 vehicles were contracted for the support of the IRS operations in the 36 districts (Figure 5).

FIGURE 5. INSECTICIDE AND SOP TRANSPORT IN 2016

5. ENVIRONMENTAL COMPLIANCE

In reference to the Supplemental Environmental Assessment (SEA) amended and approved in 2015 and the letter report prepared for the year 2016, the AIRS project used Actellic 300CS (organophosphate) for spraying of all the 36 target districts. Based on PMI BMPs, there was a need for a strong monitoring system to ensure that environmental compliance requirements were adhered to during the IRS operation so as to protect spray actors, beneficiaries and the environment. 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 36 project districts using the checklists installed on smartphones. The first-round PSECA was performed well ahead of the TOT, and informed the district staff of EC gaps they needed to address. Areas that required the contribution of AIRS project office were also identified. In the second round of PSECA, conducted one week before spray operations began, the team verified that all needs had been fulfilled by stakeholders and that the districts were ready for the spray operations. Tables 10 and 11 summarize the key gaps identified during the first round PSECA.

TABLE 10. KEY GAPS IDENTIFIED DURING FIRST ROUND PSECA FOR DISTRICT STORES

District Store	Zone						Total
	West Wollega	Kellem Wollega	East Wollega	West Shewa	Ilu Aba Bora	Jimma	
How many laminated correct pesticides and safety sheets are required?	20	14	24	14	12	13	97
How many health and safety procedure sheets are needed for stores and vehicles?	27	27	18	17	32	26	147
How many emergency response procedure sheets are required?	20	14	24	14	12	13	97
How many spill response procedure sheets are needed?	11	21	19	24	11	17	103
How many fully stocked first aid kits are needed?	7	5	9	5	4	6	36
How many doses of Atropine and/or charcoal antidotes to pesticides are required?	14	16	24	20	18	15	107
How many pregnancy test kits are needed?	35	28	49	36	30	88	266

TABLE 11. KEY GAPS IDENTIFIED DURING FIRST ROUND PSECA FOR SOAK PITS

Soak Pits	Zones						Total
	West Wollega	Kellem Wollega	East Wollega	West Shewa	Ilu Aba Bora	Jimma	
How many soak pits are in a critically-sensitive area (e.g., flood prone) and/ or overgrown with vegetation?	0	0	0	0	0	2	2
How many soak pits need vegetation cleared?	35	13	25	20	34	27	154
How many soak pits need maintenance of fence, gate, lock?	30	13	25	20	34	27	149
How many washing areas need repair of slope, leak, or cracks?	15	28	26	26	34	30	159
How many soak pits need lines to dry clothes?	1	10	0	7	0	0	18
How many soak pits need the skull and cross-bones danger signs?	7	5	4	3	6	10	35
How many soak pits need a temporary shower built?	21	12	13	11	16	10	83

A total of 73 district-based soak pits and 120 kebele-based soak pits were maintained and used for disposal of insecticide contaminated effluents in the spraying operation. In 2016, the AIRS project used mobile soak pits in six sites.

Further to the usual maintenance works of the soak pits, most of the district based soak pits (55 soak pits) were lined with plastic sheet on the sides to prevent any potential side leakage of effluent into the environment (Figure 6). Polyethylene plastic sheets were used as ground cover in place of cement for the washing/rinsing areas of the soak pits. AIRS staff and other IRS supervisors inspected the stores for stock management and EC. The project equipped the stores with fire extinguishers, shelves, pallets, first aid kits, dust bins, emergency spill kits, and thermometers to ensure health and environmental safety during the spray campaign.

FIGURE 6. PLASTIC SHEET LINING INSTALLED TO PROTECT SIDE LEAKAGE OF EFFLUENT IN KERSA DISTRICT

Pregnancy screening was conducted for all female spray actors. Pregnancy tests were undertaken by the 513 women involved in the IRS operation and 2 were found to be pregnant and were not recruited into IRS. In 2016, all spray actors underwent medical fitness screening before they enrolled in the spraying operation and 10 actors did not pass the test. The physical condition of SOPs was also assessed during training process by trainers including the MFPs. In addition, the squad leaders assessed the physical condition of each SOP and porter every day during morning mobilization sessions by using the daily health check list (Annex D, Tab D-6).

The project trained 96 clinical practitioners on insecticide exposure management for one day. Districts were notified of the need to have the recommended antidotes (atropine or diazepam). AIRS ensured that at least one of the antidotes was available in the health facility in the operation sites. In the 2016 spray round, no site reported insecticide exposure during the spray operations. However, one SOP in Kersa district had a minor allergic reaction and was assigned a new role as a porter.

The SOPs were provided with functional flashlights to ensure that the houses were adequately prepared for spraying and items removed or covered with plastic sheet before the spraying would commence. In addition, unlike in previous spray rounds, all SOPs were provided with neck protection (Figure 7).

FIGURE 7. DRESS REHEARSAL AND SPRAY OPERATIONS IN ACTION

5.2 MID- AND POST-SEASON ENVIRONMENTAL INSPECTIONS

AIRS Ethiopia technical staff were involved in EC inspections and conducted supervision and 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. The timeliness of feedback of the inspections was not satisfactory because of poor connectivity. A summary of inspections and mitigation measures taken are fully described in Table B-1 in Annex B.

5.3 Post-Season Demobilization and Waste Disposal

5.3.1 Closure of Storerooms and Soak Pits

Collection of IRS commodities from temporary storerooms was done soon after completion of the spraying operation 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 health facility in charge.

5.3.2 Solid Waste Disposal

At the end of the spray operations, AIRS Ethiopia collected solid wastes, including empty bottles and used masks, for management at the central level. The project with support of the Arysta country representative identified 2 recycling firms and memoranda of understanding were signed in April 2016. Empty insecticide bottles (270,228[3]) are progressively being transferred to pre-identified recycling firms to be used for production of electric cables. Recycling is in progress and the AIRS project will continue to ensure that the bottles are fully utilized for the intended use (Figures 8). Similarly, a MOU has been signed by the Ethiopian pulp and Paper Company for the recycling of insecticide cartons. Some 10,435 Kg of cartons have been supplied to the recycler for the production printing papers, card boards and cartons. The project's ECO will closely monitor the recycling and will pay regular visits to the firms to confirm utilization of the supplied bottles and cartons for the production of the pre-determined products and ensure that both firms provide certificates of completion.

Contaminated IRS wastes including 840.5 Kg of used masks are stored in the central warehouse awaiting incineration at the project's incinerator in Addis Ababa. The AIRS project has engaged Addis Ababa University to conduct the analysis of smoke emissions and ash at the incinerators based on the recommendations of the Ethiopian EPA emanating from findings of the environmental compliance field evaluation conducted by GEMS 2015. Other recommendations by the regulatory section of ORHB team including extension of the chimney, fencing off the incinerator compound to keep away animals and unauthorized personnel have been done already.

FIGURE 8. ACTELLIC BOTTLE RECYCLING IN ADDIS ABABA IN 2016

[3] This is the number of empty bottles that are being recycled. This number differs from the number of empty bottles reported in our M&E database. Please see footnote #4 for more information.

5.3.3 Incidents Encountered during the IRS Operation

The major incidents encountered this year were attempts of insecticide theft. These attempts were thwarted in early stages through coordinated effort by AIRS supervision teams and insecticide loss was averted. This includes the situation in Bedele district where 12 bottles were reported missing but further follow up through the police led to the recovery of all the bottles. In Borecha district, 881 bottles reported as used were found in a separate store at the district offices and returned to the main district insecticide store. Also, during the end of the campaign inventory, nine full bottles of insecticide were missing, seven in Sasiga, one in Seka Chekorsa, and one in Lalo Kile. The missing bottles were reported to the police and investigation has not been concluded.

Two accidents involving hired IRS vehicles were encountered in the 2016 spray operation. The first accident occurred on June 1, 2016 in Sekoru town in which a hired insecticide transport truck was hit from behind by a police van. The driver of the police van and occupants were treated of minor injuries and discharged. The second accident occurred on July 27, 2016 in Kondala. A hired SOP transport vehicle was knocked by a public transport vehicle and 1 SOP reported minor injuries. He was treated and discharged and continued with the role as a SOP.

5.4 Disposal of Obsolete DDT

One of the key achievements recorded on AIRS Ethiopia project is the facilitation of the disposal of obsolete DDT. A total of 101.6 tons of DDT shipped to Poland has successfully been incinerated and a certificate of completion of the incineration process has been received from the disposal company. The remaining task related to this activity is the shipping of contaminated DDT cartons which is already stacked in 180 FIBCs (Figure 9). AIRS received transit consent from the Djibouti government on November 2, 2016 and will now proceed to ship the waste to Poland for incineration. It is expected to be completed by March 31, 2017.

FIGURE 9. DDT PACKED IN BAGS AND REPACKED INTO FIBCS

6. POST-SEASON ACTIVITIES

6.1 POST-SPRAY REVIEW MEETING

The AIRS project conducted a post spray evaluation meeting on 30 – 31 August 2016 to review experiences and challenges with the view of improving operations in future spray rounds. A total of 92 participants including district MFPs (33), zonal MFPs (5), district's health office vice heads (33) and zonal heads (3), IRS seasonal supervisors (3), NMCP (2) and ORHB staff (3) participated (Annex C).

The two day meeting covered presentations by zonal MFPs (4), district MFPs (3) and AIRS project technical team members (4). The presentations focused on overall performance, positive experiences and challenges in the following key areas:

- IRS planning/ spray and mobilization calendars
- IRS implementation processes, spray coverage and mobilization
- IRS quality, recruitment of spray actors and supervision
- Data management
- Environmental compliance, house preparation and waste management
- IRS logistics quantification and vehicle use
- Store management and insecticide tracking

A number of key challenges and experiences were discussed with view of attention by ORHB, district authorities and AIRS Ethiopia. Recommendations from the meeting included:

- Training conducted in 2016 including boot camp, training of master trainers and TOT was highlighted as having been critical in improving IRS performance and quality, and the meeting recommended that the training in future rounds should maintain and even improve the focus on practical skills at all levels.
- Participants recognized the importance of supervision especially direct observation of SOPs during spraying as a way of improving spray quality and reiterated the need for all supervisors to partake in this activity with commitment in future spray rounds.
- Preparation and used of spray and mobilization calendars was critical for success in the 2016 spray round and all MFPs were urged to ensure use of the same.
- The zonal and district health offices should ensure that recruitment criteria shared by ORHB is adhered to and proper screening of all spray actors including MFPs, Storekeepers, TLs, SLs and SOPs is done thoroughly to ensure that only people with integrity are recruited to avoid insecticide pilferage.
- Continued focus on mobilization for IRS through the HEWS should be evaluated to ensure full participation of the mobilizers in the activity as a way of ensuring household readiness and house preparation.
- Most districts reported difficulties with use of the CFV due to regular blockage and uneven discharge of insecticide, and AIRS will investigate this occurrence further.
- The ORHB notified 10 districts that will be graduated and will not be receiving full PMI support in 2017.

6.2 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 recorded. All empty bottles have been transferred to Addis Ababa for recycling. The project will conduct a detailed post-spray inventory of all IRS-related materials in the 36 target districts by September 30, 2016.

7. ENTOMOLOGY

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 implemented the following entomology activities in collaboration with local universities:

- Wall bioassay to assess quality of insecticide application and insecticide decay rates.
- Vector density and species composition in intervention areas.
- Vector behavior
- Insecticide resistance monitoring.

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

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 and CB IRS 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 sites. The tests were carried out using known susceptible *An. arabiansis* colonies reared in the Aklilu Lemma Institute of Pathobiology and Jimma University insectary. 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 conducted 1 to 2 days after spraying with pirimiphos methyl are shown in Table 12. Mortality of susceptible mosquitoes was 100% for all wall surfaces tested in Shebe Sombo district and all painted wall surfaces in all 4 villages. In Chewaka and Bako Tibe districts, mortality of susceptible mosquitoes was 98.3% and 98.9% for mud wall surfaces, respectively. The mortality of susceptible mosquitoes on dung wall surfaces was 98.7% in Tiro Afeta district. There was no significant difference in mortality of mosquitoes between CB IRS and DB IRS model sites on all wall surfaces sprayed. The overall mean mortality of *An. arabiensis* for time zero was 99.7% (1 - 2 days after IRS). A mean mortality after IRS of 97.8%, 95.7% and 82.4% was recorded at one, two and three months, respectively.

TABLE 12. WALL BIOASSAY RESULTS FOR PIRIMIPHOS-METHYL

Time	% Mortality of *An. arabiensis*																Overall mean
	Chewaka				Tiro-Afeta				Bako-Tibe				Shebe-Sombo				
	Dung	Mud	Painted	Mean	Dung	Mud	Painted	Mean	Dung	Mud	Painted	Mean	Dung	Mud	Painted	Mean	
T0 (June 2016)	100(60/60)	98.3(173/176)	100(118/118)	99.6	98.7(148/150)	100(150/150)	100 (60/60)	99.6	100(60/60)	98.9(177/179)	100(117/117)	99.6	100(30/30)	100(180/180)	100(150/150)	100	99.7
T1 (July 2016)	98.4(60/61)	93.4(169/181)	100(121/121)	97.3	100(121/121)	100(180/180)	100 (60/60)	100	94.9(56/59)	96.7(176/182)	100(120/120)	97.2	100(31/31)	100(185/185)	100(152/152)	100	98.6
T2 (Aug 2016)	80.6(54/67)	79.9(159/199)	99.2(131/132	86.6	90.5(105/116)	100(165/165)	100 (58/58)	96.8	63.3 (42/66)	83.5(83.5/162/194)	97.8(131/134)	81.5	93.5(29/31)	91.3(178/195)	99.4(167/168)	94.7	95.7
T3(Sept 2016)	81.7(49/60)	73.8(135/183)	96.8(12/125)	84.1	64.7(75/116)	74.3(133/179)	100(58/58)	79.7	62.3(38/61)	78.3(144/184)	96(12/126)	78.9	100(29/29)	75.9(136/179)	84.7(127/150)	86.9	82.4

NB: Figures in parenthesis indicate number of mosquitoes tested

8. Monitoring and Evaluation

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;
- 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 five 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 Malaria Focal Person Daily Summary Form.

AIRS Ethiopia uses only the Daily Spray Operator Form for data entry and analysis as a primary data source. The other three data summary forms are used by district operations supervisors to manage team and squad performance on a daily basis. 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. 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, Kebele), per spray operator, etc. These various reports required no computer knowledge or individual analysis. Hence, they were used by AIRS operations team members or FMOH supervisors to get updates and respond to spray coverage issues in real time. The data-cleaning function was used by DECs for data verification and daily data reconciliation and cleaning. The M&E team and spray supervisors also used the cleaning function to perform data verification (e.g., looking up the spray data for a specific day, SOP, or Household).

During regional and zonal TOTs, the M&E team emphasized definitions of key IRS terms and reporting indicators, compliance with M&E protocols, and proper data collection. They also trained field staff and supervisors on supervisory roles and responsibilities and data security. The M&E team was fully engaged in supervising field work 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.

One of the key tools for providing corrections in the field was the DCV form. In 2016, AIRS introduced an electronic version of the tool integrated with the existing mHealth supervisory application on smartphones. Supervisors used the tool to share information in real-time and this made the form available at all times. 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 13.

TABLE 13. USE OF DCV FORM: COMMON ISSUES AND CORRECTIVE ACTIONS

Errors/Issues Observed	Corrective Actions Taken
Missing IRS card numbers Some households did not have their IRS cards from previous years' campaigns.	The team provided reserve IRS cards during spray operations to be distributed to households needing replacement IRS cards. Additionally, the SOPs were told to emphasize to households the importance of retaining their IRS cards in a safe place.
Missing house marking pattern SLs did not consistently mark visited structures with chalk.	The M&E team and supervisors advised SLs, TLs, and field supervisors to follow the marking protocol and provided on-the-spot correction and training.
IRS cards not updated SLs were not updating the 2016 section of the IRS cards with 2016 spray information: date of spray, name and code of SOP, total # of eligible structures found and whether or not the structure was sprayed or not sprayed.	Orientation was provided to SLs to remind them to update IRS cards correctly.

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 40 DECs, one per district in 32 districts and 2 per district in four districts which had large numbers of structures. The 2016 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 retained the server-based data entry system in East Wollega zone where four DEC computers were networked to a single Structured Query Language (SQL) server. A single laptop was set up as an 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 DECs 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 Data Entry Clerks.

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, Database Manager, and IT Specialist with the help of Data Center supervision checklist facilitated data cleaning at the district level, which involved the following:

- 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;
- 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 previously. The DECs cleaned spray data daily throughout the spray campaign, with final data cleaning completed 7 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, though with some delays in some districts due to long distances between spray sites and data entry centers. SLs collected the data while TLs checked and verified data. Further checks were completed by MFPs and district IEC Officers. District DECs checked the completeness and accuracy of daily spray data variables before entering the data into the database. 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.

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.

8.6.1 Number of Structures Found, Sprayed, and Spray Coverage

A total of 717,396 structures were found by SOPs during the 2016 spray campaign across all the 36 districts. Of the structures found, 715,541 structures were sprayed, and an overall spray coverage of 99.7 percent was achieved. District-level data is presented in Table 14. In total, SOPs found 523,651 living/sleeping and kitchen structures and sprayed 521,956 (99.7%) of them. Of the total structures sprayed, living/ sleeping and kitchen structures represented 72.9% (n= 521,956) while the rest of the structures including cowsheds, toilets and others constituted 27.1% (n= 193,585). 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. Table 15 presents the spray data disaggregated by structure type.

8.6.2 POPULATION PROTECTED

A total of 1,688,745 people were protected through the project in 2016. This population includes 23,011 pregnant women and 230,690 children under five years of age. The vulnerable groups accounted for 15.0% of the total population protected through IRS.

TABLE 14. SUMMARY OF 2016 SPRAY RESULTS

Zone	District	Structures Found	Sprayed					Total Population	% Population Protected
			Structures Sprayed	Spray Coverage (%)	Population Protected	Pregnant Women	Children <5		
East Wollega	**East Wollega**	**144,636**	**144,425**	**99.9%**	**313,073**	**4,102**	**42,990**	**313,708**	**99.8%**
	Boneya Boshe	12,233	12,210	**99.8%**	22,856	325	3,211	22,934	**99.7%**
	Dega	15,748	15,623	**99.2%**	40,258	750	6,346	40,624	**99.1%**
	Gida Ayana	22,137	22,129	**100.0%**	39,922	410	4,876	39,951	**99.9%**
	Gobu Sayo	14,226	14,211	**99.9%**	26,488	161	3,009	26,506	**99.9%**
	Guto Gida	16,920	16,913	**100.0%**	34,994	532	4,815	35,028	**99.9%**
	Limmu	11,610	11,609	**100.0%**	24,447	377	2,819	24,452	**100.0%**
	Sasiga*	18,108	18,103	**100.0%**	46,954	563	6,951	46,967	**100.0%**
	Wama Hagalo	17,069	17,068	**100.0%**	42,625	697	6,766	42,633	**100.0%**
	Wayu Tuka	16,585	16,559	**99.8%**	34,529	287	4,197	34,613	**99.8%**
Ilu Aba Bora	**Ilu Aba Bora**	**83,769**	**83,568**	**99.8%**	**180,405**	**4,588**	**31,197**	**181,247**	**99.5%**
	Bedele	10,529	10,340	**98.2%**	28,073	619	5,109	28,891	**97.2%**
	Borecha	21,316	21,316	**100.0%**	37,604	1,566	7,214	37,604	**100.0%**
	Chewaka*	37,670	37,667	**100.0%**	86,004	1,933	14,747	86,007	**100.0%**
	Dedesa	14,254	14,245	**99.9%**	28,724	470	4,127	28,745	**99.9%**
Jimma	**Jimma**	**152,822**	**152,675**	**99.9%**	**393,956**	**4,306**	**53,385**	**394,356**	**99.9%**
	Kersa*	28,643	28,620	**99.9%**	73,726	835	9,952	73,795	**99.9%**
	Omonada	36,541	36,523	**100.0%**	100,110	1,138	14,345	100,126	**100.0%**
	Seka Chekorsa	24,576	24,557	**99.9%**	56,632	598	7,674	56,684	**99.9%**
	Sekoru	20,548	20,548	**100.0%**	60,687	689	8,607	60,687	**100.0%**
	Shabe Sombo	17,219	17,209	**99.9%**	38,692	303	4,782	38,713	**99.9%**
	Tiro Afeta	25,295	25,218	**99.7%**	64,109	743	8,025	64,351	**99.6%**

Zone	District	Structures Found	Sprayed					Total Population Found	% Population Protected
			Structures	Spray Coverage (%)	Population Protected	Pregnant Women	Children <5		
Kellem Wollega	**Kellem Wollega**	**104,351**	**104,282**	**99.9%**	**229,089**	**3,680**	**29,350**	**229,135**	**100.0%**
	Dale Sadi	17,815	17,815	**100.0%**	35,005	362	4,726	35,005	**100.0%**
	Dale Wabara	20,323	20,323	**100.0%**	36,585	259	4,136	36,585	**100.0%**
	Hawa Galan*	37,056	37,045	**100.0%**	100,041	2,521	14,372	100,071	**100.0%**
	Lalo Kile	13,035	12,977	**99.6%**	23,476	279	2,848	23,492	**99.9%**
	Seyo	16,122	16,122	**100.0%**	33,982	259	3,268	33,982	**100.0%**
West Shewa	**West Shewa**	**90,782**	**90,287**	**99.5%**	**212,161**	**2,401**	**27,507**	**213,783**	**99.2%**
	Bako Tibe*	19,691	19,656	**99.8%**	45,477	686	5,665	45,597	**99.7%**
	Danno	21,964	21,759	**99.1%**	51,181	360	6,936	51,891	**98.6%**
	Dendi	13,084	12,956	**99.0%**	33,670	353	4,126	34,060	**98.9%**
	Ilu Galan	20,295	20,205	**99.6%**	43,601	520	5,932	43,849	**99.4%**
	Nonno	15,748	15,711	**99.8%**	38,232	482	4,848	38,386	**99.6%**
West Wollega	**West Wollega**	**141,036**	**140,304**	**99.5%**	**360,061**	**3,934**	**46,261**	**362,500**	**99.3%**
	Babo Gamebel	18,155	18,152	**100.0%**	53,034	425	6,031	53,042	**100.0%**
	Begi	17,384	17,384	**100.0%**	50,716	707	9,003	50,716	**100.0%**
	Guliso	13,766	13,375	**97.2%**	29,237	107	2,561	30,541	**95.7%**
	Kiltu Kara	12,272	12,258	**99.9%**	30,411	160	2,344	30,473	**99.8%**
	Kondola	20,632	20,632	**100.0%**	71,865	1,543	13,891	71,865	**100.0%**
	Manasibu*	40,566	40,566	**100.0%**	82,822	758	8,856	82,822	**100.0%**
	Nejo Rural	18,261	17,937	**98.2%**	41,976	234	3,575	43,041	**97.5%**
Grand Total		**717,396**	**715,541**	**99.7%**	**1,688,745**	**23,011**	**230,690**	**1,694,729**	**99.6%**

*Community-Based districts

TABLE 15. 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 Structures Sprayed	Found	Sprayed	Found	Sprayed	Found	Sprayed	Found	Sprayed	Found	Sprayed
East Wollega	**East Wollega**	**63,153**	**63,006**	**99.8**	**46,783**	**46,731**	**22,862**	**22,852**	**8,806**	**8,806**	**3,032**	**3,030**	**144,636**	**144,425**
	Boneya Boshe	4,328	4,308	**99.5**	2,563	2,563	4,916	4,915	269	269	157	155	**12,233**	**12,210**
	Dega	7,733	7,644	**98.8**	7,093	7,059	839	837	51	51	32	32	**15,748**	**15,623**
	Gida Ayana	9,510	9,504	**99.9**	7,776	7,774	2,713	2,713	1,095	1,095	1,043	1,043	**22,137**	**22,129**
	Gobu Sayo	4,884	4,880	**99.9**	4,472	4,467	3,752	3,746	824	824	294	294	**14,226**	**14,211**
	Guto Gida	6,885	6,879	**99.9**	4,590	4,589	1,281	1,281	3,976	3,976	188	188	**16,920**	**16,913**
	Limmu	5,591	5,590	**100.0**	3,958	3,958	1,211	1,211	726	726	124	124	**11,610**	**11,609**
	Sasiga	9,762	9,760	**100.0**	5,428	5,426	1,367	1,366	1,468	1,468	83	83	**18,108**	**18,103**
	Wama Hagalo	7,323	7,322	**100.0**	5,858	5,858	3,179	3,179	134	134	575	575	**17,069**	**17,068**
	Wayu Tuka	7,137	7,119	**99.7**	5,045	5,037	3,604	3,604	263	263	536	536	**16,585**	**16,559**
Ilu Aba Bora	**Ilu Aba Bora**	**34,997**	**34,818**	**99.5**	**18,935**	**18,920**	**23,891**	**23,884**	**3,981**	**3,981**	**1,965**	**1,965**	**83,769**	**83,568**
	Bedele	6,157	5,988	**97.3**	1,759	1,745	2,390	2,384	204	204	19	19	**10,529**	**10,340**
	Borecha	6,735	6,735	**100.0**	4,832	4,832	5,604	5,604	2,816	2,816	1,329	1,329	**21,316**	**21,316**
	Chewaka	16,797	16,794	**100.0**	8,862	8,862	10,772	10,772	939	939	300	300	**37,670**	**37,667**
	Dedesa	5,308	5,301	**99.9**	3,482	3,481	5,125	5,124	22	22	317	317	**14,254**	**14,245**
Jimma	**Jimma**	**72,998**	**72,900**	**99.9**	**37,455**	**37,423**	**31,878**	**31,865**	**945**	**945**	**9,546**	**9,542**	**152,822**	**152,675**
	Kersa	12,887	12,868	**99.9**	8,636	8,632	6,196	6,196	294	294	630	630	**28,643**	**28,620**
	Omonada	16,963	16,955	**100.0**	7,229	7,225	8,198	8,194	133	133	4,018	4,016	**36,541**	**36,523**
	Seka chekorsa	11,694	11,679	**99.9**	7,167	7,164	4,000	4,000	220	220	1,495	1,494	**24,576**	**24,557**
	Sekoru	11,468	11,468	**100.0**	4,021	4,021	4,337	4,337	66	66	656	656	**20,548**	**20,548**
	Shabe Sombo	8,079	8,074	**99.9**	4,538	4,533	3,246	3,246	95	95	1,261	1,261	**17,219**	**17,209**
	Tiro Afeta	11,907	11,856	**99.6**	5,864	5,848	5,901	5,892	137	137	1,486	1,485	**25,295**	**25,218**

Kellem Wollega	**Kellem Wollega**	**46,468**	**46,456**	**100.0**	**26,962**	**26,939**	**19,907**	**19,893**	**8,418**	**8,398**	**2,596**	**2,596**	**104,351**	**104,282**
	Dale sadi	6,328	6,328	**100.0**	5,376	5,376	5,314	5,314	147	147	650	650	**17,815**	**17,815**
	Dale wabara	7,591	7,591	**100.0**	5,078	5,078	3,454	3,454	3,268	3,268	932	932	**20,323**	**20,323**
	Hawa Galan	22,268	22,261	**100.0**	8,543	8,540	5,194	5,193	902	902	149	149	**37,056**	**37,045**
	Lalo Kile	4,113	4,108	**99.9**	3,162	3,142	3,128	3,115	2,530	2,510	102	102	**13,035**	**12,977**
	Seyo	6,168	6,168	**100.0**	4,803	4,803	2,817	2,817	1,571	1,571	763	763	**16,122**	**16,122**
West Shewa	**West Shoa**	**41,412**	**41,059**	**99.1**	**25,652**	**25,566**	**18,350**	**18,309**	**1,544**	**1,543**	**3,824**	**3,810**	**90,782**	**90,287**
	Bako Tibe	9,098	9,068	**99.7**	5,335	5,331	4,424	4,423	451	451	383	383	**19,691**	**19,656**
	Danno	9,907	9,748	**98.4**	6,963	6,927	3,387	3,380	176	176	1,531	1,528	**21,964**	**21,759**
	Dendi	6,513	6,428	**98.7**	3,086	3,066	3,127	3,109	68	67	290	286	**13,084**	**12,956**
	Ilu Galan	8,528	8,477	**99.4**	5,125	5,106	5,377	5,363	270	270	995	989	**20,295**	**20,205**
	Nonno	7,366	7,338	**99.6**	5,143	5,136	2,035	2,034	579	579	625	624	**15,748**	**15,711**
West Wollega	**West Wollega**	**65,829**	**65,338**	**99.3**	**43,007**	**42,800**	**24,047**	**24,027**	**1,506**	**1,504**	**6,647**	**6,635**	**141,036**	**140,304**
	Babo Gamebel	10,482	10,480	**100.0**	4,877	4,876	1,688	1,688	176	176	932	932	**18,155**	**18,152**
	Begi	8,457	8,457	**100.0**	6,082	6,082	1,925	1,925	5	5	915	915	**17,384**	**17,384**
	Guliso	6,192	5,909	**95.4**	4,401	4,314	2,264	2,249	38	38	871	865	**13,766**	**13,375**
	Kiltu Kara	5,808	5,795	**99.8**	3,988	3,987	2,341	2,341	114	114	21	21	**12,272**	**12,258**
	Kondola	12,230	12,230	**100.0**	3,888	3,888	2,817	2,817	14	14	1,683	1,683	**20,632**	**20,632**
	Manasibu	14,787	14,787	**100.0**	14,547	14,547	9,986	9,986	39	39	1,207	1,207	**40,566**	**40,566**
	Nejo Rural	7,873	7,680	**97.5**	5,224	5,106	3,026	3,021	1,120	1,118	1,018	1,012	**18,261**	**17,937**
		324,857	**323,577**	**99.6**	**198,794**	**198,379**	**140,935**	**140,830**	**25,200**	**25,177**	**27,610**	**27,578**	**717,396**	**715,541**

8.6.3 Availability and Use of Mosquito Nets

Across the 36 districts, households reported having a total of 581,987 mosquito nets at the time the SOP visited during the 2016 spray campaign. In total, 19,118 pregnant women were reported as having slept under a mosquito net the night prior to the SOP's visit. Additionally, 198,140 children under five years of age were reported as having slept under a mosquito net the previous night (Table 16). The proportion of pregnant women and children <5 reported to have slept under a mosquito net was 83% and 86%, respectively.

TABLE 16. NUMBER AND USE OF MOSQUITO NETS

Zone	District	Total # of Mosquito Nets Found	# of Pregnant Women Sleeping Under Mosquito Nets	# of Children <5 Sleeping Under Mosquito Nets
East Wollega	**East Wollega**	**98,829**	**3,251**	**36,079**
	Boneya Boshe	7,953	227	2,577
	Dega	11,183	670	5,893
	Gida Ayana	10,400	336	4,240
	Gobu Sayo	9,564	116	2,443
	Guto Gida	10,499	452	4,270
	Limmu	6,464	151	1,444
	Sasiga	15,779	457	5,585
	Wama Hagalo	17,274	666	6,536
	Wayu Tuka	9,713	176	3,091
IluAba Bora	**Ilu Aba Bora**	**44,439**	**3,719**	**24,216**
	Bedele	8,975	572	4,919
	Borecha	15,347	1,564	7,207
	Chewaka	12,583	1,218	8,652
	Dedesa	7,534	365	3,438
Jimma	**Jimma**	**163,219**	**3,884**	**50,100**
	Kersa	23,184	694	8,668
	Omonada	41,860	1,028	13,499
	Seka Chekorsa	24,823	563	7,609
	Sekoru	27,959	650	8,362
	Shabe Sombo	17,011	283	4,631
	Tiro Afeta	28,382	666	7,331
Kellem Wollega	**Kellem Wollega**	**76,225**	**2,965**	**23,666**
	Dale Sadi	13,801	361	4,716
	Dale Wabara	11,405	168	2,562
	Hawa Galan	38,841	2,034	12,619
	Lalo Kile	6,912	241	2,051

	Seyo	5,266	161	1,718
West Shewa	**West Shewa**	**72,734**	**2,145**	**24,672**
	Bako Tibe	18,014	633	5,072
	Danno	13,023	305	6,022
	Dendi	11,697	334	4,029
	Ilu Galan	18,149	484	5,691
	Nonno	11,851	389	3,858
West Wollega	**West Wollega**	**126,541**	**3,154**	**39,407**
	Babo Gamebel	20,511	397	5,682
	Begi	21,417	704	9,000
	Guliso	10,694	68	1,403
	Kiltu Kara	9,583	138	2,107
	Kondola	14,434	988	9,678
	Manasibu	33,520	660	8,273
	Nejo Rural	16,382	199	3,264
Grand Total		**581,987**	**19,118**	**198,140**

8.6.4 Insecticide Consumption and SOP Performance Indicators

During the 2016 spray campaign the project used Actellic 300 CS (pirimiphos methyl, an organophosphate) in all 36 districts. For 8 districts (Babo Gambel, Chewaka, Gida Ayana, Hawa Galan, Ilu Galan, Kondola, Omonada, Tiro Afeta) the insecticide was being used for a second time. A total of 271,196 bottles of insecticide were consumed leaving a balance of 15,988 bottles. The expiry date of the remaining insecticide stock is March/April 2018 and AIRS Ethiopia will ensure that they will be fully utilized during the 2017 spray round. SOPs sprayed 17.3 unit structures per day and 2.6 unit structures with one unit (bottle) of insecticide. A total of 9 full bottles and 87 empty bottles were reported missing and have been reported to the police. All empty bottles in our possession were transported from the districts to Addis Ababa for recycling. Table 17 provides detailed insecticide usage and SOP performance per district.

TABLE 17. INSECTICIDE USE AND SPRAY OPERATOR PERFORMANCE

Zone		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	**East Wollega**	**17.3**	**53,155**	**6.4**	**2.7**
	Boneya boshe	17.2	4,776	6.7	2.6
	Dega	19.2	5,604	6.9	2.8
	Gida Ayana	16.9	7,487	5.7	3.0
	Gobu Sayo	17.0	5,384	6.4	2.6

	Guto Gida	20.5	5,393	6.5	3.1
	Limmu	16.0	4,371	6.0	2.7
	Sasiga	18.9	6,856	7.1	2.6
	Wama Hagalo	15.8	6,816	6.3	2.5
	Wayu Tuka	15.4	6,468	6.0	2.6
Ilu Aba Bora	**Ilu Aba Bora**	**18.5**	**31,538**	**7.0**	**2.6**
	Bedele	18.0	3,963	6.9	2.6
	Borecha	18.9	8,177	7.2	2.6
	Chewaka	18.9	13,893	7.0	2.7
	Dedesa	17.6	5,505	6.8	2.6
Jimma	**Jimma**	**16.9**	**59,283**	**6.6**	**2.6**
	Kersa	15.6	11,246	6.1	2.5
	Omonada	17.6	14,476	7.0	2.5
	Seka Chekorsa	17.8	9,569	6.9	2.6
	Sekoru	16.6	8,102	6.6	2.5
	Shabe Sombo	17.5	6,495	6.6	2.6
	Tiro Afeta	16.5	9,395	6.1	2.7
Kellem Wollega	**Kellem Wollega**	**17.9**	**40,465**	**6.9**	**2.6**
	Dale Sadi	19.3	6,953	7.5	2.6
	Dale Wabara	19.2	8,198	7.7	2.5
	Hawa Galan	18.6	13,820	6.9	2.7
	Lalo Kile	14.6	5,303	6.0	2.4
	Seyo	16.8	6,191	6.4	2.6
West Shewa	**West Shewa**	**16.5**	**35,760**	**6.5**	**2.5**
	Bako Tibe	16.8	8,088	6.9	2.4
	Danno	17.5	8,352	6.7	2.6
	Dendi	15.8	5,256	6.4	2.5
	Ilu Galan	15.3	8,088	6.1	2.5
	Nonno	16.9	5,976	6.4	2.6
West Wollega	**West Wollega**	**17.1**	**50,995**	**6.2**	**2.8**
	Babo Gamebel	17.7	7,209	7.0	2.5
	Begi	16.1	6,087	5.6	2.9
	Guliso	16.6	4,678	5.8	2.9
	Kiltu Kara	17.6	4,548	6.5	2.7
	Kondola	17.6	6,931	5.9	3.0
	Manasibu	18.0	15,472	6.9	2.6

	Nejo Rural	15.2	6,070	5.1	3.0
Grand Total		**17.3**	**271,196**[4]	**6.5**	**2.6**

[4] This is the number of empty bottles reported in our M&E database. This number differs from the number of bottles (270,228) that were physically present at the end of the spray round and are in the process of recycling. The reason for the discrepancy is that 881 bottles were reported as used but were found as full bottles in a secondary store in Borecha district. It also includes 87 missing empty bottles that remain missing. These missing bottles have been reported to the police and investigations are yet to be concluded.

9. Capacity Building and Support to FMOH

9.1 FMOH Capacity Building

In 2016, 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 environmental compliance procedures. A number of training initiatives have been conducted in entomological monitoring, environmental compliance and IRS planning and implementation.

Entomology training was conducted at the Malaria Control Training Center, Adama Town from June 7-14, 2016, with participants drawn from 6 universities. The AIRS project provides support to 6 universities (Arba Minch, Mekele, Gonder, Haromaya, Jigjiga and Jimma) in the country to conduct vector density and behavior studies and insecticide susceptibility monitoring at selected sentinel sites. A total of 26 participants, including 4 coordinators and 22 entomology assistants, attended the training which covered the following topics:

- Malaria entomology and malaria transmission
- Malaria vector sampling methods
- Identification of malaria vectors
- Vector incrimination
- WHO tube bioassay
- Cone bioassay

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 (Figure 10). The project provided support to 1staff member from ORHB to attend the environmental compliance training organized by the PMI AIRS project in Accra Ghana, April 1 – 4, 2016. The project further supported the participation of 1 staff from the FMOH in the AIRS organized regional entomology held in in Harare, Zimbabwe from June 27 – July 4, 2016.

FIGURE 10. MOLECULAR LAB SUPPORTED BY PMI AIRS PROJECT AT JIMMA UNIVERSITY

Spray operations training conducted by AIRS Ethiopia as part of TOT in 2016 enhanced the capacity of 261 FMOH staff in IRS planning and implementation. The trained TOTs in turn facilitated the training of spray operators and other actors at the district level. Besides, AIRS Ethiopia conducted boot camp to enhance the FMOH's staff competency in IRS planning and implementation as well as facilitation skills. In order to enhance spray quality all IRS training

initiatives in 2016 paid special attention to spray techniques and supervision.

10. Challenges, Lessons Learned and Recommendations

10.1 Challenges

The main challenges experienced during the IRS campaign included:

- Limited storage space at the district and health posts to accommodate the bulky Actellic bottles
- Poor store management including insecticide recording and documentation
- Network connectivity and electric power was intermittent in several districts leading to delays in data reporting
- Heavy rain during the whole period of the spray campaign led to reduced output in some districts
- Overlap of IRS operation with the Muslim fasting season was a challenge in some districts leading to reduced daily output of SOPs
- Attempts of insecticide stealing by IRS spray actors
- Home preparation in households with bulky house furniture was a challenge
- Inability of vendors to provide IRS vehicles on time

10.2 Lessons Learned and Recommendations

- Comprehensive practical training of IRS supervisors, TOTs and SOPs involved in IRS implementation with focus on spray techniques enhanced skills and spray quality. Several old standing practices regarding IRS were discussed and the appropriate technique was agreed upon.
- A cadre of master trainers (25) including AIRS staff was critical in enhancing practical training on spray techniques due to low trainer to trainee ratio (1: 5).
- Recruitment of seasonal supervisors to support training at TOT and subsequent field supervision was critical in enhancing spray quality through directly observed spraying. We recommend hiring 12 full time zonal coordinators who will be in charge of preparing and supervising four districts each during the 2017 campaign.
- Cascade training (SOPs, SLs and Porters) by TOTs following venue assessment and providing training guidelines and materials (training wall, dye) highly improve the training on spray techniques.
- Coordinated supervision by AIRS staff, seasonal supervisors, zonal MFPs, district MFPs, TLs and SLs based on training and implementation supervision plan important for improved spray quality.
- Recruitment of FMOH staff that serve as supervisors on IRS by the District Health Office should consider their availability and commitment to the activity.
- Recruit supervisors from lower levels of the district's FMOH structure (e.g. health centers) to minimize supervisor absenteeism.
- Careful planning of activities by ORHB, zonal and districts done by incorporating IRS in annual work plan for proper coordination helped reduce interference with IRS training and supervision.

- Zonal and district MFPs should share and discuss IRS progress and challenges on a regular basis with zonal/district heads to enhance their participation and support for IRS.
- Enhanced mobilization by embedding HEWs as mobilizers on IRS teams ensured better community readiness and participation in IRS.
- Adherence to recruitment guidelines developed and shared by the ORHB to districts should help to get appropriate personnel for the IRS positions.
- Recruitment of one pump technician per district to take charge of major pump maintenance and support weekly pump calibration was important in reducing spray pump issues.
- Contract agreement with vehicle suppliers and drivers should be revised to ensure that vehicle start dates are respected or otherwise penalized.
- Recruit and train seasonal AIRS storekeepers with professional experience to manage IRS stores to improve the overall quality of inventory management at district stores.
- Refurbish existing stores at district level to increase space to accommodate the large volume of Actellic.
- Involve district administration and security representatives in IRS planning and operations to provide oversight supervision of district IRS teams.

Annex F provides a detailed description of actions undertaken in 2016 aimed at improving IRS training; spray quality, supervision and mobilization.

ANNEX A: 2016 IRS PROCUREMENT

TABLE A-1. PPE AND OTHER SUPPLIES PROCURED

Items	36 Districts (30 DB IRS & 6 CB IRS)	24 Graduated Districts	Non-PMI Districts	Total
International Procurement				
Actellic 300CS (833ml Bottles)	280,000			280,000
Ceramic Nozzle Tips (8002E)	2,000	1,500	1,500	5,000
Gaskets for CFV	2,000			2,000
Control Flow valves (CFV)	2,000			2,000
Rubber Gloves - short (pair)	3,048	2,500	2,500	8,048
Rubber Gloves – medium (pair)	2,000	2,500	2,500	7,000
Mouth/nose masks (pieces)	83,250	28,500	45,000	156,750
Spray pumps	100	60	60	220
Helmets		500	1,000	1,500
Face sheilds		500	1,000	1,500
Laptops for data entry	16			16
Local Procurement				
Aprons	24			24
Coveralls	800	1,500		2,300
Washing basins	14			14
Funnels	43			43
Warning sign – stores	15			15
Duffle bags	29			29
Tool kits	57			57
Water tank 2000L	6			6
Bathing soap	28,080			28,080
Laundry Soap	10,500			10,500
Mattresses	40			40
Candles (box of 8)	509			509
Flashlights (Torches)	1,750			1,750
Neck protection	3,040			3,040
Spray bags	1,575			1,575
IRS cards (pieces)	199,655			199,655
Training wall made of canvas	4			4
M&E formats & Checklists	95,234			95,234
Batteries for flashlights (pairs)	3,500			3,500

ANNEX B: INSPECTION REPORTS AND SUPERVISION RESULTS

2016 MID- AND POST-SPRAY INSPECTION REPORTS

INTRODUCTION

The IRS Ethiopia project conducted 2016 spray operations from June 28 to August 5 for all 36 PMI-supported districts. The project used two models of IRS to deliver the service to the 36 project districts: district-based IRS (DB IRS – 30 districts) and community-based IRS (CB IRS – 8 districts) delivered through the national health extension program.

The entire AIRS Ethiopia technical team, including Spray Operations Coordinator, Operations Manager, M&E Manager, and M&E coordinator, was involved in environmental compliance inspections. The team members divided six zones and 36 project districts among themselves to conduct supervision and pre-, mid-, and post-spray inspection of the spray campaign to all districts. In addition to the AIRS supervisors, four seasonal supervisors were recruited to strengthen the quality of the operation and were involved in EC inspections.

During the supervision and environmental inspection visits, the team used AIRS project-wide 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 health teams supervising IRS 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.

OBJECTIVES OF INSPECTIONS

The objective of conducting mid- and post-spray environmental compliance activities during the 2016 IRS operation in Ethiopia was to:

- Ascertain the level to which the Ethiopian IRS operation is compliant with USAID's Pesticide Procedures specified in Federal Regulations 22CFR216, the Ethiopia IRS PERSUAP/SEA, and the IRS guidelines;
- Work with the district, zonal, and regional health offices and Federal Ministry of Health to observe progress of IRS activities, and determine and document whether the recommendations and procedures established during the previous inspections are being followed;
- Assess the logistics systems to ensure that adequate supplies exist and that processes to prevent pilferage ("leakage")/misuse of insecticides outside of the AIRS spray campaign are in place;
- Ensure that the safe use of the insecticide, including handling of the chemicals, safe distribution, and other safety procedures are maintained;
- Evaluate stock and inventory management system in the district stores; and
- Observe SOPs' compliance with best IRS management practices in project spray sites.

GENERAL OBSERVATION

In 2016, all the soak pits in DB IRS districts and CB IRS districts were inspected by district malaria focal persons and AIRS supervisors prior to the start date of spraying operation. 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 ongoing smoke and ash testing by Addis Ababa University confirms that it is safe to use the facility in the current location.

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. Mobile soak pits were used in some sites as an alternative where there was likelihood of soak pit flooding due to high water table.
- Most district stores did not have the capacity to hold the large volume of actellic bottles hence stacking of insecticide cartons did not adhere to standard guidelines. This is an urgent need to consider making extension to existing facilities.
- 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 and in a few cases where this was not done, SOPs and SLs provided support.
- The 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 DIGA DISTRICT 2016

AREAS FOR IMPROVEMENT

INSECTICIDE TRACKING

Even though the bulkiness of Actellic 300CS is recorded as a challenge, it has presented an opportunity to accurately count and track each bottle utilized in the operation. The weekly insecticide reconciliation by AIRS supervisors made it possible to identify stock variance early enough for remedial action to be taken. This approach will be extended to the district and zonal MFPs as a key responsibility in the next spray round. To achieve this, MFPs will undertake sessions on store management during TOT. To ensure that no obsolete insecticide accumulated in the districts, the AIRS supervision team confirmed that the entire Actellic stock balance from the 2015 spray round was exhaustively used before utilization of the 2016 stock. The same approach will be conducted in the next spray round.

To be able to better track insecticide distribution to the districts, the AIRS Ethiopia project plans to have district MFPs or storekeepers collect their stock of insecticide directly from the warehouse in Addis Ababa.

POST-SPRAY ACTIVITIES AND INSPECTIONS

Contaminated IRS wastes (empty bottles, cartons and used masks) from districts were collected to the central warehouse.

- PPEs 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.
- Soak pits are cleaned 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

- Due to limited insecticide storage space at district stores leading to stacking of insecticide above the recommended 2 meter height, the project should invest in expanding existing stores.
- Space availability and security was a challenge at some health posts. The district health management team and AIRS should explore availability and use of storage space at health centers.
- AIRS project consider recruitment of seasonal storekeepers whom the project can have control over. These seasonal storekeepers will work under the supervision of AIRS staff and MFPs.

TABLE B-1. ENVIRONMENTAL MITIGATION AND MONITORING REPORT

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
1a. Pre-contract inspection and certification of vehicles used for pesticide or spray team transport	A total of about 101 transport vehicles were inspected and approved for use following the screening done from 20th June up to 15th July 2016. Two types of vehicles were hired for the operation i.e. Long base vehicles and mini trucks. The major challenges encountered include scarcity of long base vehicles on the market because of other competing campaigns. For example, there was a famine relief campaign that occupied a huge number of these vehicles. The other limitation noticed was the weak reinforcement of seats on the mini trucks.	All of the trucks with the above mentioned limitation were sent back to fix the gaps and they were corrected accordingly.	An alternative mitigation measure used was to replace long base vehicles with mini trucks in a few areas. All vehicles that fulfilled the required criteria were provided with a certificate that showed they met the criteria needed to be used for the IRS campaign. Because the logistics coordinator encountered a medical problem during the spray campaign, only 45 checklists were filled using the smart phone for the vehicle screening. The remaining 56 inspections were conducted by other support staff using paper forms.
1b. Driver training	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.

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
1c. Cell phone, personal protective equipment (PPE) and spill kits on board during pesticide transportation.	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. This will also be done in the upcoming spray campaign.	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.
1d. Initial and 30-day pregnancy testing for female candidates for jobs with potential pesticide contact.	All prospective female actors undertook a pregnancy test prior to the start of IRS. Two female candidates tested positive.	Except for a few districts where the project provided pregnancy test kits almost all districts provided the test kits.	As the spray campaign lasted a maximum of 32 days, second round pregnancy test was not done
1e. Health fitness testing for all operators	In 2016 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, 10 people were found to be unfit for the operation (4 due to chronic medical conditions and 6 due to physical fitness). The individuals found to be unfit did not participate in the operation	In addition, SLs conducted daily health check screening for members of their squad. One SOP reported to be allergic in Kersa district so he/she switched to the porter position.
1f. Procurement of, distribution to, and training on the use of PPE for all workers with potential pesticide contact.	Use of PPE was incorporated in to all trainings provided in 2016. SOPs were provided with a pair of neck protection.	International procurement was late but they arrived in time for the start of the spray campaign.	In preparation for the next spray campaigns, we plan to ensure completion of the procurement activity in well before the start of the spray season.

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
1g. Training on mixing pesticides and the proper use and maintenance of spray pumps.	Training on mixing of insecticide (Actellic 300CS) was done at TOT and during cascade training and no mistakes in mixing were encountered during supervision visits during the spray campaign.	No outstanding issue related to this point.	Besides the inclusion of a basic spray pump maintenance session in the TOT and cascade trainings, all districts hired a dedicated spray pump technician throughout the operation period.
1h. Provision of adequate facilities and supplies for end-of-day cleanup.	In addition to the fixed soak pits in 78 district-based operational sites and 120 CB-based district sites, 20 MSPs were used in areas that could have potentially experienced challenges due to high water tables. 14 MSPs were successfully used in different sites.	MSPs were used in three sites because they were hard to reach.	Of 133 total inspections done using the smartphone, 36 inspections showed non-compliance due to limited space forcing stacking of insecticide at a height of more than 2 meters. Each operational site had at least some storage facility, though not adequate.
1i. Enforce spray and clean-up procedures.	The standard triple rinsing procedures were demonstrated at all levels of training and they were practiced during the spray campaign. An eighth small bucket was used to rinse CFVs.	No outstanding point with this matter.	
2a. IEC campaigns to inform homeowners of responsibilities and precautions.	This year, mobilizers were deployed by the project to convey clear information to the households. Out of the 522 smartphone inspections, only 39 households responded that they were not notified of the actual date of the spraying.	No outstanding point with this matter.	Engaging mobilizers in the operation has contributed to better participation of the community.
2b. Prohibition of spraying houses that are not properly prepared.	SOPs and Squad Leaders were trained on how to prepare structures before spraying was done. Out of 522 inspections captured by the smart phone, 16 were non-compliant with the procedure.	No outstanding point with this matter.	In all non-compliant cases, actions were taken to address the situation including covering immovable materials with plastic sheets.

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
2c. Two-hour exclusion from house after spraying	Of the 522 home owner 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.	In order to meet the daily output of 16 structures per SOP per day, there was an attempt to spray until the late in the afternoon which did not give spray actors enough rest time after work..	The key messages were adequately communicated. There might be a need to consider the daily output expected of SOPs per day.
2d. Instruct homeowners to wash itchy skin and go to health clinic if symptoms do not subside.	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.	No outstanding point with this matter.	
3a. Indoor spraying only.	SOPs sprayed the indoor walls of living structures. This included inner walls, ceiling, and eaves of all sleeping rooms, kitchens, toilets and animal sheds.		10 incidents of the 522 inspections reported SOPs spraying wrong surfaces. The SOPs were immediately provided with guidance.
3b. Training on proper spray technique	Unlike the previous rounds, training on proper spray techniques was conducted. Out of 522 observations, 31 SOPs sprayed at the wrong distance from the wall and were corrected on the spot.	Intensive training should continue to keep the quality of spraying high.	Based on this years' experience, intensive training focused on practical sessions and supported by direct supervision led to improved quality of spraying.
3c. Maintenance of pumps	Besides the dedicated pump technicians, SOPs, Supervisors, and Team Leaders were trained on pump maintenance. Pumps were checked daily before use. The parts of pumps that were found to be faulty were replaced.	Dedicated pump technicians were helpful for operation and are recommended for next year.	On 43 occasions, pumps were found to be leaking. Immediate maintenance of the pumps was done.
4a. Choose sites for disposal of liquid wastes, including mobile soak pit sites, according to PMI BMPs.	Though the sites selected for soak pit construction met the BMP requirement, new constructions of housing/ offices are unacceptably approaching the soak pit sites after the installation of it.	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.

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
4b. Construct fixed and mobile soak pits with charcoal to adsorb pesticide from rinse water.	All soak pits were constructed with five layers including sawdust, charcoal, bigger stones, smaller stones, and gravel as the top layer. They were sloped 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 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.
4c. Maintain soak pits as necessary during season.	Soak pit maintenance is done on yearly basis.	Durable fencing material, like wire mesh, would help to reduce frequent maintenance work on the soak pit and temporary showers.	
4d. Inspection and certification of solid waste disposal sites before spray campaign.	Solid contaminated wastes generated in the operation, including empty bottles, cartons and used masks, were collected for management at the central level. Incineration of the used masks at the project's incinerator is on hold awaiting results of smoke and ash analysis being conducted by Addis Ababa university. An MOU with companies for recycling empty bottles and cartons was done.	Some amount of worn-out gloves was collected from districts to the central warehouse. The gloves are stored at the warehouse seeking alternative disposal mechanism as recyclers could not accept them for recycling.	
4e. Monitoring waste storage and management during campaign.	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 final disposal of the worn-out gloves.	
4f. Monitoring disposal procedures post-campaign.	The AIRS Ethiopia ECO is monitoring the post-spray campaign solid waste disposal including incineration of used masks, and recycling of the empty bottles and cartons.	The smoke and ash analysis result of Addis Ababa University will pave the way for incineration of the used masks at the project incinerator. The project is sourcing incineration services at one hospital in Addis Ababa.	

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
5a. Maintain records of all pesticide receipts, issuance, and return of empty sachets/bottles.	Records of all pesticide receipts, issuance, and returned empties are being kept on stock cards with a backup in a ledger.	No outstanding issue on this point.	
5b. Reconciliation of number of houses sprayed vs. number of sachets/bottles used.	AIRS and temporary supervisors conducted regular insecticide reconciliation to avert misuse. A few cases of missing OP was discovered and responsible persons are under investigation.	The discrepancies noticed are still under follow-up.	
5c. Visual examination of houses sprayed to confirm pesticide application.	Direct observation of the house spraying to ensure high spray quality was conducted during the 2016 spray round.	Direct supervision is encouraged.	
5d. Perform physical inventory counts during the spray season.	149 store checks were conducted during the spray campaign. AIRS supervisors conducted the inspection frequently to ensure proper recording/ tracking of material movement.	Close-out inventory was conducted in September 2016.	

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	SQL	TL,	DHead	DMFP	ZMFP	EC	IEC	AIRS staff

II. Vital signs			
	Within the Acceptable Range		
	Yes	No	Remark
- Body temperature			
- Pulse rate			
- Respiratory rate			
- Blood Pressure			
	Capable to Carry on the Challenge of IRS Operation		
III. Physical Examination	Yes	No	Remark
- Musculo-skeletal system			
- Vision acuity			
- Auditory acuity			
- Speech acuity			
- General Physical Fitness			
IV. Laboratory Investigation (for females)	Pregnancy status		
	+ve	-ve	Remark
- Hcg test result			
V. History of chronic or acute illness	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 2016 POST-IRS EVALUATION MEETING

The project organized a post-spray meeting to evaluate the implementation of the 2016 IRS campaign and document lessons learned from the process. The meeting was held in Adama (East Showa Zone) on August 30 - 31, 2016. The participants were malaria focal persons (MFPs) and district health office heads from the 36 project districts, zonal MFPs; zonal health office heads or vice heads from the six project zonal health offices, representatives from the Oromia Regional Health Bureau (ORHB) and NMCP, Seasonal IRS supervisors and AIRS Ethiopia office staff. A total of 92 participants attended the evaluation meeting.

TABLE C-1: 2016 POST-IRS EVALUATION MEETING PARTICIPANTS

Areas	Professional category	Sex			Remarks
		M	F	Total	
Project districts	Malaria Focal Person	33	2	35	1 absent
	Health office head/deputy	33	1	34	2 absent
Project zones	Malaria Focal Person	5	0	5	1 absent
	Health office head/Deputy	3	0	3	3 absent
Seasonal IRS supervisor	AIRS Supervisor	3	0	3	1 absent
ORHB	Malaria experts	3	0	3	
FMOH	NMCP Malaria Control Experts	2	0	2	
AIRS staff	Technical staff	6	1	7	
Total		**88**	**4**	**92**	

Main agenda items included:

- Opening Remarks by NMCP, and opening Speech by ORHB representatives;
- Presentations on IRS implementation and current malaria situation by 4 zonal MFPs;
- Presentations on IRS implementation by 2 MFPs (DB IRS) and 1 MFP (CB IRS) to share experiences and challenges;
- AIRS technical staff presentations on spray operations, EC, Entomology, Logistics, M&E, Finance and Administration).
- Discussions and recommendations.

The presentation and discussions indicated that:

- The 2016 IRS Operation was a success with high coverage and great improvement in spray quality;

- Spray quality was maintained due to intensive practical training delivered at all levels and that every effort should be made to maintain the training focus, and that greater attention should be given to further improving training in the CB IRS model;
- The rigorous supervision employed with focus on direct observation of spray operators (DOS) and adherence to supervision plans was critical to improving quality of IRS and should be maintained;
- The role played by AIRS technical team and IRS seasonal supervisors was appreciated as this afforded close supervision and strengthened the capacity of district MFPs to deal with challenges encountered during the campaign;
- Payment of spray actors during IRS cascade training through Commercial Bank of Ethiopia should be considered for the 2017 spray round to avoid interference with the training program.
- The NMCP, ORHB, 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.
- Limited storage space for Actellic was highlighted as a major challenge in most districts and especially in CB IRS districts and a solution needs to be found;
- Zonal MFPs indicated that there has been a notable decrease in malaria cases in the project zones over the past five years, and attributed this to USAID/ PMI support for IRS, and the 10 districts earmarked for graduation in 2017 were encouraged to build on the support.

Challenges and lessons learned:

- Training to enhance spray actors skills and supervision are critical for improved quality IRS with regard to maintaining correct nozzle distance, speed and rhythm and should be maintained;
- The size of the store at districts was too small to accommodate insecticide especially at health posts in CB IRS kebeles and improvement of storage should be given due attention by district office/ Government;
- Timely daily reporting and submission of spray data as per data flow protocol has to be adhered to and the meeting called on MFPs and supervisors to keep clear of dishonesty as witnessed in Borecha District;
- Poor network connectivity necessitating travel of DECs to distant locations was noted as a challenge to smooth data entry and reporting;
- Gaps in community mobilization were noted in some districts due to competing priorities of HEWs during IRS implementation. The MFPs were advised to carefully plan for mobilization and fully involve community leaders;
- Attempts to steal insecticide and loss (9 bottles) were reported in some districts. The district MFPs and store keepers would bear full responsibility in future spray rounds and should ensure appropriate use of insecticide tracking system;
- Issues related to CFV including regular blockage and uneven insecticide discharge were raised. AIRS team promised to seek guidance on CFV functionality and learn from experiences in other AIRS countries.

ANNEX D: DATA COLLECTION AND QUALITY ASSURANCE TOOLS

TABLE D-1. ETHIOPA IRS 2016 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 squad leaders (SLs) during spray operations to capture structures found, structures sprayed and not sprayed, population protected and not protected, and mosquito net and insectcide information. This tool also captures geography, spray actors' names and codes, household names, IRS numbers, structures type, 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 team leaders (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	Purpose: • To check the completeness and correctness of data collected in the field. • To highlight common data collection errors so they can be quickly identified with corrections being made and retraining provided by the supervisor. Used in the field post-data collection by: • TLs on daily basis to check 50% of the forms filled by the spray operators (SOPs) under their supervision. • Information, education and communication (IEC) supervisor each day to check 37.5% of the forms filled by SOPs under his/her supervision. • District MFP each day checks 12.5% of the forms filled by SOPs under his/her supervision.
Data Collection Verification (DCV) Form	Purpose: • To check the accuracy of data collected in the field, i.e., ensure that the data written on the Daily Spray Operator Forms match the information reported by households and/or the data recorded on the IRS Cards disseminated to households. Used during field audits by:

Data Quality Assurance Tool	Purpose and Usage
	• AIRS M&E and Database Managers • AIRS Operations Manager • AIRS Spray Operations Coordinator • Zonal District MFPs • District Heads and Deputies • District Environmental Compliance Experts
Data Entry Site Supervision Checklist	Purpose: • To check the application of data entry and documentation protocols and provide on-the-spot support to data entry clerks (DECs) Used during visits to data entry centers by: • M&E Manager • Database Manager • IT Specialist

TABLE D-3. DATA QUALITY ASSURANCE AND CONTROL

Quality Assurance/ Quality Control Issue	Method/Tools for Quality Assurance
Spray data integrity	• Used standardized data collection forms • Comprehensive training for spray data capture and protocols • Multiple levels of supervision • SOPs are supervised directly by their SL and TL ▪ Supervisors monitor TLs and verify Daily Spray Operator Forms. ▪ TLs, and IEC and EC experts monitor and verify data capture by SLs. ▪ District MFP verifies and run random spot checks on data collection. • Use of EE and DCV forms to ensure complete and accurate data collection
Spray data entry and management	• Data entry training for all DECs and spray supervisors • Prompt field data entry and transfer; data collection forms arrive at data entry sites daily and data entry is done on a daily basis • Data verification via double-data entry system ▪ Initial data entry of totals per data collection form ▪ Follow-up entry of detailed data, i.e., per individual household • Use of Microsoft Access-based IRS Cleaning/Reporting tool to clean data on a daily basis • Database designed with locks and validation checks
Data security	• Paper data collection forms stored systematically in binders and filed at district level for permanent reference • Database designed with passwords to restrict unauthorized entry • Databases backed up daily on the data entry server laptop, on Sugar Sync, and on external pen drives every day

TABLE D-4. HUMAN RESOURCES HIRED BY DISTRICT AND TYPE FOR THE 2016 SPRAY ROUND

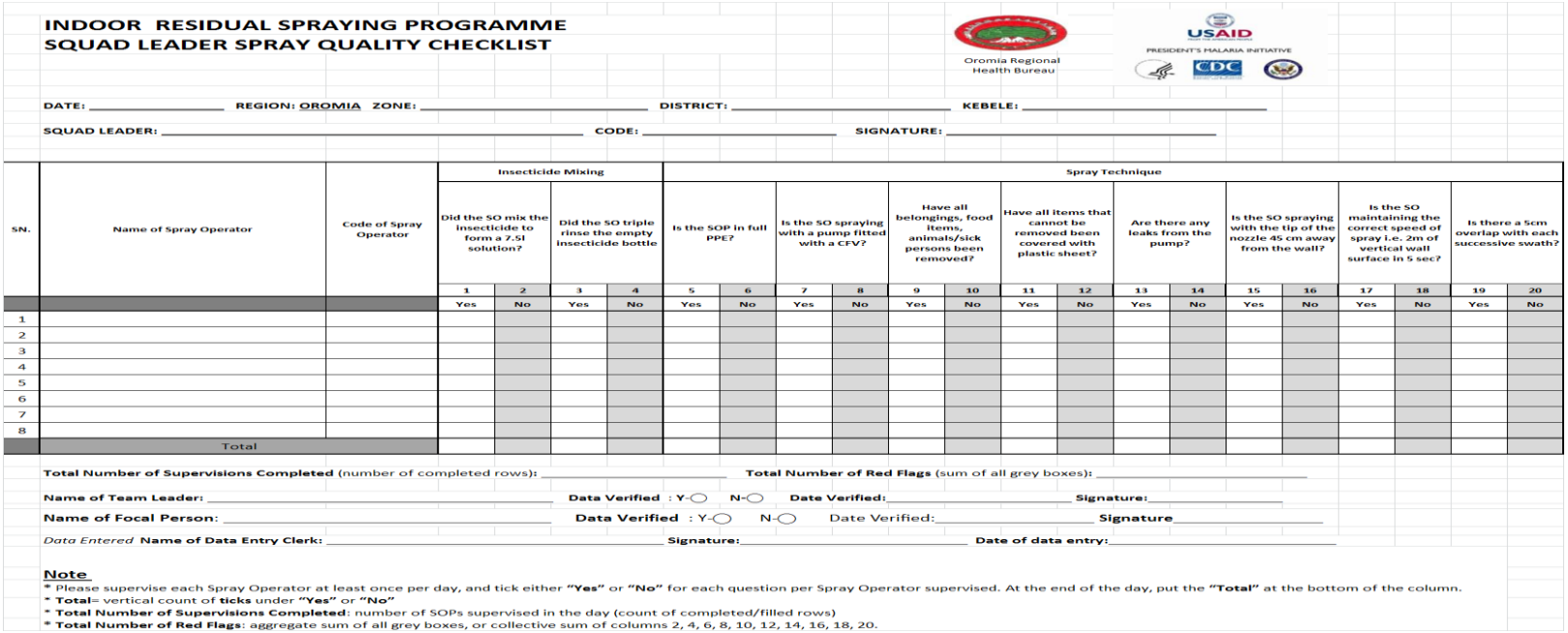
District	Team leaders			Squad leaders			Spray operators			Porters			Washers			Security guards			Water fetchers			Store assistants			Data entry clerks			Drivers		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Diga	2	0	2	5	2	7	22	6	28	0	7	7	0	2	2	1	0	1	1	0	1	1	0	1	0	1	1	3	0	3
Sasiga	CB IRS			0	20	20	36	0	36	0	9	9	0	0	0	10	0	10	0	0	0	1	0	1	0	1	1	1	0	1
Gida Ayana	2	0	2	7	3	10	40	4	44	0	10	10	0	3	3	2	0	2	2	0	2	1	0	1	1	0	1	4	0	4
Boneya Boshe	2	0	2	6	0	6	24	0	24	2	4	6	1	1	2	1	0	1	2	0	2	0	1	1	1	0	1	2	0	2
Wama Hagalo	2	0	2	9	0	9	36	0	36	2	7	9	0	2	2	2	0	2	2	0	2	0	1	1	1	0	1	3	0	3
Guto Gida	1	1	2	4	3	7	28	0	28	0	7	7	0	2	2	2	0	2	2	0	2	1	0	1	1	0	1	3	0	3
Gobu Sayo	1	1	2	7	0	7	28	0	28	7	0	7	1	1	2	2	0	2	2	0	2	1	0	1	1	0	1	2	0	2
Limu	2	0	2	5	1	6	23	1	24	0	6	6	0	3	3	2	0	2	2	0	2	1	0	1	1	0	1	3	0	3
Wayu Tuka	1	1	2	4	5	9	34	2	36	0	9	9	0	2	2	2	0	2	2	0	2	1	0	1	0	1	1	3	0	3
Manasibu	CB IRS			5	44	49	100	0	100	17	8	25	0	0	0	26	0	26	0	0	0	1	0	1	2	0	2	1	0	1
Kondala	2	0	2	9	0	9	38	0	38	7	2	9	0	3	3	3	0	3	3	0	3	1	0	1	1	0	1	3	0	3
Begi	2	0	2	9	0	9	36	0	36	4	5	9	0	3	3	3	0	3	3	0	3	1	0	1	0	1	1	3	0	3
Guliso	2	0	2	7	0	7	28	0	28	4	3	7	0	2	2	2	0	2	2	0	2	0	1	1	1	0	1	3	0	3
Kiltu Kara	1	1	2	5	1	6	24	0	24	5	1	6	0	2	2	2	0	2	2	0	2	1	0	1	1	0	1	3	0	3
Nejo Rural	2	0	2	9	1	10	40	0	40	0	10	10	0	3	3	3	0	3	3	0	3	0	1	1	1	0	1	3	0	3
Babo Gambel	2	0	2	7	2	9	36	0	36	5	4	9	0	2	2	3	0	3	2	1	3	1	0	1	1	0	1	3	0	3
Dendy	2	0	2	2	5	7	28	0	28	7	0	7	2	0	2	2	0	2	2	0	2	1	0	1	1	0	1	2	0	2
Danno	2	0	2	9	1	10	40	0	40	0	10	10	0	2	2	2	0	2	2	0	2	0	1	1	1	0	1	4	0	4
Nonno	1	1	2	5	3	8	32	0	32	1	7	8	0	2	2	2	0	2	1	1	2	1	0	1	1	0	1	3	0	3
Ilu Galan	3	0	3	11	0	11	40	4	44	0	11	11	0	3	3	3	0	3	3	0	3	0	1	1	1	0	1	4	0	4

Bako Tibe	CB IRS			1	26	27	56	0	56	10	4	14	0	0	0	16	0	16	0	0	0	1	0	1	1	0	1	1	0	1
Sekoru	2	0	2	10	0	10	40	0	40	10	0	10	0	2	2	2	0	2	1	0	1	0	1	1	1	0	1	4	0	4
Omo Nada	3	1	4	16	0	16	64	0	64	9	7	16	0	4	4	4	0	4	4	0	4	1	0	1	2	0	2	5	0	5
Tiro Afeta	2	1	3	11	2	13	50	3	53	0	13	13	0	3	3	3	0	3	2	0	2	1	0	1	1	0	1	4	0	4
Kersa	CB IRS			0	40	40	80	0	80	19	1	20	0	0	0	5	15	20	0	0	0	1	0	1	0	1	1	1	0	1
Seka Chekorsa	3	0	3	11	0	11	44	0	44	10	1	11	0	3	3	3	0	3	1	0	1	1	0	1	0	1	1	4	0	4
Shebe Sombo	2	0	2	8	0	8	32	0	32	4	4	8	1	1	2	2	0	2	2	0	2	1	0	1	1	0	1	4	0	4
Lalo Kile	2	0	2	7	1	8	32	0	32	7	1	8	0	2	2	2	0	2	2	0	2	1	0	1	1	0	1	3	0	3
Dale Sadi	2	0	2	0	8	8	32	0	32	8	0	8	0	2	2	2	0	2	2	0	2	1	0	1	1	0	1	3	0	3
Dale Wabara	2	1	3	5	5	10	40	0	40	1	9	10	0	3	3	3	0	3	0	3	3	0	1	1	1	0	1	4	0	4
Hawa Galan	CB IRS			3	38	41	88	0	88	19	3	22	0	0	0	24	3	27	0	0	0	1	0	1	2	0	2	1	0	1
Seyo	2	0	2	8	0	8	32	0	32	0	8	8	1	1	2	2	0	2	2	0	2	0	1	1	1	0	1	3	0	3
Chewaka	CB IRS			14	42	56	112	0	112	12	16	28	0	0	0	15	12	27	0	0	0	1	0	1	2	0	2	1	0	1
Borecha	2	0	2	10	0	10	40	0	40	3	7	10	0	3	3	3	0	3	3	0	3	1	0	1	1	0	1	2	0	2
Dhedessa	2	0	2	7	0	7	28	0	28	0	7	7	0	2	2	2	0	2	2	0	2	1	0	1	1	0	1	3	0	3
Bedele	1	0	1	5	0	5	20	0	20	5	0	5	0	1	1	1	0	1	1	0	1	1	0	1	0	1	1	2	0	2
Total	**57**	**8**	**65**	**241**	**253**	**494**	**1503**	**20**	**1523**	**178**	**201**	**379**	**6**	**65**	**71**	**164**	**30**	**194**	**60**	**5**	**65**	**27**	**9**	**36**	**33**	**7**	**40**	**101**	**0**	**101**

Note: CB IRS =Community-Based IRS

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	Purpose: • To make sure Spray Operators follow BMP and are immediately corrected if they are not • Ensure any gaps identified during the previous day are corrected, and any consistent or ongoing issues are escalated • Document gaps identified daily and bring it for the morning briefing session • SLs (4 SOPs) and TLs (16 SOPs) are expected to directly observe Spray Operators daily and twice weekly respectively Used during IRS by: • Squad Leaders, • Team Leaders, • Malaria Focal Person (uses the summary data for decision-making and rapid error correction)



INDOOR RESIDUAL SPRAYING PROGRAMME
SQUAD LEADER SPRAY QUALITY CHECKLIST

Oromia Regional Health Bureau

USAID PRESIDENT'S MALARIA INITIATIVE CDC

DATE: _____ **REGION:** OROMIA **ZONE:** _____ **DISTRICT:** _____ **KEBELE:** _____

SQUAD LEADER: _____ **CODE:** _____ **SIGNATURE:** _____

SN.	Name of Spray Operator	Code of Spray Operator	Insecticide Mixing				Spray Technique															
			Did the SO mix the insecticide to form a 7.5l solution?		Did the SO triple rinse the empty insecticide bottle		Is the SOP in full PPE?		Is the SO spraying with a pump fitted with a CFV?		Have all belongings, food items, animals/sick persons been removed?		Have all items that cannot be removed been covered with plastic sheet?		Are there any leaks from the pump?		Is the SO spraying with the tip of the nozzle 45 cm away from the wall?		Is the SO maintaining the correct speed of spray i.e. 2m of vertical wall surface in 5 sec?		Is there a 5cm overlap with each successive swath?	
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1																						
2																						
3																						
4																						
5																						
6																						
7																						
8																						
	Total																					

Total Number of Supervisions Completed (number of completed rows): _____ **Total Number of Red Flags** (sum of all grey boxes): _____

Name of Team Leader: _____ **Data Verified** : Y-◯ N-◯ **Date Verified:** _____ **Signature:** _____

Name of Focal Person: _____ **Data Verified** : Y-◯ N-◯ Date Verified: _____ **Signature** _____

Data Entered **Name of Data Entry Clerk:** _____ **Signature:** _____ **Date of data entry:** _____

Note

* Please supervise each Spray Operator at least once per day, and tick either **"Yes"** or **"No"** for each question per Spray Operator supervised. At the end of the day, put the **"Total"** at the bottom of the column.
* **Total**= vertical count of **ticks** under **"Yes"** or **"No"**
* **Total Number of Supervisions Completed**: number of SOPs supervised in the day (count of completed/filled rows)
* **Total Number of Red Flags**: aggregate sum of all grey boxes, or collective sum of columns 2, 4, 6, 8, 10, 12, 14, 16, 18, 20.

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: ETHIOPIA MONITORING AND EVALUATION PLAN INDICATOR MATRIX

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
1.1.1 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	1; 100%	1 order[5]; 100%	1; 100%	1 order; 100%	TBD; 100%	

[5] Actellic 300CS (87,372 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
1.1.2 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	1; 100%	1 order; 100%	1; 100%	1 order; 100%	TBD; 100%	
1.1.3 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	1; 100%	1 order[6]; 100%	1; 100%	1[7]; 100%	TBD; 100%	

[6] Ceramic Nozzle Tip, Washer for CFV, Control Flow Valve (CFV), Gumboots, Rubber Gloves, Mouth/nose masks

[7] 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)

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
1.1.4 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	1; 100%	1 order[8]; 100%	1; 100%	1[9]; 100%	TBD; 100%	
1.1.5 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	
1.2 In-Country Exemption and Custom Clearance Process								
1.2.1 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	
1.3 In-Country Logistics, Warehousing, and Training								
1.3.1 Number and percentage of logistics and warehouse managers trained in IRS supply	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	TBD; 100%	

[8] 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

[9] 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

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
chain management								
1.3.2 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[10]; 36 district stores, 2 central warehouses	38; 100%	38; 36 district stores, 2 central warehouses	TBD; 100%	
1.3.3 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	In Progress	TBD; 100%	
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	
2.1.2 Percentage reduction in project operational expenses	Data source: Project financial records	By Spray Campaign	5%	7.5%[11]	5%	5%	5%	

[10] In 2015 AIRS used 2 central warehouses
[11] Plan=$4.94, Actual=$4.57; save $0.37

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
per structure from the previous year, excluding insecticide costs	Reporting frequency: Annually							
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	
2.2.2 Number of spray personnel trained in environmental compliance and personal safety standards in IRS implementation	Data source: Project records – Training reports Reporting frequency: Each spray season	By Spray Campaign By Gender	2,584	3,178[12]; Male=2,588 Female=590	3,060[13]	3,057[14] Male= 2,456 Female= 601	TBD	

12 ToT Participants 255, SQL=484, SOP=1511, Porter=495, Washer=69, Driver=102,Guard=191, Store keeper=35 and Store keeper assistant=36
13 ToT Participants 234, SQL=498, SOP=1513, Porter=380, Washer=72, Driver=101,Guard=190, Store keeper=36 and Store keeper assistant=36
14 ToT Participants 223, SQL=494, SOP=1523, Porter=379, Washer=71, Driver=101,Guard=194, Store keeper=36 and Store keeper assistant=36

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
2.2.3 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	TBD	
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[15] (occupational exposure)	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% CB IRS districts: 120 soak pits;	DB IRS: 61Soakpits; 93.8% 2 Central werhouses; and 30 Store rooms; 100% CB IRS: 120 Soakpits; 100% and 6 Store	DB IRS: 78 soak pits; 100% and 30 store rooms; 100% CB IRS: 120 soak pits; 100%; 6 stores 100% 2 central	DB IRS: 78[16] Soakpits; 100% 30 Store rooms; 100% CB IRS: 120 Soakpits; 100% and 6 Store rooms; 100% 2 central	TBD; 100%	

[15] A Spray Operator was identified as being allergic to the insecticide and changed to porter

[16] 55 soak pits were lined with plastic sheet on the sides to prevent any potential side leakage of effluent into the environment

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Year 1		Year 2			
			Target	Results	Target	Results	Target	
			100%; 6 stores 100%	rooms; 100%	warehouses	warehouses		
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[17]	N/A	N/A	N/A	TBD	
2.3.2 Number of IRS print materials disseminated	Data source: Project records Reporting frequency: Semi-annually	By Spray Campaign By Type of printed materials & messages	N/A	N/A[18]	N/A	N/A	N/A	
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	TBD	
2.4 Spray Targeted Structures According to Technical Specifications								

[17] Radio spots are not used in Ethiopia.
[18] Ethiopia carries out mass mobilization and does not go house-to-house distributing printed materials. Mass mobilization is conducted by the government.

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[19]	708,258	708,258[20]	717,396[21]	TBD	
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[22]	704,945	602,019[23]	715,541	TBD	
2.4.3 Percentage of total structures targeted for spraying that were sprayed with a residual	Data source: Daily Spray Operator Forms Reporting frequency:	By Spray Campaign	85%	99.5%	85%	99.7%	85%	

19 Number of structures targeted based on the number of structures found in 2014.
20 Number of structures targeted based on the number of structures found in 2015
21 Number of structures found in 2016 campaign
22 85% of target (85% * 670,303).
23 85% of target (85% * 708,258).

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
insecticide (Spray Coverage)	Daily per spray campaign							
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[24]	1,655,997[25] Pregnant women= 23,084 Children <5= 230,366 Male: 831,310 Female: 824,687	1,655,997	1,688,745[26] Pregnant Women= 23,011 Children <5 = 230,690 Male: 847,750 Female: 840,995	TBD	TBD
Component 3: Ongoing Monitoring and Evaluation and Quality Control Measures								
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	

[24] Based on number of people protected in 2014

[25] 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%.

[26] 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%

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
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	N/A	N/A	Completed	
Component 4: Contribute to Global and Country-Level IRS Policy Setting and Develop and Disseminate Experiences and Best Practices								
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- nnually	By Spray Campaign By Guideline/checklist/tool	TBD	6[27]	7[28]	10[29]	TBD	
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	
4.3 Number of best practice	Data source: Project records – Activity	By Spray Campaign	TBD	-	0	0	TBD	

[27] 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.

[28] 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.

[29] 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

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
presentations given at national/ regional/international workshops and conferences	reports Reporting frequency: Semi-annually	By IRS Technical Area						
4.4 Number of enterprises engaged through public-private partnerships	Data source: Project records – Activity reports Reporting frequency: Semi-annually	By Spray Campaign	2[30]	2	2	3[31]	TBD	
Component 5: Contribute to the collection and analysis of Routine entomological and epidemiological data								
5.1 Support entomological monitoring activities and insecticide resistance strategies								
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	Data source: Entomological reports Reporting frequency: Annually	By Spray Campaign	3[32]	3	8	8[33]	TBD	

[30] Two private companies will be targeted for recycling AIRS waste: one for plastic OP bottles and the other for cardboard boxes.
[31] A total of three private companies: two for empty plastic Actellic bottles and one for cardboard boxes recycling
[32] Three selected kebeles from three different districts (Ilu Gelan, Gobu Sayo and Seka Chekorsa) will host entomological sentinel sites.
[33] The Sites are: Seka Chekorsa, Alamata, Shele, Metema, Goro, Haromaya, Gobu Sayo and Ilu Gelan

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
time, and location)								
5.1.2 Number and percentage of entomological monitoring sentinel sites measuring all the five primary PMI entomological monitoring indicators	Data source: Entomological reports Reporting frequency: Annually	By Spray Campaign	3;100%	3;100%	8; 100%	8 Sites; 100%	TBD	
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%	TBD	
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	Data source: Entomological reports Reporting frequency: Annually	By Spray Campaign	8[34];100%	8[35]; 100%	11[36]; 100%	9; 81.2[37]%	TBD	

[34] The sites are Omo Nada, Chewaka, Zeway Dugda, Halaba, Bahirdar, Alamata, Amibara and Gambela.
[35] All sites stated on footnote 29 are covered
[36] 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
[37] Three sites are completed; remaining sites are still conducting testing.

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
malaria vector control								
5.1.5 Number of wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS	Data source: Entomological reports Reporting frequency: Per spray campaign	By Spray Campaign	48[38]	48	48[39]	48	TBD	
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[40]	264[41]	288	48[42] Ongoing	TBD	
5.1.7 Number of vector susceptibility tests for different insecticides	Data source: Entomological reports	By Spray Campaign By Type of	88[43]	49 Tests[44]	77[45]	63[46]	TBD	

[38] 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.
[39] From 4 kelebes (2 DB Tiro Afeta and Shebe; 2 CB Bako and Chewaka); 12 houses each within 2 weeks of spraying.
[40] 48 bioassays per month for 5 months will be conducted in 4 kelebes (2 DB Tiro Afeta and Shebe; 2 CB Bako and Chewaka).
[41] 264 bioassays from 4 kelebes (2 OP Tiro Afeta and Chewaka [168]; 2 Bendiocarb Bako and Shebe[96]);
[42] It will continue up to December
[43] AIRS Ethiopia plans to test 11 insecticides in eight different sites (number of sites noted in indicator 5.1.4).
[44]49 Tests: Permethrin=5, Propoxur=5, Malathion=4, Lambdacyhalothrin=4, Fenitrothion=5, Etofenprox=4, DDT=4, Bendiocarb=5, Deltamethrin=5, Alpha-cypermethrin=3, Pyrimphos-methyl=5
[45] AIRS Ethiopia plans to test 7 insecticides in 11 different sites.
[46] 63 Tests: Permethrin=8, Propoxur=9, Malathion=9, DDT=9, Bendiocarb=9, Deltamethrin=9, Pirimiphos-methyl=9; Fenitrothion= 1

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
conducted in selected sentinel sites*	Reporting frequency: Per spray campaign	Insecticide						
5.2 Support Epidemiological Malaria Data Collection and Analysis								
5.2.1 Collect routine epidemiological data	Data source: Project Reports Reporting Frequency: Annually	By Spray Campaign	N/A[47]	N/A	N/A	N/A	TBD	
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	TBD	
Component 6 (Cross-cutting): Capacity Building, Knowledge Transfer, Gender Inclusion								
6.1 Increasing the Role of Women and Addressing Gender Barriers								
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	2,885[48]	2,845 Male=2,318 Female=527; 18.5%	2,733	2,749 Male= 2,236 Female= 513 18.6%	TBD	

[47] This activity is not being carried out in Ethiopia.
[48] 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.

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
		of Women Trained						
6.1.2 Total number of people trained to support IRS in target districts[49]	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Gender Percentage of women trained	4,398	4,383[50] Male=2,755 Female=1,624; 37.1%	4,220	4,346[51] Male= 2,746 Female= 1,600; 36.8%	TBD	
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	TBD	
6.1.4 Number of people trained as IRS Training of Trainers	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Gender Percentage	267	255 Male=236 Female=19; 7.5%	234	223 Male=205 Female=18; 8.1%	TBD	

[49] This indicator covers all of the cadre who support IRS operations.
[50] TOT=255; Data Entry Clerks=44; Pesticide poison management=100; HEW=1061; SQI=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.
[51] TOT=223; Data Entry Clerks=44; Pesticide poison management=96; HEW=1,041; SQI=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.

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
		of women trained						
6.1.5 Total number of people hired to support IRS in target districts	Data source: Project records – Contracts signed Reporting frequency: Semi-annually	By Spray Campaign Gender Percentage of women hired	4,398; 1,759 women/40% female	4,379[52] Male=2,753 Female=1,626; 37.1%	4,065 1,626 Women; 40%	4,342[53] Male=2,753 Female=1,626; 37.1%	TBD	
6.1.6 Number and percentaage of women hired in supervisory roles in target districts (this number includes site supervisors, squad leaders, team leaders, 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[54]; 33.9%	304; 40%	276[55]; 36.7%	TBD	

[52] TOT=255; Data Entry Clerks=40; Pesticide poison management=100; HEW=1061; SQI=484; SOP=1511; Porter=495; Washers=69; Drivers=102; Guards=191; Store keepers=35 and Store keeper Assistant=36

[53] TOT=223; Data Entry Clerks=40; Pesticide poison management=96; HEW=1041; SQI=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

[54] Supervisors(incl. TLs)=19, SQLs=238 and Store keepers=5

[55] Supervisors(incl. TLs)=18, SQLs=253 and Storekeepers=5

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
6.1.7 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[56]; Male=282 Female=28; 9.0%	291	279 (Male= 252 Female= 27; 9.6%)[57]	TBD	
6.2 Capacity Building								
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[58]	290[59]; Male=266 Female=24, 8.3%	234	259[60] Male= 236 Female= 23	TBD	
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	

[56] 255 TOT attendees; 35 Store keepers and 20 AIRS permanent staffs.
[57] 20 AIRS (16 male and 4 female), 36 Store keepers (31 male 5 female) and 223 supervisors (205 males and 18 females)
[58] 267 from TOT; 35 from National training.
[59] 255 from TOT; 35 from store keepers training
[60] 223 from TOT; 36 from store keepers training

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
6.2.3 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[61]	Completed	Not Completed[62]	TBD	

[61] In 2015, the government of Ethiopia was responsible for mass mobilization prior to the implementation of the IRS campaign.
[62] In 2016, the government of Ethiopia didn't take any independent responsibility in implementing the IRS program.

ANNEX F: ACTIONS TAKEN TO IMPROVE SPRAY QUALITY IN 2016

	Action Accomplished	Output/ Remark
Proposed Action 1: Improve the Quality of TOT and SOP Training		
Train all AIRS Ethiopia technical staff and cadre of master trainers on spray techniques to facilitate high quality supervision and IRS	25 master trainers trained to conduct TOT with focus spray techniques	Skills of trainers and supervisors enhanced
Conduct a comprehensive training of MOH staff on IRS techniques and supervision through a boot camp	54 MOH and AIRS staff trained on IRS management and facilitation skills	Facilitation and IRS management skills enhanced
Conduct TOT in small and manageable groups of no more than 50 participants	TOT conducted in classes of 40 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, AIRS, zonal and district MFPs and shared with districts	SOPs with previous experience were recruited. 40% of total 1,902 were new
Recruit one pump technician per district	36 pump technicians trained and engaged op IRS operations	Pump maintenance and weekly calibration adequately done
Recruit seasonal IRS Coordinators to support training and supervision	4 seasonal supervisors recruited and trained during boot camp and as master trainers	Improved coordination of training supervision
Proposed Action 2: Improve IRS Supervision and Spray Quality		
Train MOH staff with emphasis on supervision roles and spray	Training conducted (Boot camp/ TOT) and supervisors	Spraying techniques improved through

	Action Accomplished	Output/ Remark
Proposed Action 1: Improve the Quality of TOT and SOP Training		
techniques	engaged in direct observation of spraying by SOPs	continuous guidance
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	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
Proposed Action 3: Improve Community Mobilization and House Preparation		
Train and engage mobilizers (HEWs) on IRS	Some 1041 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
Proposed Action 4: Procure and Ensure Use of Correct Nozzle Tips		
Conduct inventory of nozzle tips	Ceramic nozzles tips (Micron **C 8002 E**) procured and supplied to districts	Use of correct nozzle in all districts ensured since only ceramic nozzles were used