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PMI | Africa IRS (AIRS) Project
Indoor Residual Spraying (IRS 2) Task Order Six

2016 MALI
END OF SPRAY REPORT

SPRAY CAMPAIGN:
JULY 9 – AUGUST 12, 2016

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The views expressed in this document do not necessarily reflect the views of the United States Agency for International Development or the United States Government.



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2016 MALI END OF SPRAY REPORT

Spray Campaign:
July 9 – August 12, 2016

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ACRONYMS

AIRS	Africa Indoor Residual Spraying Project
ASACO	Community Health Association (<i>Association de Santé Communautaire</i>)
COP	Chief of Party
DNACPN	National Directorate for Sanitation and Pollution Control (<i>Direction National de l'Assainissement, Contrôle de Pollution et de Nuisances</i>)
DOS	Directly Observed Spraying
DTC	Health Center Technical Director (<i>Directeur Technique de Centre de la Santé</i>)
ECO	Environmental Compliance Officer
HBR	Human Biting Rate
HLC	Human Landing Catches
IEC	Information, Education, and Communication
IRS	Indoor Residual Spraying
M&E	Monitoring and Evaluation
MOE	Ministry of Environment
MOH	Ministry of Health
MSP	Mobile Soak Pit
NMCP	National Malaria Control Program
OP	Organophosphate
PID	Pulvérisation Intra Domiciliaire
PMI	President's Malaria Initiative
PMT	Performance Management Tracker
PPE	Personal Protective Equipment
PSC	Pyrethrum Spray Catches
PSECA	Pre-Season Environmental Compliance Assessment
SEA	Supplemental Environmental Assessment
SOP	Spray Operator
USAID	United States Agency for International Development
WHO	World Health Organization
WHOPES	World Health Organization Pesticide Evaluation Scheme

EXECUTIVE SUMMARY

The President’s Malaria Initiative (PMI) has been funding indoor residual spraying (IRS) in Mali since 2008 with the aim of reducing the malaria burden, especially among children under five years and pregnant women. In August 2011, Abt Associates was awarded a three-year Africa IRS (AIRS) project, funded by the United States Agency for International Development under PMI. In September 2014, Abt Associates was awarded another three-year project, called The PMI AIRS Project (or “the project”) to implement IRS in up to 20 African countries, including Mali. The objective of the project is to limit exposure to malaria and reduce its incidence and prevalence.

The objective of AIRS Mali in 2016 was to reduce malaria-associated morbidity and mortality in Baroueli, Koulikoro, and Fana districts by spraying 242,684 structures (73,528, 66,927, and 102,229, respectively). AIRS Mali implemented all activities with the involvement of the Malian Government at different levels.

Key lessons learned from the 2016 IRS campaign include:

- When planning any future campaign, the project should take into account the period when the geographical reconnaissance is conducted. This year the AIRS Mali team conducted the reconnaissance in Fana during the dry season, which did not provide the project with a good understanding of the topography and household location. During the campaign, the district’s topography changed: the river overflowed, submerging a bridge the spray team needed to cross. Roads became impassable and a boat hired to help transport the team repeatedly broke down.
- Early introduction of beneficiary communities to new IRS approach and their involvement in IRS implementation facilitated good acceptance
- The new IRS approach, Villages and Neighborhoods, contributed to the following:
 - Increased household awareness of and preparedness for IRS
 - Improved involvement of women in IRS activities
 - Reduced daily wage rate for seasonal workers as the result of AIRS Mali’s pre-spray negotiations with communities. The savings contributed to additional funds for the IRS campaign in Fana.
- Use of the light-weight Goizper pumps facilitated the involvement of women in IRS activities.
- The Goizper pump’s incorporated control flow valve saved a significant amount of insecticide.

TABLE ES-1: AIRS MALI AT A GLANCE

Number of districts covered by PMI-supported IRS in 2016	3 districts: Baroueli, Koulikoro, and Fana
Insecticide	Organophosphates (Actellic CS) in all districts
Number of structures found by spray operators	235,394
Number of structures sprayed by spray operators	228,672
2016 spray coverage	97.14%
Population protected by PMI-supported IRS in 2016	788,922 (20,813 pregnant women and 135,754 children under five)
Dates of PMI-supported IRS campaign	July 9–August 12, 2016
Length of campaign (operational days)	30 days
Number of people trained with U.S. Government funds to deliver IRS*	1,216

*Based on the PMI indicator definition. It includes only spray personnel such as spray operators, team leaders, supervisors, and clinicians. It excludes data clerks, Information, Education and Communication mobilizers, drivers, washers, porters, pump technicians, and security guards.

RESUME (EN FRANÇAIS)

L'Initiative du Président Américain contre le Paludisme (President's Malaria Initiative: PMI) a commencé à financer la Pulvérisation Intra Domiciliaire depuis 2008 avec le but de réduire le fardeau du au Paludisme spécialement au sein des Enfants de moins de 5 ans et des femmes enceintes. En Aout 2011, Abt Associates a obtenu un projet Africain de Pulvérisation Intra Domiciliaire pour 3 ans financé par l'Agence des Etats Unis pour le Développement International (USAID) sous PMI, pour mener à bien le travail. En Septembre 2014, Abt Associates a reçu trois ans complémentaire pour continuer le projet appelle PMI AIRS Project et assure la mise en œuvre de la Pulvérisation Intra Domiciliaire dans 20 pays d'Afrique incluant le Mali. L'objectif de PMI AIRS Project est de limiter l'exposition au Paludisme et en réduire l'incidence et la Prévalence.

En 2016, l'Objectif de PMI AIRS Mali était de réduire la morbidité et la mortalité associées au Paludisme dans les Districts de Baroueli, Koulikoro et Fana en pulvérisant 242 684 structures (73 528 à Baroueli, 66 927 à Koulikoro et 102 229 à Fana). PMI AIRS Mali a mis en œuvre toutes ces activités avec la pleine implication du Gouvernement Malien à tous les niveaux.

Les principales leçons tirées de la campagne PID 2016 sont les suivantes:

- Nous devons tenir compte de la période de la reconnaissance géographique est effectuée, si ces activités sont nécessaires à l'avenir. Celles menées à Fana par l'équipe cette année ont été faites, au cours de la saison sèche, ce qui n'a pas permis au projet de venir avec une bonne compréhension de la situation géographique et de la répartition des ménages. Pendant la campagne, le visage du district a complètement changé. Le fleuve a débordé et submergé le pont qui permet de relier les deux rives. Les routes sont devenues impraticables et le bac qui aurait pu nous aider à traverser était constamment en panne. La campagne a été très difficile parce que nos prévisions du temps ont été dépassées.
- Les négociations communautaires ont facilité l'introduction et la mise en œuvre de nouvelles approches de la PID.
- Les nouvelles approches "Villages et quartiers" ont permis de régler certaines questions:
 - La sensibilisation et la préparation des ménages pour recevoir les Operateurs
 - L'implication de plus de femmes dans les activités de pulvérisation intra domiciliaire
 - Les négociations communautaires nous ont permis de réduire le cout de la prise en charge des agents communautaires. Le gain obtenu nous a permis d'augmenter le budget pour couvrir le District de Fana en PID.
- A cause de leur poids léger, l'utilisation des pompes Goizper a facilité également l'implication des femmes dans les activités PID.
- A cause de leur valve incorporée, les pompes Goizper nous ont permis d'économiser l'insecticide.

TABLE ES-2: AIRS MALI EN BRIEF

Nombre des districts couverts par PMI en 2016	3 districts: (Baroueli, Koulikoro et Fana)
Insecticide utilisé pour la PID	Organophosphores (Actellic CS) dans les 3 districts
Nombre de structures trouvées par les Opérateurs.	235,394
Nombre de structures pulvérisées par les opérateurs en 2016	228 672
Taux de couverture de la PID 2016	97.14%
Population protégée par PMI en 2016	788,922 (20,813 femmes enceintes et 135,754 enfants de moins de 5 ans)
Dates de la campagne financée par PMI	9 Juillet au 12 Aout 2016
Durée de la campagne (jours opérationnels)	30 days
Nombre de personnes formées avec les fonds du Gouvernement des Etats Unis d'Amerique pour faire la PID*	1,216

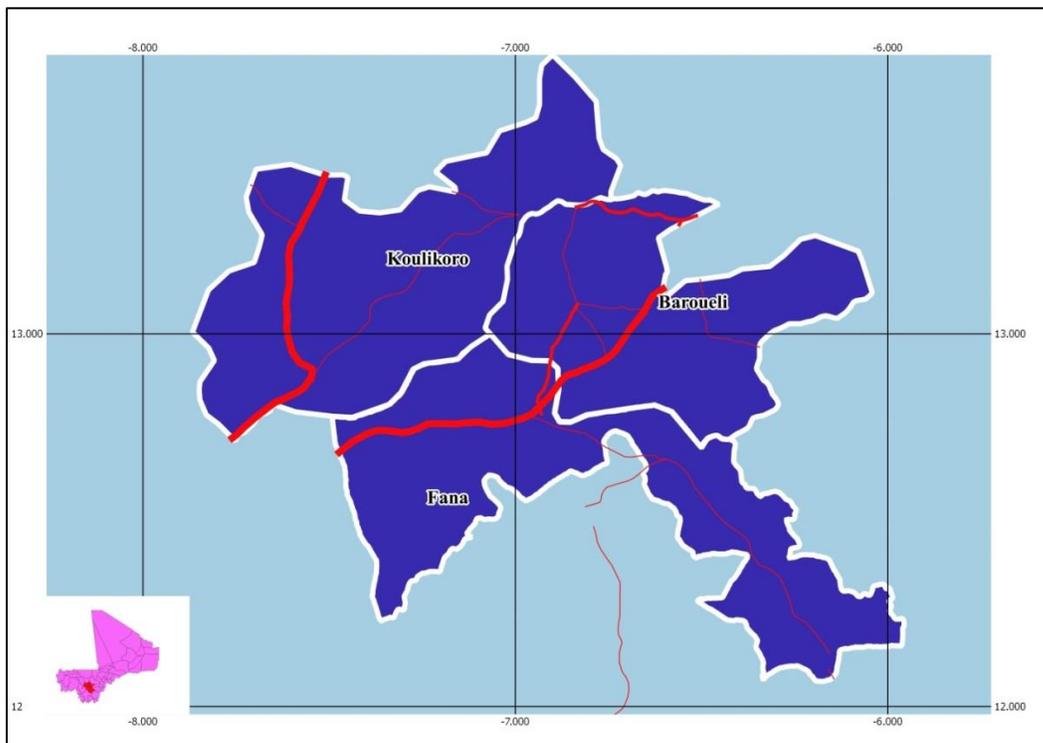
* En se basant sur la définition des indicateurs de PMI. Ce chiffre inclut seulement les acteurs comme les Opérateurs, les Chefs d'Equipe, les Superviseurs, et les Cliniciens. Il exclut les agents de saisie, les mobilisateurs, les Chauffeurs, les lingères, les maintenanciers, et les gardiens.

I. BACKGROUND

The President's Malaria Initiative (PMI) has supported indoor residual spraying (IRS) in Mali since 2008, initially through IRS programs in Bla and Koulikoro districts. In 2011, PMI added support for Baroueli district, thus making the IRS-supported area geographically continuous. In 2012 and 2013, PMI continued spraying in the three districts with a carbamate class insecticide (bendiocarb). However, the results from 2013 monthly monitoring indicated that bendiocarb was short lived in the IRS districts, particularly Baroueli. In 2014, due to observed short residual life (two months) of this insecticide, PMI switched to a long-lasting (up to six months) version of an organophosphate (OP) class insecticide (pirimiphos methyl, Actellic CS) in Baroueli and Bla districts, and continued to use bendiocarb in Koulikoro. In 2015, PMI and the National Malaria Control Program (NMCP) agreed to switch to an OP insecticide in all districts. However, due to the high cost of the new insecticide and NMCP's planned implementation of a universal net coverage campaign in Bla district, only Baroueli and Koulikoro were targeted for IRS in 2015.

In 2016, with the support of NgenIRS, a UNITAID project, the IRS campaign was extended to Fana (Figure 1). The campaign started on July 9 using Actellic CS, to ensure that the sprayed surfaces would retain their efficacy through the peak malaria transmission season in September and October. The July start of the 2016 IRS campaign coincided with the start of the rainy season, however, which presented challenges in transportation and spraying.

FIGURE 1: 2016 IRS CAMPAIGN DISTRICTS: BAROUELI, KOULIKORO, AND FANA



1.1 2016 IRS CAMPAIGN OBJECTIVES

As stated in the 2016 work plan of the PMI Africa Indoor Residual Spray (AIRS) project in Mali, the program's objectives in 2016 were to:

- Cover at least 85 percent of eligible structures in the three districts and protect an estimated population of 778,884.
- Promote participatory implementation by the Ministry of Health (MOH) and NMCP at all levels of IRS operations in the three districts.
- Continue developing national and local capacity in organizing, planning, implementing, and evaluating IRS campaigns.
- Support orientation and dissemination workshops regarding the application of national IRS strategic documents to the subregional levels.
- Complete quality entomological monitoring for the 2016 IRS campaign and collect data on insecticide resistance to inform insecticide selection for the 2017 spray campaign.
- Support orientation and dissemination workshops regarding the application of national IRS strategic documents to the subregional levels.

1.2 2016 RESULTS SUMMARY

The following results respond to the 2016 objectives listed in Section 1.1:

- By the end of the 2016 spray campaign, AIRS Mali achieved 97.14 percent coverage (228,672 structures) protecting 788,922 people in the three districts.
- The project worked closely with government counterparts: three district- and national-level partners were involved in planning and scheduling of the IRS roll-out and sensitization of communities.
- AIRS Mali completed the post-spray meetings with the communities, and technical and administrative leaders in three districts.
- AIRS Mali initiated and tried a new Village/Neighborhood approach for IRS, described in Section 4.2.1. It contributed to reducing the transportation costs and increasing participation of women in IRS.
- To contribute to the budget for IRS in Fana, AIRS Mali negotiated with community workers to accept a reduction of 500 FCFA in their daily rate.
- AIRS Mali conducted timely spray quality tests that indicated almost 100 percent mortality within 24 hours after spraying; it continued to collect monthly data on insecticide residual life.

2. PREPARATION FOR IRS CAMPAIGN

2.1 IRS CAMPAIGN PLANNING

The following activities were undertaken to plan and organize the 2016 IRS campaign:

- **Internal IRS Campaign Planning (January–June):** In January, the AIRS Mali team began detailed planning for all activities of the IRS campaign. AIRS Mali staff met regularly to review the progress with campaign organization and planning. At the meetings, the team discussed revising training programs and materials, and setting standards for the campaign. AIRS Mali inventoried IRS equipment and commodities left over from the 2015 campaign, and then did local and international procurement of goods needed for successful implementation of the 2016 campaign.
- **Meeting with IRS Steering Committee (March):** All activities were planned and implemented in collaboration with government technical partners (NMCP, National Directorate for Sanitation and Pollution Control (DNACPN), Ministry of Education (MOE), Ministry of Agriculture, and other government and non-government stakeholders) at the national, regional, district, and community levels. At the steering committee meeting, all key partners agreed on their roles as well as objectives, targets, and needs for the spray campaign.
- **Meeting with Community Leaders in Koulikoro, Baroueli, and Fana (March–April):** Meetings with community leaders included discussions regarding the dates for the IRS campaign and introductions to new approaches to implement IRS. In Fana district, the team also held sensitization meetings with authorities and community leaders to introduce IRS that would be done there for the first time.
- **Meetings with Local Partners (May–June):** The project held meetings with Community Health Associations (Association de Santé Communautaire, ASACO) and health center technical directors (Directeurs Techniques de Centres de la Santé, DTCs) throughout the spray districts to ensure that communities were aware of the dates for IRS campaign implementation and to establish the roles and commitments of ASACO and DTCs in implementing the campaign.

2.2 INSECTICIDE SELECTION AND PROCUREMENT

Based on entomological monitoring and insecticide resistance results after the 2015 IRS campaign, insecticide from the OP class (Actellic CS) was selected for spraying in the 2016 IRS campaign. AIRS Mali calculated that 88,195 bottles of Actellic CS would be needed to cover a total of 228,672 structures in the three spray districts in addition to 5,757 bottles of Actellic CS left over from the 2015 campaign. The total quantity of OP procured was 89,703 bottles. The difference between calculated and ordered quantity is due to packaging of the product. The OPs arrived in Mali in June after Abt Associates had successfully tested the quality of the insecticide at CEMA, a UK-based independent laboratory.

2.3 LOGISTICS PLANNING AND PROCUREMENT

2.3.1 INVENTORY ASSESSMENTS AND PROCUREMENT

Prior to the spray campaign, AIRS Mali did a full inventory in both district warehouses, located in Segou (for Baroueli and Fana districts) and Koulikoro (for Koulikoro district). Using the inventory results and needs assessed for the 2016 campaign, AIRS Mali initiated requests for international procurement to the project home office team at Abt Associates in Bethesda, Maryland, and completed local, in-country procurement. Local procurement involved an open, competitive tendering process. The AIRS Mali procurement committee selected suppliers based on the lowest-cost, technically acceptable bid according to the criteria given in the solicitation for the quotations. The tables in Annex A include a detailed list of items procured locally and internationally and the post-campaign balance.

2.3.2 LOGISTICAL NEEDS ASSESSMENTS

During the internal planning meetings, the AIRS Mali team developed the logistics and commodity distribution schedules for the 2016 IRS campaign. In May and June, the operations manager, logistics coordinator, and environmental compliance officer (ECO) visited all 63 operational sites and finalized the plans for moving IRS commodities to each site on June 29-30, 2016. Table 1 shows the quantities of key IRS commodities distributed to each district for the spray campaign, and Table 2 shows the vehicle distribution. Annex B includes details of vehicle usage in three districts in 2016.

TABLE 1: DISTRIBUTION OF SELECTED IRS COMMODITIES TO OPERATIONAL SITES

Operation Sites	Number of Teams	Overalls	Boots/P air	Helmets/ Complete	Spray Pumps	Gloves	Masks Respirators
Koulikoro	50	626	376	299	206	622	9360
Baroueli	77	925	539	425	285	588	12,870
Fana	64	687	476	431	295	574	9930
Total	191	2,238	1,391	1,155	786	1,784	32,160

TABLE 2: DISTRIBUTION OF VEHICLES

District	Minibuses	Pick-up/4x4	Taxini
Koulikoro	7	3	38
Baroueli	9	3	51
Fana	9	3	42
Total	25	9	131

2.4 HUMAN RESOURCES

To implement the 2016 IRS campaign, AIRS Mali hired 1,628 seasonal staff, 1,152 men and 476 (29.23 percent) women. Table 3 provides a breakdown of the seasonal staff by position and gender.

TABLE 3: SEASONAL STAFF HIRED IN 2016, BY POSITION AND GENDER

Position	Men	Women	Total
District logisticians	3	0	3
Data clerks	8	15	23
Pump mechanics	6	0	6
District warehouse managers	2	0	2
Finance assistants	1	0	1
IRS data transporters	9	0	9
Spray operators	622	277	899
Community supervisors	59	4	63
Team leaders	161	30	191
Storekeepers	46	16	62
Washers	0	128	128
Entomological technicians	9	6	15
Security guards	61	0	61
Drivers	165	0	165
Total	1,152	476	1,628

Priority was given to hiring seasonal staff from previous IRS campaigns who performed well. The head of the ASACO and the DTC in each spray area recruited spray operators (SOPs), team leaders, pump mechanics, and washers based on criteria the AIRS Mali technical team developed. Hiring criteria for SOPs included: 1) ability to read and write, 2) ability to carry spray pumps for several hours per day, and 3) having a certified note from a doctor stating that the candidate was in good health. The DTCs gave all SOPs a medical exam at the health post, a process closely supervised by AIRS. Women applicants also had to present a note from the doctor stating that they were not pregnant.



A team of six female and one male SOPs hired to spray in Korokoro, Fana District.

2.5 TRAININGS

AIRS Mali held 13 different trainings to ensure that all seasonal staff were aware of their roles, understood how the IRS campaign would function, and had the technical knowledge and skills to perform their jobs well. Additionally, the trainings covered what to do in emergency situations (such as insecticide poisoning), and reinforced the value of preventing malaria transmission. Brief descriptions of trainings are in Annex C.

All the trainings were implemented with the support and involvement of government technical partners. The trainings took place June 7-July 4. As shown in Table 4, in total, AIRS Mali trained 2,138 people, 598 (27.9 percent) of whom were women (compared to 16.5 percent women in 2015).

TABLE 4: SEASONAL STAFF TRAINED, BY TOPIC AND GENDER

Categories of Persons Trained	Training on IRS Delivery								Other Trainings																Total Trained		
	Training of Trainers		Spraying Operations training		Medical Treatment of Intoxication Cases Training		Supervisor Training		Data Capture Training		Logistics Training		Coveralls Washing		Structure Enumeration Training		Transport/ Security Training		Stores Security Training		District Team Training		Entomological Monitoring Training			Radio Hosts Training	
	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
DTCs	56	7																									63
District coordinators	3	0																									3
*Spray operators			622	277																							899
*Team leaders			161	30																							191
*Clinicians					56	7																					63
*Community supervisors							59	4																			63
Data clerks									8	15																	23
Storekeepers											46	16															62
Washers													0	128													128
Enumerator agents in Fana															274	108											382
Drivers																	165	0									165
Security guards																		61	0								61
District logisticians																					3	0					3
Warehouse keepers																					2	0					2
Entomologist technicians																							9	6			15
Radio hosts																									15	0	15
TOTAL M/F District	59	7	783	307	56	7	59	4	8	15	46	16	0	128	274	108	165	0	61	0	5	0	9	6	15	0	2,138
Total Trained	66		1090		63		63		23		62		128		382		165		61		5		15		15	2,138	

*Based on the PMI indicator definition. It includes only spray personnel such as spray operators, team leaders, supervisors, and clinicians. It excludes data clerks, Information, Education and Communication mobilizers, drivers, washers, porters, pump technicians, and security guards.

3. COMMUNICATIONS AND ENUMERATION

AIRS Mali has continued to build upon communication activities from past IRS campaigns using as a main strategy community radio station messaging. All communications activities have engaged key stakeholders, such as the NMCP and ASACOs. AIRS Mali and local partners have worked together to sensitize the village chiefs and the public criers to ensure that the information is reaching all households. The project organized the sensitization meetings that team supervisors led in their communities. Most of them continued as supervisors during the IRS operations. Through the supervisors, AIRS Mali has sensitized community leaders, such as chief of quartier (neighborhood), prefects, village/commune mayors, traditional chiefs, youth and women's group leaders, and health peer educators, on key IRS and malaria prevention information. With such a strategy, the project prepared a large number of community activists to support the spray campaign and disseminate malaria messages as part of their work throughout the year.

AIRS Mali has also worked with the NMCP and district and regional health staff on April 25, World Malaria Day, to implement some of the IRS advocacy and publicity activities.

AIRS Mali completed the following communication activities in 2016:

- Community Mobilization

The IRS mobilization began 10 days prior to the campaign with radio announcements and community meetings. In 2016, AIRS Mali did not hire formal mobilizers. Instead, field supervisors, village chiefs, and public criers were responsible for mobilizing the communities before and during the campaign. According to plans developed prior to the IRS campaign, field supervisors were in charge of the mobilization activities in their respective health areas. One day before the arrival of the spray team, the field supervisor or the DTC called the village chief to advise him of the arrival. The village chief then requested a public crier to announce the news to the community. AIRS Mali complemented this with announcements on community radio stations, which continuously broadcast the spray schedule to the different villages.

It should be noted that the health areas that used the mobile soak pit (MSP) or Village/Neighborhood approach needed fewer public criers. In MSP areas, SOPs camped in a village for a few days and informed the community about which houses would be sprayed each day. Where the Village/ Neighborhood approach was used, SOPs were from the targeted communities, and therefore could easily inform neighbors about the day when they would spray particular houses.

- Radio Broadcasts

Because radio is widely available and listened to in the spray districts, AIRS Mali used radio broadcasts to ensure wide dissemination of IRS spray campaign information. AIRS Mali worked with 15 local radio stations to broadcast 3,165 radio spots in French and Bambara to promote the IRS campaign. Also broadcast were radio programs with announcements about the spray schedule, call-in shows, and live interviews with AIRS Mali and District Health Center staffs, DTCs, community leaders, spray campaign beneficiaries, and SOPs during the spray campaign. AIRS Mali staff prioritized interviewing female beneficiaries and female seasonal workers. AIRS Mali also asked radio stations to

produce small concerts in communities, where griots and other musicians played songs about malaria and IRS.

- Enumeration in Fana:

To collect reliable data on structures targeted for spraying in the new district of Fana, AIRS Mali carried out enumeration of the district in April 2016. Prior to actual data collection, the project team had sensitization meetings with the community leaders and members. The project also selected seasonal personnel for enumeration with the understanding that the same people would apply for SOP positions. Bringing people on board earlier increased the understanding and importance of the IRS program among the seasonal personnel and their communities.

The DTC of Fana played the role of facilitator. The project held training for enumerators on April 15-21, 2016, and enumeration took place over the following 10 days. The team cleaned the data by mid-May and produced the following results.

- • Number of population: 347,059;
- • Number of eligible structures: 102,229.

The results differed from the targets estimated in the work plan because the project had used data from the secondary sources when doing the plan, and those data were not up to date.

Enumeration has helped the project determine the correct number of population, compounds, and structures to be targeted. With these data, AIRS Mali was able to develop more detailed and localized calendars for distribution and supply spray campaign operations.

4. IMPLEMENTATION OF IRS ACTIVITIES

4.1 SPRAY CAMPAIGN

The 2016 IRS campaign lasted for 30 operational days, from July 9 through August 12, 2016. AIRS Mali deployed a total of 191 spray teams in 63 sites. The distribution of spray teams was determined by the number of eligible structures per district and the geography/terrain that the spray teams would cover (Table 5).

TABLE 5: DISTRIBUTION OF SPRAY TEAMS BY DISTRICT

District	No. of Spray Teams	No. of Eligible Targeted Structures
Baroueli	77	73,528
Koulikoro	50	66,927
Fana	64	102,229
Total	191	242,684

Spray teams consisted of four or five SOPs and one team leader. During the spray campaign, each operational site had a storekeeper, guards, and washers. Spray operations began at 6 am, when the spray personnel met at their designated operational sites to put on personal protective equipment (PPE) and pick up pumps and insecticide for the day. Once these were distributed, the supervisor met with the spray team leaders, shared the spray schedule for that day, and the route to take to reach each community.

The spray teams departed for the communities shortly after 6 am to carry out spraying, and they returned to the operational site around noon or 1 pm. At the soak pit, the SOPs lined up to do progressive rinsing of spray pumps and then they removed their coveralls and PPE for washing. They returned all insecticide bottles (both empty and unused bottles) to the site storekeeper. The storekeeper also counted/verified the number of empty bottles against the number of bottles reported having been used; the storekeeper then placed the empty bottles in a drum located in the storeroom to await transport to a recycling facility after the IRS campaign. The unused bottles were returned to the available stock-on-hand and were distributed the following day.

IRS district teams, consisting of a district coordinator, central warehouse manager, logistician, monitors and pump technicians, in close collaboration with the DTCs, provided oversight to achieve AIRS Mali's goal of providing day-to-day operational management and support for IRS implementation, including all aspects of monitoring and quality assurance for spray operations.

4.2 SUPERVISION OF IRS

AIRS Mali deployed field supervisors to monitor spray operations. Each supervisor had four teams to work with. In addition of monitoring the work of the spray teams they managed the movement of vehicles to and from spray sites. The supervisors, in turn, were supervised by the district coordinator and informally by the DTC. The DTC's role was to provide supervision to the campaign during morning mobilization and when the spray teams were doing cleanup at the end of each day. They also supervised spraying in randomly selected villages using phone-based inspection forms. Information on

the number of supervisory inspections is included in Annex D. The team observed that by 2016, AIRS Mali had developed too many supervisory tools. The increased burden on supervisors to complete and submit the higher quantity of forms resulted in a lower number of inspections conducted. The quality of some inspections was also questionable. The team will streamline the forms in the coming year to ensure that supervisors will have an adequate and feasible amount of supervisory work to be done during next year's IRS campaign.

4.3 INNOVATIONS AND SPRAY CAMPAIGN IMPROVEMENTS

In 2016, AIRS Mali pilot tested or expanded implementation of several innovations that increased efficiency and reduced costs.

4.3.1 VILLAGE/NEIGHBORHOOD APPROACH PILOT

In 2016, AIRS Mali decided to test a new way of doing IRS that combined the proven advantages of taxinis and MSPs with locally based SOPs. AIRS Mali implemented the test in rural areas as the Village approach and in urban areas as the Neighborhood approach. The objective was to determine if the Village /Neighborhood approach cost less than traditional IRS and, thus, demonstrated a potential for sustainable implementation at the local level if residents are supplied with insecticide and PPEs. Preliminary results indicate the new approach has no cost benefit over traditional IRS. The AIRS Mali team will produce a brief report on the cost comparison analysis. Description of the pilot and potential cost-saving categories and challenges are described below.

The project identified three to four health areas per district to test this new method of IRS.

- Koulikoro District: Doumba, Massala, and Sizani,
- Fana District: Farakoro, Bougoucourala, Diele, and Fougadougou
- Baroueli District: Dioforongo, Mpebougou, and Ngassola

Each health area consisted of five or six villages. AIRS Mali trained one or two SOPs in each village. The villages were sprayed in a consecutive (not simultaneous) order. One field supervisor and one team leader supervised the mini SOP teams in each area as they moved from village to village in one taxini and carrying an MSP with them. The Regional Directors of Health of Koulikoro and Segou regions, the NMCP, the Medical Chief of Districts, and some prefects, mayors, and ASACO approved this community-based approach before the campaign began. The expectation was that the approach would generate savings in the programming areas listed below:

- Reduce the SOP daily wage because they were working in their own villages.
- Replace larger (and more expensive) vehicles with smaller and cheaper taxinis.
- Reduce fuel consumption.
- Reduce cost of mobilization and sensitization because there was no need to hire public criers.

After the spray campaign ended, AIRS Mali gathered feedback and identified the following advantages and challenges of the pilot approach.

Advantages:

- Increased number of women involved in IRS.
- Embedded mobilization and sensitization into the SOP tasks.
- Shortened the duration of the spray campaign because the SOPs sprayed in their home villages, thus doing away with their travel time.
- Reduced number of work days for SOPs.

Challenges:

- The reduced number of work days did not allow SOPs to master the spraying technique. Normally after the supervision visit, the SOP has time to practice and to correct what he/she did not do well in the beginning. But in the pilot the time for spraying was so short that the SOP didn't have time to improve the needed skill.
- More trainers and facilitators were required to train all the village-based mini SOP teams.
- Payment of SOPs via mobile phones was challenging because not all SOPs had a mobile phone and not every village had a place to get cash. Because of two-week payment policy AIRS Mali set up with the mobile service provider for the spray campaign, the SOPs had to wait for almost two weeks to receive their small earnings.
- AIRS Mali reduced the daily rate for SOPs participating in the pilot because they worked in their home villages. However, the team kept the same spray schedule (two days per village) as in past years. That is, under the traditional approach, five SOPs spray a village in two days; under the Village/Neighborhood approach, AIRS Mali had to hire more than five SOPs at times to complete the job in a timely manner, thereby increasing the cost.

Preliminary calculations indicated that savings obtained on fuel, taxis, shortened duration, and simplified mobilization were used to pay the wages of the increased number of SOPs hired for the pilot. Although some stakeholders appreciated this approach in regard to its potential sustainability, AIRS Mali is not planning to roll out this approach in 2017; it will continue using MSPs and taxis as part of the traditional IRS model.

4.3.2 MOBILE PAYMENTS

Many projects have used mobile money to pay seasonal staff for some time. AIRS Mali tested this payment method in 2015, in Koulikoro district. The project used Orange Money, a local mobile phone operator, to transfer payments. The method was much less costly than AIRS Mali's earlier payment practice of hiring vehicles and armed soldiers to transport cash. Vehicle rental in particular was very costly. Table 7 shows how the total cost of paying seasonal staff has fallen from 2012 through 2016.

In 2016, the project expanded mobile payment to the two other districts, Baroueli and Fana. The one problem that did arise was delays in payment in many areas, due to errors in recording phone numbers and some seasonal staff lacking phones. Another reason for delay was shortage or lack of cash in the Orange agents' shops.

TABLE 7: COST OF SEASONAL WORKERS PAYMENT, 2012-2016

2012 (3 districts)	2013 (3 districts)	2014 (3 districts)	2015 (2 districts, 1 of them with mobile payment)	2016 (3 districts, all with mobile payment)
US\$ 25,390	US\$ 26,476	US\$ 24,793	US\$ 7,421	US\$ 5, 920

Note: Cost include bank fees, 1 travel and transport only; excludes workers' wages.

4.3.3 GOIZPER PUMPS

For the 2016 campaign, AIRS Mali replaced its old stock of Hudson pumps with an improved model of Goizper pump. The program purchased 754 units.

One advantage of the Goizper pumps is that they have control flow valves incorporated in the design. This allows the pump to maintain a constant pressure and, therefore, optimize use of insecticide. With Goizper pumps AIRS Mali used on average one bottle of OP to spray 2.7 structures, more than the 2.5 structures per OP bottle the program sprayed with Hudson pumps. This was an unexpected but significant positive finding, which left the project with a higher-than-projected stock of insecticide at the end of the campaign, a savings for next year.

Another advantage of the Goizper pump is its weight. It is light weight compared with the Hudson and this made the spray task attractive to the women who practiced with the pumps during the training.

The issue that some SOPs encountered while using the Goizper pumps was a black rubber residue that formed on the inside of the pumps. SOPs needed additional time and soap to wash the inside of the pump, which meant they had to stay longer at the operational site after returning from the villages. The manufacturer has agreed to look into the matter.

4.3.4 MHEALTH ACTIVITIES: SMARTPHONES FOR SUPERVISION, SMS FOR DAILY REPORTING

Since 2013, AIRS Mali has used smartphones to conduct environmental compliance inspections before, during, and after the IRS campaign. In 2016, with support from Dimagi, the PMI AIRS project technology partner, the Mali team extended the use of smartphones by the community supervisor to conduct routine supervision during IRS. In addition, Dimagi introduced the use of Java-enabled phones to transfer daily spray progress data via text messages, also called the Performance Management Tracker (PMT).

There were challenges with implementation of both activities, though continued use and retraining facilitated better performance later in the campaign. The main problems were:

- Confusion regarding delivery receipt message
- Incomplete internet coverage in geographical area from which supervisors are trying to send completed supervisory forms via smartphone
- Data collection forms were not completely appropriate for Mali context
- Date format for PMT used a US-based format, which added to number of error messages
- Too many SMS job aids were sent to the seasonal workers, which overloaded the phone credit and slowed down the transmission.

The team made the following recommendations, which will be implemented for the 2017 campaign:

- Raise the education level of community team leaders and supervisors to better use basic phones and smartphones including better understanding of delivery receipt messages
- Provide funds to buy fuel so supervisors can travel to areas with better internet access to send the data to the server
- Ensure collection forms are fully adapted to Mali context before the start of the campaign
- Change the date format in the syntax used for SMS to reflect the francophone format for date, i.e., DD/MM/YYYY
- Reduce the frequency of messages sent to actors by the Gateway phone

- Consider reconfiguring the gateway to reply, at most, two times in order to manage the loaded phone credit
- Allocate one full day at the mHealth tools training to practicing PMT system in order to master the system before the campaign starts
- Make sure the geographical information in the system matches the information provided in the mHealth Implementation Handbook.

The AIRS Mali and Dimagi team will start working on addressing these problems significantly in advance of the 2017 campaign.

4.3.5 DIRECTLY OBSERVED SPRAYING

In 2016, the PMI AIRS Project home office has developed a new procedure to enhance spray performance of SOPs. The project established this procedure, Directly Observed Spraying (DOS), in response to growing concerns about spray quality and the level of supervision by team leaders observed in some AIRS counties. Equipped with an 11-question checklist, each team leader had to observe each SOP of his/her team once a day every day and record the results on the spot. Monitors delivered these records to the data entry center every day for entering in a database. At the end of each week, the Monitoring and Evaluation (M&E) manager produced a report that he shared with the operations manager, district coordinators, and the home office team for corrective feedback on the ground. For example, the following are results from two questions, for the period July 9–August 12, 2016:

- Existence of leaking pump: 25.6 percent in Baroueli, 4.6 percent in Koulikoro, and 11.24 percent in Fana
- No spray with valve: 0.44 percent in Baroueli, 0.14 percent in Koulikoro, and 4.2 percent in Fana

4.4 STOCK MANAGEMENT DURING THE IRS CAMPAIGN

Good management of the PPE stock and especially the insecticide is a major priority during an IRS campaign. There must be a balance in the procurement, storage, and consumption of products, so nothing is out of stock.

4.4.1 ELECTRONIC INVENTORY MANAGEMENT

As it did in the preceding two years, in 2016 AIRS Mali used a program that allows it to do computerized management of PPE and insecticide stocks at the central (district) and secondary stores. The central warehouse managers in Segou and Koulikoro use an Access-based inventory database. At the end of each spray day, every site storekeeper sends a text message to the central warehouse managers, reporting bottles consumed and remaining full bottles. The district warehouse managers compile this information into a database to produce a daily summary, which is used to predict site stock-outs and resupply the site before the stock-out occurs.

The application works on a simple but effective principle, “perpetual inventory,” which records on a daily basis the movement of insecticide stock (input-output), especially during the campaign. This enables the AIRS Mali office in Bamako to know in real time:

- The inventory of insecticides at the central stores
- The dispatching of supplies from the main store to the secondary store
- The movements of the stock at the central and secondary stores
- The level of supply of each primary and secondary store.

4.4.2 INVENTORY MANAGEMENT AT OPERATIONAL SITE LEVEL

AIRS Mali recruited three district logisticians for the IRS campaign to serve as a link between the operational site storekeepers and the district warehouse managers. The logisticians worked to coordinate supply chains to move needed IRS materials to the appropriate operational site, and to ensure the correct use and accuracy of stock cards for inventory record-keeping. The district logisticians regularly checked with storekeepers regarding their stock levels and, when needed, arranged for the transport of IRS commodities from the district warehouses to the operational sites.

Every morning during the spray campaign, the team leaders, with the storekeepers, would organize, distribute, and sign out all PPE to be used for the spray operations. The storekeepers also organized and distributed all PPE to the washers and other IRS staff as needed. At the end of each day, the PPE was turned over to the washers for cleaning. After the PPE was washed, the washers returned the PPE to the storekeepers and team leaders, who did another inventory count to ensure that all PPE had been returned.

At each operational site, storekeepers handed over to the team leaders the number of bottles of OP that each SOP would use for spraying that day. The team leaders signed an insecticide tracking card to acknowledge receipt of the bottles. The cards also noted the codes of the bottles, for further tracking if needed. The team leader noted on a separate card the number of bottles provided to each SOP and the bottle codes.

At the end of each spray day, SOPs turned in their used and unused bottles to the team leader, who collated these and submitted them to the site storekeeper. The storekeeper recorded the returned full bottles on the stock card as a positive adjustment and updated the stock balance. The used bottles were registered on a daily utilization record form that helped AIRS Mali calculate trends in insecticide use.

Additionally, the storekeepers prepared a comprehensive weekly stock report and submitted it to the district logisticians and the AIRS Mali logistics coordinator, who then generated aggregated total stock balances for the IRS campaign and noted where PPE and insecticide needed to be sent from the district warehouses to prevent stock-outs.

Mid-way through the campaign, the district logisticians completed a physical inventory in each operational site in their districts and reconciled the physical counts with the warehouse inventories in each district. The AIRS Mali logistics coordinator reviewed these mid-campaign inventory balances and used them to send needed IRS commodities to each site during the second half of the campaign.

5. MONITORING AND EVALUATION

M&E for the 2016 IRS campaign closely followed the processes outlined in the 2016 AIRS Mali Work Plan and the M&E Concept Paper developed by the AIRS core team. M&E activities, under the supervision of the Chief of Party (COP), were led by the AIRS Mali M&E manager and the database manager. A previously used secure and reliable Access database was updated by the database manager to reflect minor changes to the 2016 AIRS M&E system, and deployed to the data entry centers in Bamako and Segou. Fifteen data entry clerks worked in the Segou data center, which received data from Baroueli and Fana districts. Eight clerks worked in the Bamako data center. One clerk in each center was responsible for entering DOS data.

5.1 KEY OBJECTIVES

The key objectives of AIRS Mali M&E activities are:

- To emphasize accuracy of both the data collection and data entry processes through comprehensive training and supervision at all levels
- To streamline and standardize data flow, minimize errors, and facilitate timely reporting
- To ensure IRS data security and storage for future reference through the establishment and enforcement of proper protocols
- To document lessons learned and good practices observed in the implementation of the project activities and apply these to future project years

5.2 DATA MANAGEMENT

The AIRS Mali team made revisions to the data collection process to reflect the updates to the AIRS M&E system for the 2016 spray campaigns, such as installing cleaner software on the computers of the data entry clerks. As noted above, all updates were incorporated into the Access database to ensure accuracy and consistency of data entry and reporting.

Data clerks entered spray data into the database and transmitted the results to the AIRS Mali office in Bamako within 24 to 48 hours of spray for quality control purposes and the timely generation of weekly progress reports. It is important to mention the delivery of data collection forms from community-level entry center, especially in the new district Fana, often took three to four days, not one day as planned. This was because a bridge had been flooded out, closing a road, and monitors responsible for transporting data collection forms were not able to reach the health areas on the other side of the river. Once the data were entered, paper forms were filed and temporarily archived at the data centers. Eventually, all the forms were transferred to the AIRS Mali office in Bamako for long-term storage. A daily electronic back-up of the data was saved to the AIRS Mali server and to an external hard drive for data safety.

5.3 DATA QUALITY ASSURANCE AND QUALITY CONTROL

Data quality assurance was carried out daily during the IRS campaign by a variety of AIRS staff (SOPs, team leaders, district coordinators, M&E manager, database manager, etc.). Specific activities conducted to ensure data quality included:

Physical Data Verification:

- SOP level: Team leaders and the supervisors reviewed, arithmetically verified, and signed off on all Daily Spray Operator Forms.
- District level: District coordinators received the paper forms from the supervisors and checked the accuracy of the spray data. Afterward, the monitors delivered the Daily Spray Operator Forms to the data centers each evening.
- Data entry level: Data clerks reviewed each form for typos and transcription errors and verified the arithmetic calculations on the Daily Spray Operator Forms were correct before enter the data into the database.

5.4 M&E DATA QUALITY ASSURANCE TOOLS AND RESULTS

AIRS Mali had used three data quality assurance tools. These tools focus specifically on data quality assurance methods. After some initial struggles due to the conversion of the data collection verification form into an electronic version, the users learned how to navigate the form on a smart-phone. Tables 8 and 9 show the percentage of records verified by AIRS Mali in 2016 using each data quality assurance tool.

TABLE 8: TYPES OF M&E SUPERVISORY TOOLS USED AND DATA CHECK RESULTS

M&E Supervisory Tools	Structure Records Verified	Structure Records Corrected	Percent of Records Correct
Error Eliminator (Support 17 form)	6,028	1,085	82%
Data Collection Verification (Support 15 form)	5,137	872	83%
Data Entry Verification (Support 16 form)	2,065 lines	309	85%

TABLE 9: DIRECTLY OBSERVED SPRAYING RESULTS

District	Total cases of supervision	SOP mix the insecticide to form a 7.5l solution? (NO)	Triple rinse of empty bottles (NO)	Full PPE on (NO)	Spray with valve (NO)	Removing food, and animals (NO)	Items inside Covered (NO)	Leaks from pump (YES)	Spray at 45 cm of wall (NO)	Maintain speed of spray (NO)	Respect for overlap band (NO)	House properly marked (NO)
Koulikoro	3,660	0	0	0	5	15	56	168	13	4	1	2
Baroueli	3,664	1	0	11	16	12	24	938	20	19	7	19
Fana	4,245	0	5	1	178	11	4	477	10	0	0	3
Total	11,569	1	5	12	199	38	84	1,583	43	23	8	24
% of correct answers		99.99	99.96	99.90	98.28	99.67	99.27	86.32	99.63	99.80	99.93	99.79

5.5 RESULTS

The complete list of all program indicators for the 2016 spray campaign is presented in the M&E Plan matrix in Annex F. The following sections provide summaries on the core PMI indicators and other spray indicators.

5.5.1 SPRAY COVERAGE

The 2016 AIRS Mali campaign sprayed 228,672 of the 235,394 structures found, for spray coverage of 97.14 percent. In total, 788,922 people were protected, including 20,813 pregnant women and 135,754 children under five, as seen in Table 10. Table 11 breaks down population protected by gender.

TABLE 10: SPRAY COVERAGE AND POPULATION PROTECTED

District	Eligible Structures Found	Structures Sprayed	Spray Coverage	Population Protected (Total)	Children <5 Protected	Pregnant Women Protected
Koulikoro	68,583	66,181	96.50%	240,947	41,994	9,003
Baroueli	73,819	71,333	96.63%	279,135	47,869	6,427
Fana	92,992	91,158	98.03%	268,840	45,891	5,383
Total	235,394	228,672	97.14%	788,922	135,754	20,813

TABLE 11: POPULATION PROTECTED, BY GENDER AND DISTRICT

District	Total Population Protected		
	Male	Female	Total
Koulikoro	120,449	120,498	240,947
Baroueli	141,532	137,603	279,135
Fana	133,406	135,434	268,840
Total	395,387	393,535	788,922

5.5.2 INSECTICIDE USAGE

Table 12 shows insecticide availability and use in 2016. In total, 84,571 bottles of insecticides were used to spray 228,672 structures. On average, 2.7 structures were sprayed per bottle of insecticide. The leftover amount of 10,889 bottles will be used during the spray campaign in 2017.

TABLE 12: INSECTICIDE USAGE DURING THE 2015 IRS CAMPAIGN

Organophosphates	Balance
OP balance before the spray campaign began	5,757
OP procured for the 2016 campaign	89,703
Total number of insecticide bottles available for 2016 campaign	95,460
OP bottles used during the 2016 IRS campaign	84,571
Balance after the completion of the campaign	10,889

6. ENVIRONMENTAL COMPLIANCE

6.1 ENVIRONMENTAL DOCUMENTATION

A Supplemental Environmental Assessment (SEA) was prepared for IRS in Mali for 2016-2021. Earlier environmental documentation, for PMI-supported IRS in Mali, authorized the use of pyrethroid, carbamate, and organophosphate classes of the World Health Organization Pesticide Evaluation Scheme (WHOPES)-recommended pesticides nationwide in Mali from 2011 to 2015, and was prepared in accordance with the provisions of USAID 22 CFR (216) regarding the use and application of pesticides. The current SEA reauthorized the use of the same three classes of WHOPES-recommended insecticides, and expanded the authorization to include the use of chlorfenapyr (when recommended by WHOPES). The SEA also maintained the nationwide geographical coverage of authorized PMI-supported IRS, including a new district, Fana, and included authorization for small-scale, closely-supervised hut trials using new IRS insecticides, such as chlorfenapyr, once the insecticide has been submitted for Phase III WHOPES evaluation and country-level required documentation has been submitted.

6.2 MOBILE SOAK PIT AND TYVEK SUIT PILOT

The 2016 campaign was the second year of MSP use in Mali, after being piloted in 2014. Until 2014, AIRS Mali had used permanent soak pits only. This year, the project used the MSP in 26 out of 63 health areas: 14 in Fana district, six in Baroueli district, and six in Koulikoro district. This helped AIRS Mali to continue improving its environmental compliance, time management, cost efficiency, and SOP convenience during the campaign.

Based on a successful use of Tyvek, a disposable coverall suit made out of light material, during an insecticide repackaging activity in Ethiopia, the PMI AIRS team asked AIRS Mali to test the Tyvek suits during the 2016 spray campaign. The suits were tested in three sites: Tienfala (Koulikoro district), Banido (Baroueli district), and Korokoro (Fana district). The objectives of the test were to demonstrate that:

- Tyvek suits can be used in place of cloth (cotton/polyester) overalls for IRS.
- Tyvek suits offer the same or better protection from insecticide contact with skin.
- Tyvek coveralls provide equal or greater comfort on hot days.
- Maintenance and end-of-day decontamination are easier and less resource-intensive.
- The use of wet wipes allows SOPs to clean their hands, sleeves, front upper body, and face shields in order to facilitate mid-day hydration.

This test showed that all SOPs liked the Tyvek suits, as they were able to take a drink break while still in the suit. The suit also provided them better protection from insecticide exposure. However, they also reported that they sweated more in the Tyvek suits than in cotton/polyester coveralls, which is a regular IRS issue.

6.3 PRE-SEASON ENVIRONMENTAL COMPLIANCE ASSESSMENT

In accordance with the 2016 action plan, the Pre-Season Environmental Compliance Assessment (PSECA) took place March 21–May 4 in the 41 operational sites in Koulikoro and Baroueli districts. On May 12–19, the project team worked in Fana district to identify 21 new storerooms and soak pit sites. An inspection team led by the AIRS Mali ECO and comprising representatives from the MOE and NMCP carried out site identification and the subsequent PSECA. The objectives of this inspection were to:

- Review the location and physical condition of soak pits and insecticide storerooms
- Verify that sufficient quantities of PPE and hygiene items are available
- Identify problems related to the storage of insecticides and equipment;
- Verify that the district health center has doses of Atropine available
- Write a report containing the recommendations and a plan to rectify any problems identified;

A smartphone was used to collect the PSECA data for each site. The data were sent to Abt Associates' home office server, which automatically forwarded information on identified problems and issues to the COP, operations manager, and ECO.

The PSECA provided a list of findings, including operational site-specific strengths and weaknesses. In response, site-specific recommendations were developed. Common strengths and areas that needed improvement are listed below:

Aspects of operations sites found in compliance

- Secondary stores were available in almost all health areas.
- Storage facility and area soak pits were located an adequate distance from sensitive receptor.
- Soak pit fences were in good condition.
- Danger signs were visible at the store level and washing area fences.
- All soak pits and storage facilities were closed with heavy slabs.
- Stores were in good condition at almost all the sites visited.
- Atropine was available at district health centers and in almost all operational site-level health centers.

Aspects of operations sites needing improvement

- Areas surrounding soak pits were covered with grass/debris.
- Cracks were visible in the concrete of the washing areas.
- Some line supports (used for drying coveralls) needed repair.
- Padlocks needed to be replaced.
- Some windows were missing bars and screens.
- In some health areas, antidotes for pesticide were not available in nearby health facilities.

All repairs needed to bring facilities into compliance were performed before the campaign started.

6.4 MEDICAL CLEARANCES

Before being contracted, IRS team members (SOPs, team leaders, supervisors, washers, and storekeepers) had to undergo a medical check; these were conducted in each operational site by the site's DTC. The purpose was to select only workers who were physically and medically fit to do the work expected of them. In addition, pregnancy testing and counseling were provided for every woman who might have contact with pesticide. This is to avoid the recruitment of pregnant and lactating women for these positions.

6.5 MANAGEMENT OF INSECTICIDE ADVERSE EFFECTS

All spray team members (SOPs, team leaders, supervisors, washers, and storekeepers) were trained on the dangers of OP, general safety, and other best management practices of handling pesticides including the use of PPE during operations. They also received instruction on the use of spill kits and first aid kits.

Drivers hired to transport IRS commodities and spray teams received some orientation in the field on the correct methods to secure and safely handle insecticides. Participants also learned how to manage an insecticide spill, and safely clean vehicles after each day of the IRS campaign.

A training session was organized in each district by the health practitioners (DTCs) and supervised by the coordinators. The training went over the correct protocols and methods to be followed to treat any cases of insecticide poisoning that occurred during the IRS campaign.

6.6 INCIDENTS

During the 2016 IRS campaign, AIRS Mali reported two vehicular accidents. The first, in the Konobougou health area, resulted in the death of a pedestrian; the second, in the Mena health area, resulted in a fractured bone of an SOP. The team completed the incident reports and submitted them in less than 24 hours to the home office using a smartphone-based form. AIRS Mali has repeatedly asked local police to produce a report on the first accident, but the police have not done so.

6.7 MID-SPRAY INSPECTION

To be more vigilant about worker safety and environmental compliance issues, two teams of seven inspectors performed inspections throughout the 2016 campaign. Two teams comprised the AIRS Mali ECO and six representatives from the MOE (from environmental services at the national, regional, and district levels). The main practices the inspections sought to enforce were: no eating/drinking during IRS operations; keeping poultry and other livestock, children, and pets away during spraying; secure transport of operators and insecticides; triple rinsing, checking, and collecting empty insecticide bottles; having full first aid and spill management kits available at stores; carrying out the washing process at the end of the day as per best management practices; keeping teams supplied with soap and water (for cleaning); and providing the necessary information, education and communication (IEC) information to homeowners during spraying.

The inspections identified the following areas for improvement:

- Pesticides were not mixed with the household resident present.
- Many households did not keep poultry away from the structure during spray operation.
- Some SOPs did not correctly use the MSP and they did not fill spray pumps using the waste water from the previous day.

- Some stores lacked laminated danger signs (printed ones were immediately provided).
- SOPs at some sites failed to triple rinse empty bottles.

All of these compliance issues were resolved in collaboration with the operations manager.

It is important to note that each inspection team had a smartphone for filling checklists and sending them to the server in Bethesda; the feedback from the server was sent to the COP, operations manager, and ECO for corrective action.

6.8 WASTE MANAGEMENT PLAN

At the end of campaign, all waste was collected and transported to the central warehouses at Segou and Koulikoro. All empty OP bottles will be rigorously washed with detergent and pierced at the bottom before handing over to the partners contracted for recycling. From warehouses, bottles and others plastic waste will be transported to the recycling partner's site in Bamako.

Other wastes like contaminated masks and paper will be incinerated by trained operators at the AIRS Mali incinerator at Noumoubougou landfill.

The detailed environmental monitoring and mitigation report on 2016 IRS is in Annex E.

7. ENTOMOLOGY

This chapter summarizes entomological data collected between July and August 2016 before (baseline) spraying and one month after the end of the IRS campaign. A comprehensive report of the entomological monitoring will be provided at the end of field work and laboratory.

7.1 SENTINEL SITES

AIRS Mali is collecting data on key entomological indicators (all PMI primary and three secondary entomological indicators: vector infectivity, age grading, and blood meal origin) from seven surveillance sites (Table 13). Three of the sites are located in the IRS targeted districts; the other four are located in non-spray areas and will serve as control areas. Data on insecticide resistance will be collected in six additional sites, bringing the total number of resistance monitoring sites to 13.

TABLE 13: IRS ENTOMOLOGICAL SURVEILLANCE SITES FOR 2016

Region	District	Health Area	Site (village)	Spray Status	Geographic Zone
Koulikoro	Kati	N'gabakoro-droit	Sala	Non-sprayed (control)	Northern Sudanese
	Koulikoro	Tienfala	Tienfala	Sprayed	
	Fana	Fana central	Guana	Sprayed	
	Dioila	Dioila central	Kola	Non-sprayed (control)	
Segou	Baroueli	Tigui	Diaka Were	Sprayed	
	Segou	Zambougou	Kegnebougou	Non-sprayed	
	Bla	Touna	Djina	Non-sprayed (control)	

7.2 QUALITY ASSURANCE OF IRS PROGRAM AND RESIDUAL EFFICACY MONITORING

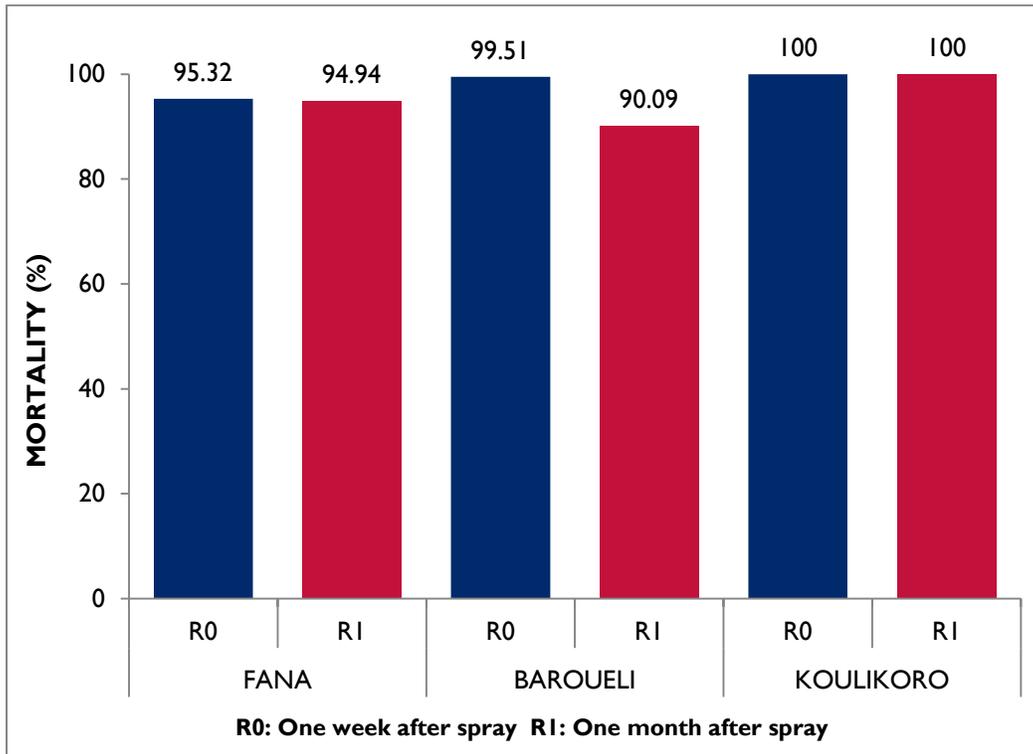
At the beginning of July 2016, AIRS Mali sprayed Koulikoro, Baroueli, and Fana districts with pirimiphos-methyl (Actellic 300 CS). To assess the quality and homogeneity of spraying on walls, cone tests with AIRS insectary-reared *An. gambiae* Kisumu susceptible strain were performed. Bioassays were performed one to two days after IRS, following World Health Organization (WHO) procedures. Cone bioassays were conducted in 19 structures in the three IRS target districts after (Table 14).

TABLE 14: RESULTS OF QUALITY ASSURANCE CONE BIOASSAY TESTING FOLLOWING IRS (JULY 2016)

Cone Position	No. Structures	No. Mosquitoes	No. Mosquitoes Knocked Down 30 Min	% Knock Down 30 Min	No. Mosquitoes Knocked Down 60 Min	% Knock Down 60 Min	No. Mosquitoes Dead after 24 Hrs.	% Observed Mortality
Top	19	224	55	24.6%	158	70.5%	219	97.8%
Middle	19	222	33	14.9%	164	75.7%	222	100%
Bottom	19	226	58	25.7%	164	72.6%	225	99.6%
Total test	57	672	146	21.7%	486	72.3%	666	99.1%

The results showed good-quality spraying in all three districts. There was no difference in the mortality rates (97.8 to 100 percent) of mosquitoes exposed to the sprayed walls at three different heights. This shows that the spraying was homogeneous. In August, one month after spraying, the mortality rate was 94.9 percent in Fana, 90.1 percent in Baroueli, and 100 percent in Koulikoro (Figure 2).

FIGURE 2: MORTALITY RATES OF AN. GAMBIAE KISUMU FOLLOWING CONE BIOASSAY ON WALLS, ONE WEEK AND ONE MONTH AFTER SPRAYING ACTELIC 300 CS (JULY AND AUGUST 2016)



7.3 ENTOMOLOGICAL SURVEILLANCE

Entomological monitoring is needed to evaluate the quality and the impact of IRS. The indicators assessed by PMI AIRS Mali are:

- Malaria vector species composition
- Vector biting rates, density and parity rates in control and IRS target sites
- Vector feeding time and location (indoors or outdoors)
- Vector susceptibility to insecticides approved for IRS and resistance mechanisms

In 2016, baseline entomology data were collected in the seven health areas listed in Table 13 (Section 7.1). Human landing catches (HLC) and CDC light traps were used to determine human biting rates (HBR). Pyrethrum spray catches (PSC) inside houses were used to assess indoor resting densities of malaria vectors. The results showed that *An. gambiae* s.l. is the predominant species complex captured in all surveyed sites.

Early morning collection of mosquitoes using PSC allowed us to evaluate in each site the mean number of *An. gambiae* s.l./house/day. Indoor resting densities of *An. gambiae* s.l. for the sprayed sites and control sites are presented in Table 15. Pre-spray densities in July were low for all sites except Bla (7.4 per house per night). The mean densities increased in sprayed sites from a mean of 0.6 in July (pre-spray) to 4.4 per house per night in August (post-spray). In the control sites there was a mean density of 17.4 *An. gambiae* s.l./house/night in August, compared with 2.7 in July.

TABLE 15: INDOOR RESTING DENSITIES OF AN. GAMBIAE S.L. IN SPRAYED AND UNSPRAYED CONTROL SITES (JULY AND AUGUST 2016)

Period	Parameters	Sprayed Sites				Control Sites				
		Koulikoro	Fana	Baroueli	Mean	Kati	Dioila	Segou	Bla	Mean
July (R0)	N collected	24	7	6	37	17	45	7	147	216
	N houses	20	20	20	60	20	20	20	20	80
	Density (An/h/d)	1.2	0.4	0.3	0.6	0.9	2.3	0.4	7.4	2.7
August (R1)	N collected	113	127	21	261	412	147	315	514	1388
	N houses	20	20	20	60	20	20	20	20	80
	Density (An/h/d)	5.7	6.4	1.1	4.4	20.6	7.4	15.8	25.7	17.4

An/h/d: *An. gambiae* s.l./house/day

HBR information is presented for July (before spraying) in Table 16 and for August (after spraying) in Table 17. Before spraying, HLC revealed *An. gambiae* s.l. biting rates of 9.5 b/m/n indoors and 4.8 b/m/n outdoors in Koulikoro (spray district). The vectors seemed to be primarily endophagic in this site. The same behavior was observed in Fana (spray district), Dioila, Ségou, and Bla (control districts). Very low biting rates were recorded in Ségou, Bla, and Baroueli.

In August, data from HLC indicate *An. gambiae* s.l. biting rates in Koulikoro, an IRS site, increased outdoors fivefold from the baseline. In Kati (control site), the *An. gambiae* s.l. HBR was 59.5 b/m/n indoors and 52.3 b/m/n outdoors, both of which also are fivefold increases from the baseline. Overall, except for Baroueli, a large increase in the biting rate was noted indoors and outdoors in all sites. This strong increase was more pronounced in the control sites.

TABLE 16: INDOOR AND OUTDOOR BITING RATES OF AN. GAMBIAE S.L. IN SPRAYED AND UNSPRAYED CONTROL SITES BEFORE SPRAYING (JULY 2016)

Location	Parameters	Sprayed Sites				Control Sites				
		Koulikoro	Fana	Baroueli	Mean	Kati	Dioila	Segou	Bla	Mean
Indoors	N collected	38	19	0	57	45	23	1	4	73
	Man night	4	4	4	12	4	4	4	4	16
	HBR (b/m/n)	9.5	4.8	0	4.8	11.3	5.8	0.3	1	4.6
Outdoors	N collected	19	2	0	21	42	13	0	1	56
	Man night	4	4	4	12	4	4	4	4	16
	HBR (b/m/n)	4.8	0.5	0	1.8	10.5	3.3	0	0.3	3.5

b/m/n: bite/man/night

TABLE 17: INDOOR AND OUTDOOR BITING RATES OF AN. GAMBIAE S.L. IN SPRAYED AND UNSPRAYED CONTROL SITES AFTER SPRAYING (AUGUST 2016)

Location	Parameters	Sprayed Sites				Control Sites				
		Koulikoro	Fana	Baroueli	Mean	Kati	Dioila	Segou	Bla	Mean
Indoors	N collected	37	144	0	181	238	136	47	36	457
	Man night	4	4	4	12	4	4	4	4	16
	HBR (b/m/n)	9.3	36	0	15.1	59.5	34	11.8	9	28.6
Outdoors	N collected	98	54	0	152	209	139	35	39	422
	Man night	4	4	4	12	4	4	4	4	16
	HBR (b/m/n)	24.5	13.5	0	12.7	52.3	34.8	8.8	9.8	26.4

b/m/n: bite/man/night

8. POST-SPRAY ACTIVITIES

The 2016 IRS campaign was completed on August 12, 2016. This chapter discusses activities implemented after the campaign was completed.

8.1 POST-SPRAY MEETINGS

In August, AIRS Mali staff held a review meeting in each spray district. DTC, ASACO leaders, village chiefs, and representatives from community women's and youth associations, local NGOs, and mayors and prefects attended the meetings. Where possible, seasonal IRS campaign staff including SOPs, team leaders, district coordinators, and storekeepers also attended the meetings. The meetings provided an opportunity for community members to jointly assess the 2016 spray campaign and provide recommendations for improving IRS programming in 2017.

8.2 POST-SPRAY INVENTORY

Starting in August, the project team returned all PPE and insecticide and other consumables left over from the 2016 IRS campaign to the district warehouses, where the AIRS Mali logistics coordinator and district warehouse managers inventoried them. The results of the inventory are included in Annex A. Major statements regarding the current inventory follow:

- In 2016, AIRS Mali procured new coveralls, face shields, and brackets for face shields. This improved SOP performance.
- AIRS Mali purchased 15 new motorbikes. They arrived in time for the campaign start and made the use of old and unreliable motorbikes unnecessary.
- The project replaced Hudson spray pumps, not updated since 2008, with the new improved Goizper pumps.
- OP insecticides take up a lot of space due to packaging; both central warehouses (Koulikoro and Segou) needed to be expanded. The owner of the Segou warehouse successfully enlarged the space prior to 2016 campaign.

8.3 POST-SPRAY CAMPAIGN RADIO PROGRAMS

Two weeks after the end of IRS campaign, 15 radio broadcasts in Baroueli, Koulikoro, and Fana districts offered short messages and programs that reinforced information on the following topics:

- The advantages and importance of sleeping in sprayed structures, to prevent malaria transmission
- The importance of continuing to use insecticide-treated bed nets even after the spraying
- Sprayed walls should not be painted or plastered until January, to allow the insecticide to remain effective against mosquitoes
- General information on malaria transmission, prevention, and treatment

9. CAPACITY BUILDING ACTIVITIES

NMCP and DNACPN were involved at all stages of implementation, including planning, training, and supervision. The project successfully implemented the following activities as part of its 2016 capacity building:

- An entomological technician from the NMCP participated in an international training of entomologists organized by the project home office team and held on May 23–28, 2016 in Dakar, Senegal.
- Central-level government personnel – two staff each from the NMCP, MOH, MOE, and DNACPN – attended a two-day (June 6–7) workshop that introduced them to different components of IRS (planning, environmental compliance, training, and implementation). The objective of the workshop was to help build a knowledge base, share tools, and discuss options about IRS among these personnel, so they can play a more active role in IRS implementation.
- In 2016, the supervisory forms updated in 2015 were managed by district coordinators, district malaria focal points, and supervisors who played a more active role in ensuring the forms were filled out and used for decision making throughout the campaign. Therefore, these staff were engaged in the management and implementation of the supervisory tools. They reviewed the forms on a daily/weekly basis to monitor their use and troubleshoot any issues.
- The supervisors from national, regional, and district levels were oriented to the use of smartphones prior to conducting the supervision of IRS campaign.

10. GENDER

The project intensified the recruitment of women to serve as seasonal staff during the 2016 campaign. As mentioned earlier in the report, AIRS Mali organized community discussions to introduce the new IRS strategies to the various district and community leaders. As part of these discussions, AIRS Mali also highlighted the importance of engaging more women in IRS implementation. The project team clarified what measures it takes to make sure the workspace for female staff was comfortable and requested support of the leaders in involving more females in the spray campaign. The leaders agreed, and kept their promises. As a result, the number of women hired for IRS increased during the campaign by 11 percent, from 16.5 percent in 2015 to 27.9 percent in 2016. Table 18 compares the numbers women trained in 2015 and 2016.

TABLE 18: STAFF TRAINED BY GENDER, 2015 VS 2016

Categories of Persons Trained	2015 (data from Baroueli and Koulikoro only)				2016			
	Male	Female	Total	Percent Female	Male	Female	Total	Percent Female
DTC	37	4	41	10%	56	7	63	11%
District coordinators	2	0	2	0%	3	0	3	0%
Spray operators	357	34	391	9%	622	277	899	31%
Data clerks	5	10	15	67%	8	15	23	65%
Community supervisors	40	1	41	2%	59	4	63	6%
Team leaders	97	12	109	11%	161	30	191	16%
Washers	0	70	70	100%	0	128	128	100%
Logisticians	2	0	2	0%	3	0	3	0%
Secondary warehouse keepers	33	8	41	20%	46	16	62	26%
Central warehouse keepers	2	0	2	0%	2	0	2	0%
Doctors involved in treating cases of poisoning	36	4	40	10%	56	7	63	11%
Mobilizers	376	78	454	17%	0	0	0	0%
Entomology technicians	10	5	15	33%	9	6	15	40%
Guardians	40	0	40	0%	61	0	61	0%
Drivers (moto, minibus, pick-up)	89	0	89	0%	165	0	165	0%
Radio hosts	16	0	16	0%	15	0	15	0%
TOTAL M/F	1,141	227	1,368	16.5%	1,266	490	1,756	27.9%

II. LESSONS LEARNED AND RECOMMENDATIONS

- SOPs appreciated AIRS Mali's adoption of Goizper pumps because of their light weight, their incorporated valve, and their design that enabled the SOPs to carry the pumps' weight equally across both shoulders. In 2017, The PMI AIRS Project should ensure that the manufacturer corrects the issue of black rubber residue
- Community mobilization and negotiation are effective ways to introduce a new strategy or other innovations to the community.
- The Village/Neighborhood approach had both advantages and disadvantages. One of the key disadvantages was the requirement for a high number of trainers to train multiple mini SOP teams in various locations almost simultaneously. If to do this again, the project will consider aggregating trainees in one place for the main SOP training and then send them back to the villages for implementation. The advantage of the approach was that SOPs were conducting awareness/sensitization of households at the same time as spraying, which helped to keep a high acceptance rate especially in Fana district.
- Future geographical reconnaissance should be done in conditions similar to those of the spray season. Geographical reconnaissance in Fana, carried out in the dry season, failed to forecast the impassible road conditions of the rainy season, and this delayed data reporting.
- Mobile payment of seasonal employees should be continued in 2017 but AIRS Mali staff must first be sure to collect correct phone numbers for all employees who will be paid in this way.
- Use of mHealth tools also should be continued in 2017 after the supervision and reporting issues enumerated in Section 4.2.4 are addressed.

ANNEX A: 2016 POST-IRS INVENTORY

TABLE A-I: KOULIKORO DISTRICT INVENTORY

Item Description	Balance after 2015 IRS Campaign	Number of Items Procured	Stock Before Campaign	Consumed/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2017
International Procurement					
Insecticide, Actellic 300CS	3,066	25,812	28,878	21,769	10,889
Spray Pump Goizper	5	206	211	-	211
Helmet	253	46	299	-	299
Red Bright Vest	40	0	39	1	39
Green Bright Vest	77	0	77	3	74
Gumboots	335	41	376	-	376
Coverall	626	0	626	-	626
Coverall (additional purchase)	0	74	74	24	50
Wipes /"lingette"	0	25	25	03	22
Thermometer, Simple /or Electronic	20	0	20	01	19
Gloves	315	841	1156	534	622
Gloves for Incineration	01	0	01	0	01
Respirator Mask	7,560	11,160	18,720	9,360	9,360
Face Shield	362	0	362	2	360
Support Face Shield	835	100	935	155	780
Complete Handle /Goizper	0	40	40	10	30
Hose /Goizper	0	10	10	01	09
Team leader survey kit 7.5 /Goizper	0	50	50	0	50
Pressure regulator /Goizper	0	10	10	04	06
Fan even nozzle /Goizper	0	250	250	0	250
Filter simple /Goizper	0	250	250	0	250
Safety valve 2.5 bar /Goizper	0	100	100	7	93
Assembly (583,1175,19) /Goizper	0	150	150	9	141
Filter with gaskets /Goizper	0	100	100	6	94
Lance tube /Goizper	0	75	75	02	73
DISC HC 80 0.2 /3/Goizper	0	273	273	0	273
Valve /Goizper	0	100	100	18	82
Collar seal /Goizper	0	30	30	21	9
Nozzle (plastic) 8002E (yellow color)/Goizper	0	0	0	0	0
Spares Kit Hudson	0	0	0	0	0
Nozzle Tip Hardened Stainless Steel (65) 8002E Catalog /Hudson	20	0	20	0	20

Item Description	Balance after 2015 IRS Campaign	Number of Items Procured	Stock Before Campaign	Consumed/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2017
Nozzle Tip Hardened Stainless Steel (65) 8001E Catalog/ Hudson	138	0	138	0	138
Nozzle flow reg Assembly (61) Catalog/153-400E / Hudson	9	0	9	0	9
Pump Filter Strainer (45)/Hudson	207	0	207	0	207
Extension tube assembly only (54)/ Hudson	0	0	0	0	0
Nozzle flow regulator (64)/Hudson	17	0	17	0	17
Cup leather only / Hudson	350	0	350	0	350
Cup retainer (20D) (White)	0	0	0	0	0
Plunger Adaptor (20C) (Black)/ Hudson	247	0	247	0	247
Pump Cylinder Assembly Completed for 3 & 4 Gallon (3 &4 Gallon unit) Catalog (21) / Hudson	57	0	57	0	57
Supply tube only Catalog (14) "resort de régulation"/Hudson	28	0	28	0	28
Pressure Gauge with filter assembled (A)/ Hudson	12	0	12	0	12
Male fitting for strainer housing (43) Catalog	127	0	127	0	127
Valve /spray pump (red color)/ Hudson	32	0	32	0	32
Ring for valve/ Hudson	0	0	0	0	0
Kit (spare part Hudson) small size	15	0	15	0	15
Local Procurement					
Steel Container	01	01	02	0	02
Solar Panel	0	0	0	0	0
Solar Mobile Lamp	12	22	34	02	32
Mobile Soak Pit	10	07	17	0	17
Spatula for Coal Load	14	0	14	0	14
Heavy Battery for Solar Panel	0	0	0	0	0
Electric Inverter	0	0	0	0	0
Ventilator /Wall	5	2	7	2	5
Bucket Plastic 60/ 40/30 Liters	152	0	152	0	152
Bucket Metal 10/15 liters	80	26	106	01	105
Bucket Plastic /15-10-20 Liters	32	0	32	02	30
Waste Bin Hard plastic	36	0	36	0	36
Cup /metal /plastic 1 Liter	59	0	59	02	57
Calibration Cup	183	0	183	44	139
Wood Seat	30	0	30	-	30
Scoreboard	20	0	20	02	18
Shovel with Short Handle	50	20	70	03	67
Fire Extinguisher	24	0	24	0	24

Item Description	Balance after 2015 IRS Campaign	Number of Items Procured	Stock Before Campaign	Consumed/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2017
Operator Bag	165	129	294	197	97
Monitor Bag	06	5	11	6	5
Tent for Mobile Sites	46	0	46	02	44
Life Jacket	07	0	07	0	07
Tarpaulin Simple	61	09	78	34	44
Tarpaulin for Mobile Soak Pit Floor	10	21	31	0	31
Raincoat	279	36	315	315	0
Head Lamp	178	192	370	11	359
Lamp Guard	27	16	43	03	40
Whistle for Guard	28	06	34	04	30
Water Filter	201	10	211	0	211
Plastic Drum/160/200 Liters	170	0	170	0	170
Bar Angle	47	0	47	44	03
Fence	05	12	17	01	16
Metal String 1mm /Roll	02	0	02	0	02
Metal String 2.5mm/Roll	01	0	01	01	0
Pincer	02	0	02	0	02
Adjustable Wrench	04	0	04	0	04
Screw Driver	03	0	03	0	03
Binete/"daba"	23	0	23	01	22
Knife "couteau"	10	0	10	03	07
Tape 10m	08	0	08	02	06
Chair /Wood /indus-	02	04	06	0	06
Desk/Wood /indus-	01	02	03	0	03
Matt/Straw/Plastic	82	0	82	11	71
Flipchart	0	0	0	0	0
Empty Barrel/Metal 200 Liters.	03	0	03	0	3
Plastic Drum /20L	39	41	80	02	78
Metal Digger /"bramine"	09	0	09	0	09
Mobile Phone	0	90	90	0	90
Plastic Operator	304	32	336	0	336
Waste Plastic Bag	320	300	620	230	390
Plastic Roll	0	0	0	0	0
Light Engine 1.20m source Generator	06	04	10	02	08
Ampoule 1.20m source generator	17	0	17	05	12
Light Engine 0.60m source generator	10	0	10	06	04
Ampoule 0.60m source generator	10	0	10	03	07
Ampoule oval source solar panel	0	0	0	0	0
Towel	0	552	552	524	28
Teflon	12	0	12	0	12

Item Description	Balance after 2015 IRS Campaign	Number of Items Procured	Stock Before Campaign	Consumed/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2017
Sweeper Traditional	0	05	05	05	0
Sweeper Industrial	40	48	88	10	78
Stapler	36	0	36	04	32
Envelope A4	50	525	575	350	225
Glue Stick	26	0	26	02	24
Chrono Hard Folder	25	0	25	05	20
Paper Folder	0	900	900	700	200
Filing box	21	0	21	0	21
Cover Cartoon	486	0	486	0	486
Flashdrive	03	0	03	0	03
Ruler 1m	03	0	03	0	03
Ruler 30 Cm	30	0	30	07	23
Paper Punch	01	0	01	0	01
Pin Box of 45 Pins	83	0	83	18	65
Staples box "Agraphes"	90	0	90	50	40
Calculator	43	10	53	09	44
Copybook	0	0	0	0	0
Bloc Notes	0	22	0	22	0
Book Register	11	23	34	27	7
Paper Ream A4	49	0	49	11	38
Sticker for Notes/ pack of 100 Sheet	0	0		0	0
Permanent Marker	1,910	280	2,190	1,060	1,130
Pen Blue	600	500	1,100	950	150
Pen Red	0	0	0	0	0
Plastic Folder with Cover	82	360	442	315	127
Fluid Corrector	02	0	02	0	0
Tape Transparent GF	15	30	45	21	24
Tape / Paper	05	0	05	0	05
Activated Carbon /Kg	18.5	20	38.5	18.5	20
Pregnancy Test	30	92	122	122	0
First Aid Kit	17	100	117	60	57
Soap Bar	624	3600	4,224	2,880	1,344
Soap Powder/Sachet	1,200	23,700	24,900	21,300	3,600
Bleach/"Javel" 1L	22	150	172	40	132
Battery /R20	0	66	66	66	0
Battery AAA	71	2,400	2,471	2,065	406
Battery AA	960	0	960	150	810
Lubricant Box "graisse" 1Kg	02	0	02	0	02
Distilled Water 1L	0	0	0	0	0
Glue Liquid Box 1Kg	02	01	03	01	02

Item Description	Balance after 2015 IRS Campaign	Number of Items Procured	Stock Before Campaign	Consumed/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2017
Oil Motorbike/ quartz 5000 Total /Liter	0	25	25	20	05
Mixing Oil Motorbike 15W40 Shell/liter	0	80	80	40	40
Pump Maintenance Oil	0	100	100	41	59
Motorbike /YBI00 / YBI25	05	05	10	0	10
Motorbike Helmet	05	0	05	0	05
Vilebrequin and Rod Assembly /YBI00	04	0	04	0	04
Tyre Motorbike Front /YBI00	05	0	05	01	04
Tyre Motorbike Back /YBI00	0	0	0	0	0
Tube Motorbike /YBI00	0	0	0	0	0
Tube Motorbike /YBI25	04	05	09	04	05
Wheel /YBI00	01	0	01	0	01
“Segment” YBI00	04	0	04	0	04
“Disque” YBI25	0	0	0	0	0
Odometer /YBI00	0	0	0	0	0
Direction Light Single /YBI00	04	0	04	0	04
Kit Motorbike “(Chain, petit pion, Grand Pion)”/YBI00	0	0	0	0	0
Spare Trailer for Motorbike (roulement) / YBI00	03	0	03	01	02
Motorbike Piston / YBI00	01	0	01	01	0
Boogie /YBI00	05	05	10	05	05
Boogie YBI25	0	0	0	0	0
T-shirts	0	422	422	422	0
Hat	0	433	433	433	0
IRS Card	19,000	33,500	52,500	43,350	9,150
IRS Leaflet	5,000	18,000	23,000	20,716	2,284
Metal sign “not allowed drink eat smoke”	12	0	12	04	08
Metal danger sign “Skull”	15	0	15	03	12
Sticker “not allowed drink eat smoke”	10	40	50	21	29
Danger Sticker “Skull”	10	73	83	10	73
Procedures for Insecticide Transportation	39	35	74	74	0
Procedures for Insecticide Storage	20	31	51	09	42
Booklet on Structure Definition	392	0	392	100	292

TABLE A-2: BAROUELI DISTRICT INVENTORY

Item Description	Balance after 2015 IRS Campaign	Number of Item Procured	Stock Before Campaign	Consumed/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2016
International Procurement					
Insecticide Organophosphates	2,691	62,400	65,091	61,311	3,780
Spray Pump Goizper	10	580	590	-	590
Helmet	652	204	856	02	854
Red Bright Vest (for team leader)	84	0	84	0	82
Green Bright Vest (for SOPs)	214	0	214	34	175
Gumboots	781	234	1,015	0	1,015
Coverall	941	594	1,535	113	1,422
Coverall (additional purchase)	0	150	150	63	87
Wipes / " lingette"	0	54	54	9	45
Thermometer Simple/or Electronic	67	0	67	04	64
Gloves	131	2169	2300	1202	1098
Gloves for Incineration	0	0	0	0	0
Respirator Mask	13,800	22,440	36,240	22,800	13,440
Face Shield	165	400	565	0	565
Support Face Shield	888	250	1138	0	1138
Complete handle /Goizper	0	98	98	54	44
Hose /Goizper	0	28	28	0	28
Team leader survey kit 7.5/Goizper	0	101	101	41	60
Pressure regulator/Goizper	0	31	31	0	31
Fan ever nozzle/Goizper	0	100	100	0	100
Filter simple/Goizper	0	550	550	0	550
Safety valve 2.5 bar /Goizper	0	200	200	40	160
Assembly (583,1175,19)/Goizper	0	200	200	44	156
Filter with gaskets /Goizper	0	200	200	0	200
Lance tube/Goizper	0	163	163	14	149
DISC HC 80 0.2 /3/Goizper	0	200	200	114	86
Valve /Goizper	0	203	203	0	203
Collar seal /Goizper	0	595	595	394	201
Nozzle (plastic) 8002E (yellow color)/Goizper	40	550	590	0	590
Steel Container	02	0	02	0	02
Solar Panel	08	04	12	0	12
Solar Mobile Lamp	14	79	93	0	93
Mobile soak pit	0	23	23	0	23
Spatula for Coal Load	0	0	0	0	0
Heavy battery for solar panel	9	4	13	0	13
Electric Inverter	02	01	03	0	03

Item Description	Balance after 2015 IRS Campaign	Number of Item Procured	Stock Before Campaign	Consumed/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2016
Ventilator /Wall	09	02	11	0	11
Bucket Plastic 60/40/30 Liters	241	0	241	08	233
Bucket metal 10/15 liters	206	0	206	13	193
Bucket Plastic /15-10-20 Liters	26	0	26	02	24
Waste bin Hard plastic	77	0	77	0	77
Cup /metal /plastic 1 Liter	548	144	692	0	692
Calibration cup	336	213	549	70	479
Wood seat	83	0	83	02	80
Scoreboard	48	0	48	0	35
Shovel with short handle	113	40	153	01	145
Fire extinguisher	63	0	63	0	62
Operator Bag	239	324	563	223	340
Monitor bag	9	5	14	07	07
Tent pour sites mobile	49	23	72	01	71
Life Jacket	08	0	08	0	08
Tarpaulin Simple	125	39	164	88	76
Tarpaulin for MSP floor	47	23	70	0	70
Raincoat	667	284	937	293	644
Head Lamp	511	386	897	293	604
Lamp Guard	40	14	54	01	53
Whistle for Guard	68	14	82	34	48
Water Filter	250	50	300	07	293
Plastic Drum/160/200 Liters	574	0	574	0	574
Bar Angle	07	09	16	07	09
Fence	03	28	31	03	28
Metal String 1mm /Roll	49	0	49	07	42
Metal String 2.5mm/Roll	0	0	0	0	0
Pincer	04	0	04	0	04
Adjustable Wrench	07	0	07	0	07
Screwdriver	15	0	15	0	15
Binete/"daba"	17	23	40	05	35
Knife "couteau"	0	0	0	0	0
Tape 10m	04	23	27	01	26
Chair /Wood /indus-	07	0	07	04	03
Desk/Wood /indus-	04	0	04	03	01
Matt/Straw/Plastic	47	0	47	0	45
Flipchart	03	0	03	0	03
Empty Barrel/Metal 200 Liters.	09	04	13	0	13
Plastic Drum /20L	42	74	116	0	116

Item Description	Balance after 2015 IRS Campaign	Number of Item Procured	Stock Before Campaign	Consumed/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2016
Metal digger /"bramine"	0	22	22	0	22
Mobile Phone	0	232	232	0	205
Plastic Operator	921	67	988	216	772
Waste Plastic Bag	220	600	820	653	167
Plastic Roll	0	0	0	0	0
Light Engine 1.20m source Generator	02	0	02	0	02
Ampoule 1.20m source generator	0	0	0	0	0
Light Engine 0.60m source generator	06	0	06	0	06
Ampoule 0.60m source generator	0	0	0	0	0
Ampoule oval source solar panel	09	0	09	0	09
Towel	720	920	1,640	1,608	32
Teflon	35	0	35	0	35
Sweeper Traditional	09	05	14	01	13
Sweeper Industrial	104	86	190	16	174
Stapler	56	0	56	0	50
Envelop A4	225	50	275	200	75
Glue Stick	56	0	56	03	53
Chrono Hard Folder	62	0	62	05	57
Folder Cartoon Simple	0	1,600	1,600	1,600	0
Archive box	310	0	310	38	272
Cover Cartoon	0	0	0	0	0
Flash drive	05	0	05	0	05
Ruler 1m	09	0	09	02	07
Ruler 30 Cm	66	0	66	07	59
Paper Driller	02	0	02	0	02
Pin Box of 45 Pins	143	0	143	33	110
Staples box "Agraphes"	270	0	270	121	149
Calculator	91	58	149	18	132
Copy book	0	0	0	0	0
Bloc Notes	108	30	138	61	77
Book Register	10	49	59	99	0
Paper Ream A4	10	0	10	05	05
Sticker for Notes/ pack of 100 Sheet	20	0	20	05	15
Permanent Marker	2000	570	2,570	2,180	390
Pen Blue	156	850	1,006	968	38
Pen Red	185	0	185	04	181
Plastic Folder With Cover	76	794	870	826	44
Fluid Corrector	0	0	0	0	0
Tape Transparent GF	40	60	100	44	56

Item Description	Balance after 2015 IRS Campaign	Number of Item Procured	Stock Before Campaign	Consumed/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2016
Tape/in paper	0	0	0	0	0
Activated carbon /Kg	0	20	20	0	20
Pregnancy Test	72	200	272	220	52
First Aid Kit	80	200	280	139	141
Soap Piece	576	8,496	9,072	8,832	240
Soap Powder/Sachet	3,050	54,000	57,050	54,050	3,000
Bleach/"Javel" 1L	24	300	324	288	36
Battery /R20	0	134	134	106	28
Battery AAA	193	5,576	5,769	5,109	660
Battery AA	0	24	24	12	12
Lubricant Box "graisse" 1Kg	0	0	0	0	0
Distilled Water 1L	26	0	26	0	26
Glue Liquid Box 1Kg	03	02	05	02	03
Oil Motorbike/quartz 5000 Total /Liter	15	50	65	45	20
Mixing Oil Motorbike 15W40 Shell/liter	140	80	220	140	80
Pump maintenance oil	0	102	102	102	0
Motorbike/YB100 /YB125	10	10	20	01	19
Hemet Motorbike	10	0	10	02	08
Vilebrequin & Rod Assembly/YB100	08	0	08	01	07
Tyre Motorbike Front/YB100	10	0	10	01	09
Tyre Motorbike Back/YB100	0	0	0	0	0
Tube Motorbike/YB100	06	0	06	0	0
Tube Motorbike/YB125	0	20	20	04	16
Wheel/YB100	01	0	01	01	0
"Segment" YB100	04	0	04	0	04
"Disque" YB125	02	0	02	02	02
Odometer/YB100	01	0	01	0	01
Direction Light Single/YB100	04	0	04	02	02
Kit Motorbike "(Chain,petit pion,Grand Pion)/YB100	0	0	0	0	0
Spares Trailer for Motorbike (roulement) / YB100	01	0	01	0	01
Piston Motorbike/YB100	01	0	01	0	01
Boogie/YB100	0	0	0	0	0
Boogie YB125	0	25	25	13	12
T Shirts	0	1,026	1,026	1,026	0
Hat	0	1,026	1,026	1,026	0
IRS Card	1,100	129,261	130361	81,861	48,500
IRS Leaflet	850	51,150	52,000	30,000	22,000

Item Description	Balance after 2015 IRS Campaign	Number of Item Procured	Stock Before Campaign	Consumed/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2016
Metal sign “not allowed drink eat smoke”	27	31	58	11	47
Metal danger sign “Skull”	23	28	51	08	43
Sticker “not allowed drink eat smoke”	130	94	224	93	131
Danger Sticker “Skull”	12	152	164	11	153
Procedures for Insecticide Transportation	78	200	278	75	203
Procedures for Insecticide Storage	79	67	146	134	12
Booklet on Structure Definition	0	0	0	0	0

ANNEX B: IRS CAMPAIGN VEHICLE

TABLE B-1: KOULIKORO DISTRICT VEHICLE USAGE, IRS 2016

Koulikoro District					
Line	Operational Site	Taxini	Nbr of Team (SOP-TL-Sup)	Minibus (12-18 Sits)	Pick-up 4X4 Dble Cabin (03)
1	Chola	02	09		
2	Doumba	03	27		
3	Gouni	03	15		
4	Kamani	02	09		
5	Kenenkoun		18	01	
6	Monzombala	02	13		
7	Koula	02	11		
8	Koulikoroba	05	25		
9	Kolebougou	05	29		
10	Massala	03	38		03
11	Nyamina		22	02	
12	Sirakorola		21	02	
13	Sirakorobougou	02	09		
14	Sizani	02	40		
15	Souban	03	06		
16	Tamani		06	01	
17	Tienfala	02	15		
18	Tombougou	02	09		
19	Tougouni		14	01	
Total		38	336	07	03

Note: AIRS Mali rented one Double-Cabin Pick-up for District Coordinator and two One-Cabin Pick-ups for logistics distribution.

	Mobile soak pit area
	Village approach area

TABLE B-2: BAROUELI DISTRICT VEHICLE USAGE, IRS 2016

Baroueli District					
Line	Operational Site	Taxini	Nbr of Team (Sop-TL-Sup)	Minibus (12-18 Sits)	Pick-up 4X4 Dble Cabin (03)
1	Banido	2	8		
2	Baroueli Central	4	66	3	
3	Boidie	2	18	2	
4	Dotembougou	2	8		
5	Dioforongo	1	22		
6	Dougoufe	2	10		
7	Gouendo	2	13		
8	Kalake	3	13		
9	Konobougou	4	71	3	
10	Moabougou	2	13		
11	Mpebougou	1	19		
12	Ndjilla	2	7		3
13	Ngassola	2	27		
14	Nianzana	2	14		
15	Sanando	3	19		
16	Seguela	2	11		
17	Somo	3	17		
18	Garna	2	9		
19	Tamani	2	14	1	
20	Tesserela	3	14		
21	Tigui	2	9		
22	Yerebougou	2	9		
23	Wondobougou	2	9		
Total		52	420	09	03

Note: AIRS Mali rented one Double-Cabin Pick-up for District Coordinator and two One-Cabin Pick-ups for logistics distribution.

 Mobile soak pit and Village approach area

TABLE B-3: FANA DISTRICT VEHICLE USAGE, IRS 2016

Fana District					
Line	Operational Site	Taxini	Nbr of Team (Sop-TL-Sup)	Minibus (12-18 Sits)	Pick-up 4X4 Dble Cabin (03)
1	Fana central	4	95	3	
2	Nangola	1	24	1	
3	Farakoro	1	11	0	
4	Beleko	3	39	2	
5	Bougoucourala	1	21	0	
6	Dandougou	3	22	0	
7	Diebe	2	13	0	
8	Diele	1	14	0	
9	Djoumanzana	1	21	1	
10	Falako	1	27	1	
11	Fougadougou	1	14	0	
12	Kankoni	2	11	0	
13	Kerela	3	16	0	
14	Koni	3	15	0	
15	Konkon	1	7	0	
16	Korokoro	2	10	0	
17	Kotoula	3	11	0	
18	Markacoungo	3	21	0	
19	Mena	1	24	1	
20	Seyla	2	13	0	
21	Tingole	3	19	0	
Total		42	448	09	03

03

Note: AIRS Mali rented one Double-Cabin Pick-up for District Coordinator and two One-Cabin Pick-ups for logistics distribution.

- Mobile soak pit area
- Mobile soak pit and Village approach area
- Village approach area

ANNEX C: DESCRIPTION OF 2016 TRAININGS

Type of Training	From	To	No. of Trainings	Description
Training of Trainers for Spray Campaign Operations	June 07	June 11	1	This was a refresher course since most of the district coordinators and DTCs had previous IRS experience.
Spray Operators	June 20	June 28	24 (8 training sites in each district)	The training covered spray techniques and rinsing of spray pumps, scheduling and the methods for completing the 2016 IRS campaign with Malian government staff, and the correct ways for working with households before, during, and after spraying. 899 people participated in the training; many of them had worked on past IRS campaigns. A post-test was provided at the end of the training, with the people who scored highest on the test becoming IRS campaign supervisors and team leaders.
Orientation of Supervisors and Team Leaders	June 29	June 30	3 (one per district)	The session was led by the AIRS Mali team and focused on supervision tasks, strategies, and the responsibilities and tasks of the storekeepers.
Logistics	June 29	June 30	3 (one per district)	Secondary warehouse managers were trained on how to manage the stocks of materials and equipment at their disposal.
Washers	June 30	June 30	3 (one per district)	Washers were trained on best practices of washing and rinsing.
Store Security Guards	June 30	June 30	3 (one per district)	Guards were trained on their roles and responsibilities in monitoring stores.
Radio Hosts	July 07	July 07	1	Hosts of community radio stations were trained on the IEC messages to disseminate and on how to fill out the monitoring cards of broadcast messages.
District Training Teams	July 01	July 01	1	Teams composed of 3 local coordinators, 3 district supervisors, 3 logistics managers, and 2 central warehouse managers were oriented on their mission, tasks, and responsibilities.
Data Clerks	July 07	July 08	1	Data clerks were familiarized with the IRS campaign data entry forms and the database used for uploading all IRS campaign data. The clerks also practiced entering data.
Security Transportation Drivers	July 07	July 07	3	Drivers hired to transport IRS commodities and spray teams learned correct methods to secure and safely handle insecticides. Participants learned how to manage an insecticide spill and safely clean vehicles after each day of the IRS campaign.
Medical Staff who Manage Insecticide Intoxication Cases	June 15	June 15	3 (one per district)	The training reviewed the correct protocol and methods for treating any SOP who was injured or fell sick from his/her activities in the IRS campaign. The DTCs were asked to present this information to the district health staff.
Entomology Technicians	July 01	July 01	1	Entomological technicians were trained in mosquito field collection practices, insectary maintenance, identifying mosquito breeding sites, larval and pupae collection, identification of Anopheles larvae from Culiciene, and managing HLCs.

ANNEX D: SUPERVISORY INSPECTION RESULTS

TABLE D-1: NUMBER OF INSPECTIONS/SITES

District	Number of Inspections/Number of Sites Concerned			
	Morning Mobilization	Homeowner Preparation and SOP Performance	Storekeeper Performance	End of Day Clean-up
Koulikoro	63/10	175/8	49/6	50/8
Baroueli	196/19	37/8	124/22	129/14
Fana	123/14	75/13	87/17	85/12
Total	382/43	287/29	260/45	264/34

ANNEX E: ENVIRONMENTAL MONITORING AND MITIGATION REPORT

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues	Remarks
Ia. Pre-contract inspection and certification of vehicles used for pesticide or spray team transport.	All vehicles used (including taxini) in AIRS campaign were inspected. ECO certification was given to those in compliance.	Some <i>taxini</i> were inspected and approved. Others were inspected but approved later after coming/swowing some documents as Insurance. All were used during campaign.	All vehicles must be inspected and approved by ECO before being used for AIRS campaign.
Ib. Driver training.	During vehicle inspection, drivers (including taxini drivers) attended orientations on correct methods for securing and safely handling insecticides.	Formal driver training not done but some attended orientation in field.	Prepare a driver training for 2017 campaign.
Ic. Cell phone, personal protective equipment (PPE) and spill kits on board during pesticide transportation.	All 6 pick-ups used to transport insecticides were provided with PPE, spill kits, and first aid kit.	Drivers used their own cell phones.	
Id. Initial and 30-day pregnancy testing for female candidates for jobs with potential pesticide contact.	DTCs ensured that every female candidate for SOP, team leader, local supervisor, storekeeper, and washer completed a pregnancy test.	ECO was not informed about full completion of this tests.	ECO should be timely informed when all tests are completed.
Ie. Health fitness testing for all operators before the spray campaign.	Done for every SOP, storekeeper, and team leader.	ECO was not informed about full completion of this tests.	ECO should be timely informed when all tests are completed.
If. Procurement of, distribution to, and training on the use of PPE for all workers with potential pesticide contact.	Every worker who might come in contact with pesticide is provided adequate PPE and shown how to wear it during their general training.	Supervision done on the field to ensure the effective use of PPE.	
Ig. Training on mixing pesticides and the proper use and maintenance of spray pumps.	Pump mechanics were recruited for spray pump maintenance and repair. They intervened when beakdowns were reported.	The new pumps often broke down during spray operations. In some cases, spraying had to be suspended.	

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues	Remarks
1h. Provision of adequate facilities and supplies for end-of-day clean-up.	All wash areas that PSECA found in need of repair were repaired. Detergents and soap were made available for clean-up.	Some mobile teams, mostly in Fana district, had problems using MSP.	
1i. Enforce spray and clean-up procedures.	Team leaders oversaw clean-up.	Storekeepers and supervisor do additional oversight of SOP triple rinsing of empty insecticide bottles.	
2a. IEC campaigns to inform homeowners of responsibilities and precautions.	Homeowners were informed on the local radio and sensitized through meetings and village criers in each district.	The role of local AIRS mobilizers and villages mobilizers is important but in 2016 this role was played but the community radio and the public criers.	Better organize village chiefs, public criers and community radio.
2b. Prohibition of spraying houses that are not properly prepared.	SOPs are prohibited from spraying any unprepared house.	Team leaders oversee house preparations before spraying to make sure they are ready for safe IRS.	Local mobilizers play an important role in preparing homeowners for spraying.
2c. Two-hour exclusion from house after spraying	After spraying, homeowners wait two hours before opening doors and windows.	In some villages, homeowners left their houses unprepared for spraying, and went to their fields.	
2d. Instruct homeowners to wash itchy skin and go to health clinic if symptoms do not subside.	SOPs and team leaders remind households after each house is sprayed.		
3a. Indoor spraying only.	SOPs are instructed during training, and this was inspected by all project team.		
3b. Training on proper spray technique.	Training and supervision of SOPs was done by a team led by the project operations manager. Further inspection was done by a team led by the ECO.		Forms filled for homeowners' performance and SOP performance inspections.
3c. Maintenance of pumps.	Pump mechanics were recruited in each district to do pump maintenance during the spray campaign.		
4a. Choose sites for disposal of liquid wastes, including mobile soak pit sites, according to PMI BMPs [Best Management Practices].	PSECA and necessary site improvements done.		
4b. Construct fixed and mobile soak pits with charcoal to adsorb pesticide from rinse water.	Soak pits and wash areas were repaired based on 2016 PSECA findings.		Use of activated charcoal for MSP and wood for repaired soak pits.

Mitigation Measure	Status of Mitigation Measures	Outstanding Issues	Remarks
4c. Maintain soak pits as necessary during season.	Inspection done to ensure proper drainage and soak pits in good condition.		Supervisors were involved in the oversight of soak pit conditions.
4d. Inspection and certification of solid waste disposal sites before spray campaign.	Following the 2016 PSECA, all solid waste disposal sites in secondary stores were checked and certified.		MOE representative is involved in this process.
4e. Monitoring waste storage and management during campaign.	Supervision of collection and storage at central warehouses in Koulikoro and Segou.		MOE representative is involved in this process.
4f. Monitoring disposal procedures post-campaign.	The ECO is monitoring disposal in each health center in accordance with the waste management plan.		MOE representative is involved in this process.
5a. Maintain records of all pesticide receipts, issuance, and return of empty sachets/bottles.	Stock cards and dispatch records for insecticides and empty bottles are available.	Logistics coordinators supervised each store at least once during campaign.	
5b. Reconciliation of number of houses sprayed vs. number of sachets/bottles used.	Supervisors used inspection and toolkit forms to do this.		NMCP and DNACPN involved in this supervision.
5c. Visual examination of houses sprayed to confirm pesticide application.	Done during inspection and supervision by a team led by project operations manager.		
5d. Perform physical inventory counts during the spray season.	Done during inspection and supervision by project operations manager.		

ANNEX F: PMI AIRS MALI

M&E PLAN INDICATOR MATRIX

Updated: 26 September 2016

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
Component I: Establish cost-effective supply chain mechanisms and execute logistical plans								
I.1 Procurement								
I.1.1 Number and percentage of insecticide procurements that had a pre-shipment QA/QC test at least 60 days prior to spray campaign	<i>Data source:</i> Project records – insecticide procurements <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	I; 100%	I; 100%	I; 100%	I; 100%	I; 100%	
I.1.2 Number and percentage of international insecticide procurements delivered in country, at port of entry, at least 30 days prior to the start of spray operations	<i>Data source:</i> Project records – international procurements <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	I; 100%	I; 100%	I; 100%	I; 100%	I; 100%	
I.1.3 Number and percentage of international equipment procurements, including PPE, delivered in country, at port of entry, at least 30 days prior to start of spray operations	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	I; 100%	I; 100%	I; 100%	I; 100%	I; 100%	

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	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	1; 100%	1; 100%	1; 100%	1; 100%	1; 100%	
1.1.5 Successfully completed spray operations without an insecticide stock-out	<i>Data source:</i> Project records <i>Reporting frequency:</i> 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	<i>Data source:</i> Project records <i>Reporting frequency:</i> 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 chain management	<i>Data source:</i> Training records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign By Gender	5; 100% M=5 F=0	4; 80% M=4 F=0	4; 100% M=3 F=1	4; 100% M=4 F=0	TBD; 100%	
1.3.2 Number and percentage of base stores where physical inventories are verified by up-to-date stock records	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	41; 100%	41; 100%	63; 100%	62; 98%	TBD; 100%	
1.3.3 Submit up-to-date inventory records 30 days after the end of each spray campaign	<i>Data source:</i> Project records <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
Component 2: Implement safe and high-quality IRS programs and provide operational management support								
2.1 Planning and Design of IRS Programs								
2.1.1 Annual PMI AIRS country work plan developed and submitted on time	<i>Data source:</i> Project records <i>Reporting frequency:</i> Annually	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
2.1.2 Percentage reduction in project operational expenses from the previous year, excluding insecticide costs .	<i>Data source:</i> Project financial records <i>Reporting frequency:</i> Annually	By Spray Campaign	5%	13% ¹	5%	10.44% ²	5%	
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	<i>Data source:</i> Project records – submitted SEAs/ letter reports <i>Reporting frequency:</i> Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
2.2.2 Number of spray	<i>Data source:</i> Project records –	By Spray	728	651 ³	1,116 ⁴	1,341 ⁵	TBD	

¹ Cost comparison 2014 vs. 2015: the project-wide approach to calculating this indicator is comparing the ratio between Oracle charges for Operations code in two years and the number of structures sprayed in two years. The difference between the two ratios is considered as a percent saved. Insecticide and capital costs are excluded.

² Cost comparison 2015 vs. 2016: the project-wide approach to calculating this indicator is comparing the ratio between Oracle charges for Operations code in two years and the number of Health districts sprayed in two years. The difference between the two ratios is considered as a percent saved. Insecticide and capital costs are excluded.

³ spray operators (391), team leaders (109) , washer (70) , storekeepers (41) , Guard (40)

⁴ spray operators (673), team leaders (185) , washer (133) , storekeepers (63) , Guard (62)

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
personnel trained in environmental compliance and personal safety standards in IRS implementation	Training reports Reporting frequency: Each spray season	Campaign By Gender	584 (2 districts)	M=527 F=124		M=890 F=451		
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	41	41	63	63	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	0	0	
2.2.5 Number and percentage of soak pits and storehouses inspected and approved prior to spraying	Data source: Project records – Reports submitted by district environmental officers Reporting frequency: Each spray season	By Spray Campaign By Soak Pit By Storehouse	83; 100% 41 soak pits 42 store houses	84; 100% 41 soak pits 43 store houses	106; 100% 63 soak pits 43 store houses	125; 100% 62 soak pits 63 store houses	TBD; 100%	
2.3 Conduct Communications Activities and Community Mobilization								
2.3.1 Number of radio spots and talk shows aired	Data source: Project records Reporting frequency: Per spray campaign	By Spray Campaign	5,035	2,532	3,376	3,165	TBD	
2.3.2 Number of IRS print materials disseminated	Data source: Project records	By Spray Campaign	50,000	79,860	180,761	195,568	TBD	

⁵ spray operators (899), team leaders (191) , washer (128) , storekeepers (62) , Guard (61)

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
	Reporting frequency: Semi-annually	By Type of printed material and message(s)		Caps=1,000 T-Shirt =1,000 IRS Card =67,860 Leaflet =10,000	Caps=1,500 T-Shirt =1,500 IRS Card =162,761 Leaflet =15,000	Caps=1,500 T-Shirt =1,500 IRS Card =177,568 Leaflet =15,000		
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	NA ⁶	NA	277,598	NA	TBD	
2.4 Spray Targeted Structures According to Technical Specifications								
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	135,717	135,971	242,684 ⁷	235,394	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	115,359	133,527	198,040	228,672	TBD	
2.4.3 Percentage of total	Data source: Daily Spray	By Spray	85%	98.20%	85%	97.14%	85%	

⁶ Door-to-door mobilization was not done this year. Instead, a mobilizer was sent only 10 days before spray and then accompanied spray teams to assist households in preparation and to sensitize them on post-spray steps.

⁷ This number is calculate after Enumeration in new district Fana

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
structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	Operator Forms Reporting frequency: Daily per spray campaign	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	502,453 M=258,791 F= 243,662	494,205 M=251,863 F= 242,342 13,219 87,861	778,884 M=375,724 F= 361,521 19,720 131,069	788,922 M=395,387 F= 393,535 20,813 135,754	TBD	TBD
Component 3: Ongoing Monitoring and Evaluation and Quality Control Measures								
3.1 Submit PMI-approved M&E plan to PMI Mali for approval	Data source: Project records Reporting frequency: Semi-annual	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
3.2 Conduct a post-spray data quality audit within 60 days of completion of spray operations	Data source: Spray operations reports Reporting frequency: Per spray campaign	By Spray Campaign	N/A	N/A	N/A	N/A	Completed	

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
Component 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-annually	By Spray Campaign By Guideline/checklist/tool	6	5 ⁸	5	5	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	2	1 ⁹	1	1 ¹⁰ In progress	TBD	
4.3 Number of best practice presentations given at national/regional/international workshops and conferences	Data source: Project records – Activity reports Reporting frequency: Semi-annually	By Spray Campaign By IRS Technical Area	1	1	1	1 ¹¹	TBD	
4.4 Number of enterprises engaged through public-private partnerships	Data source: Project records – Activity reports Reporting frequency: Semi-annually	By Spray Campaign	2	1	1	1 ¹²	TBD	

⁸ IRS Card, Support 4, 5, 7 and 11

⁹ Article: Characterizing the insecticide resistance of *Anopheles gambiae* in Mali. Authors: Cisse Moussa, Keita Chitan, Dicko Abdourhamane, Dengela Dereje, Coleman Jane, Lucas Bradford, Mihigo Jules, Sadou Aboubacar, Belemvire Allison, George Kristen, Fornadel Christen, Beach Raymond, Journal: Malaria Journal

¹⁰ Article: Entomological articles were submitted. We are waiting for their approval.

¹¹ Presentation on use of village and quartier Approach in IRS to the local stakeholders.

¹²SICMA PLAST for disposal of the gloves and other plastic.

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
Component 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 time, and location)	Data source: Entomological reports Reporting frequency: Annually	By Spray Campaign	5	5	7	7	TBD	
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	2; 40%	2; 40%	3; 47%	3; 47%	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	4; 80%	5; 100%	7; 100%	7; 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 malaria vector control	Data source: Entomological reports Reporting frequency: Annually	By Spray Campaign	5 ¹³ ; 100%	4 ¹⁴ ; 80%	5; 71%	4 ¹⁵ ; 57%	TBD	

¹³ Spray sites: Koulikoro, Baroueli; Non-spray sites: Kati, Bla, and Segou

¹⁴ Testing in the site of Segou was not done in the 2015 spray campaign

¹⁵ Testing in the site of Dioila, Bla and Segou was not done in the 2016 spray campaign

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
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	10 ¹⁶ wall bioassays	20 wall bioassays	18 wall bioassays	18 wall bioassays	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	48 wall bioassays	14 wall for this month	60 wall bioassays	19 wall for this month	TBD	
5.1.7 Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites*	Data source: Entomological reports Reporting frequency: Per spray campaign	By Spray Campaign By Type of Insecticide	12	6 ¹⁷	13	5 ¹⁸	TBD	
5.2 Support Epidemiological Malaria Data Collection and Analysis								
5.2.1 Collect routine epidemiological data	Data source: <i>Project Reports</i> Reporting Frequency: Annually	By Spray Campaign	Complete	In progress ¹⁹	Complete	In progress ²⁰	TBD	

¹⁶ Organochlorine: DDT; Pyrethroid: Lamdacyalothrine 0,05% et Deltamethrine 0,05%; Organophosphorine: Fenitrothion 1 %; Carbamate: Bendiocarb 0,1%

¹⁷ The six remaining tests will be completed in September 2015

¹⁸ The eight remaining tests will be completed before December 2016

¹⁹ The health facility data quality audits were performed in August and once the analysis is complete, the team will hopefully be able to begin epidemiological data collection with the health facilities who performed well.

²⁰ The team will hopefully be able to begin epidemiological data collection probably in October-November 2016 with the health facilities who performed well.

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
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	12 ²¹	In progress	40 ²²	In progress	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 of Women Trained	642 ²³	582 ²⁴ M=531 F= 51 9%	984 M=738 F= 246 25%	1,216 ²⁵ M=898 F= 318 26.15%	TBD	
6.1.2 Total number of people trained to support IRS in target districts	Data source: Project records – Training reports	By Spray Campaign	1,083	1,171 ²⁶	1,212	1,402 ²⁷	TBD	

²¹ This number is pending results from the Data Quality Audit that will be performed in June 2015.

²² The study involves 8 CSCOM each of the 5 health districts in 2016.

²³ Spray operators (425), team leaders (135), supervisors (41), clinicians (41)

²⁴ Spray operators (391), team leaders (109), supervisors (41), clinicians (41)

²⁵ Spray operators (899), team leaders (191), supervisors (63), clinicians (63)

²⁶ This number excludes washers (70), drivers (89) and security guards (40)

²⁷ This number excludes washers (128), drivers (165) and security guards (61)

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
	Reporting frequency: Semi-annually	By Spray Campaign By Gender Percentage of women trained		M=1,015 F= 156 13.3%	M=909 F= 303 25%	M=1040 F= 362 26%		
6.1.3 Number of women recruited for IRS employment	Data source: Project records – Recruitment reports reports Reporting frequency: Semi-annually	By Country By Percentage of women recruited	267	241	502	494	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 of women trained	41	41 M=37 F= 4 9.7%	63 M=56 F= 7 11.11%	63 M=56 F= 7 11.11%	TBD	
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	5	12	18	18	TBD	
6.1.6 Number of women hired in supervisory roles in target districts (includes site	Data source: Project records – Contracts signed	By Spray Campaign	18 ²⁸	17	18	41	TBD	

²⁸ Team leaders (13) , Community supervisors (2) , Technical directors of community health center (2) , M&E assistants (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
supervisors, team leaders, M&E assistants and others who supervise seasonal staff)	Reporting frequency: <i>Semi-annually</i>	Percentage of women hired						
6.1.7 Number of staff (permanent and seasonal) who have completed gender awareness training	Data source: Project records – Training reports Reporting frequency: <i>Semi-annually</i>	By Spray Campaign Gender Percentage of women hired	2,066	1,370 M=1,144 F= 226 16.6%	1,537 M=1,153 F= 384 25%	1,756 M=1,266 F= 490 28%	TBD	
6.2 Capacity Building								
6.2.1 Number of government officials trained in IRS oversight	Data source: Project records – Training reports Reporting frequency: <i>Semi-annually</i>	By Spray Campaign By Gender Percentage of Women Trained	10	8 M= 7 F= 1 13%	12 M= 10 F= 3 25%	12 M= 9 F= 3 25%	TBD	
6.2.2 Implement all activities outlined in their yearly Capacity Building Action Plan	Data source: Project records – Capacity assessment reports Reporting frequency: <i>Semi-annually</i>	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
6.2.3 Mali government implements at least one aspect of the IRS program independently.	Data source: Project records – MOUs Reporting frequency: <i>Semi-annually</i>	By Spray Campaign	Completed	Not completed	Completed	Not completed	TBD	

