PMI | Africa IRS (AIRS) Project

Indoor Residual Spraying (IRS 2) Task Order Six

SENEGAL
END OF SPRAY REPORT 2016

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ACRONYMS

AIRS	Africa Indoor Residual Spraying
BREIPS	*Bureau Régional de l'Education et de l'Information pour la Santé* (Regional Office of Health Education and Information)
DC	District Coordinator
DCV	Data Collection Verification
DEC	Data Entry Clerk
DEEC	*Direction de L'environnement et des Etablissements Classés* (Environmental Protection and Classified Institutions Agency
DHMT	District Health Management Team
DMO	District Medical Officer
DPM	*Divison de la Prévention Médicale* (Medical Prevention Division)
DPV	*Direction de la Protection des Végétaux* (Directorate for Plant Protection)
DOS	Data Operations Supervision
EC	Environmental Compliance
ECO	Environmental Compliance Officer
HPN	Health Post Nurse
IEC	Information, Education, and Communication
IRS	Indoor Residual Spraying
M&E	Monitoring and Evaluation
MOH	Ministry of Health
MSP	Mobile Soak Pit
NMCP	National Malaria Control Program
PMI	President's Malaria Initiative
PPE	Personal Protective Equipment
SNEIPS	*Service National de l'Education et l'Information pour la Santé* (National Health Education and Information Service)
SNH	*Service National de l'Hygiène* (National Hygiene Service)
SOP	Spray Operator
UCAD	*Université Cheikh Anta Diop de Dakar*
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

In 2016, the President's Malaria Initiative (PMI) Africa Indoor Residual Spray (AIRS) Project in Senegal conducted spray operations in the four target districts of Malem Hoddar, Koungheul, Koumpentoum, and Nioro with funding from (PMI) and the United States Agency for International Development (USAID).

As part of an ongoing transition process, AIRS Senegal worked with the National Malaria Control Program (NMCP) through an integrated team where AIRS Senegal coached Ministry of Health (MOH) counterparts during the implementation of the IRS campaign in the four target districts.

The objective of this ongoing transition process is to increase the local government's level of responsibility and ownership of indoor residual spraying (IRS). For this purpose, NMCP conducted Information, Education, and Communication (IEC) mobilization activities in all four target districts with direct funding from PMI while AIRS Senegal provided complementing technical assistance.

In 2016, Senegal's IRS Steering Committee decided to continue spraying in "hot spot" health posts – defined epidemiologically as health post zones with malaria incidence in excess of 15 cases per 1,000 residents – within the four target districts (i.e. Malem Hoddar, Koungheul, Koumpentoum, and Nioro). In total, Senegal's IRS Steering Committee identified 51 "hot spot" health posts, where one round of spray operations was conducted. In 2016, the Senegal IRS Committee decided to test community-based IRS in the district of Malem Hoddar using community means of transportation. In addition, AIRS Senegal piloted the use of Tyvek suits as personal protective equipment (PPE) and wet wipes for cleaning. AIRS Senegal has also piloted the use of a scanner to expedite data collected from far reaching operational sites to the data entry center at the district level in Koungheul.

AIRS Senegal worked in close collaboration with NMCP in the four target districts and was responsible for conducting IRS operations, including monitoring and evaluation (M&E) and environmental inspections in collaboration with the Environmental Protection and Classified Institutions Agency (DEEC). AIRS Senegal was also responsible for identifying operations sites, procuring insecticide and PPE, managing warehouses, and training seasonal staff to spray homes and follow environmental safety and health guidelines.

As for supervision of spray operations, AIRS Senegal worked very closely with NMCP, DHMT, and National Hygiene Services (SNH) in all four target districts.

In 2016, AIRS Senegal sprayed 97.3% percent of the total targeted structures in the four target districts using an organophosphate insecticide, pirimiphos-methyl (Actellic 300 CS). AIRS Senegal conducted spraying over 20 operational days in three districts (Nioro, Koumpentoum, and Koungheul) from July 11 to August 2, 2016 and over six operational days in Malem Hoddar from July 21- 26, 2016.

Table 1 shows the results of the 2016 spray campaign.

TABLE 1. SUMMARY OF 2016 IRS CAMPAIGN

Indicator	Results
Number of districts covered by the PMI-supported IRS campaign	Four districts: Koumpentoum, Koungheul, Malem Hoddar, and Nioro
Insecticide used	Organophosphates: 39,189 bottles
Number of structures sprayed by spray operators	124,757
Number of structures found by spray operators	128,185
2016 IRS campaign spray coverage	97.3%
Population protected by 2016 IRS campaign	496,728
Number of people trained to deliver IRS with US Government funds[1]	793
Total number of people trained with US Government funds[2]	1,034

For the 2016 spray campaign, AIRS Senegal used a total of 39,189 bottles of organophosphates with an average of 3.2 structures sprayed per bottle. AIRS Senegal continued to use the Dimagi-based SMS platform to collect and disseminate spray campaign data on a daily basis to PMI and local stakeholders. In addition, job aids reminding spray operators (SOPs) of best practices and gender messages were also disseminated through SMS. The project continued to use the smartphone application for delivering standardized supervision throughout the campaign, thereby improving the overall quality of the spray campaign. Eleven mobile soak pits were used in eight sites (See Sections 8 and 9 for more information).

[1] Total number of personnel trained in IRS implementation using PMI AIRS Project resources.; this figure includes only spray personnel such as spray operators and substitutes, team leaders, site manager, supervisors /DREEC, and clinicians.
[2] Total number of people trained using PMI AIRS Project resources to implement/support elements of IRS in target districts

1. COUNTRY BACKGROUND

In 2016, the NMCP in collaboration with PMI Senegal and Senegal's IRS Steering Committee decided to continue IRS operations in Koumpentoum, Koungheul, Malem Hoddar, and Nioro (Figure1), targeting the same "hot spot" using a focus spraying strategy as in 2015. As shown in Figure 2, 51 health posts in these districts were selected for IRS.

FIGURE 1. MAP OF SENEGAL PMI IRS DISTRICTS

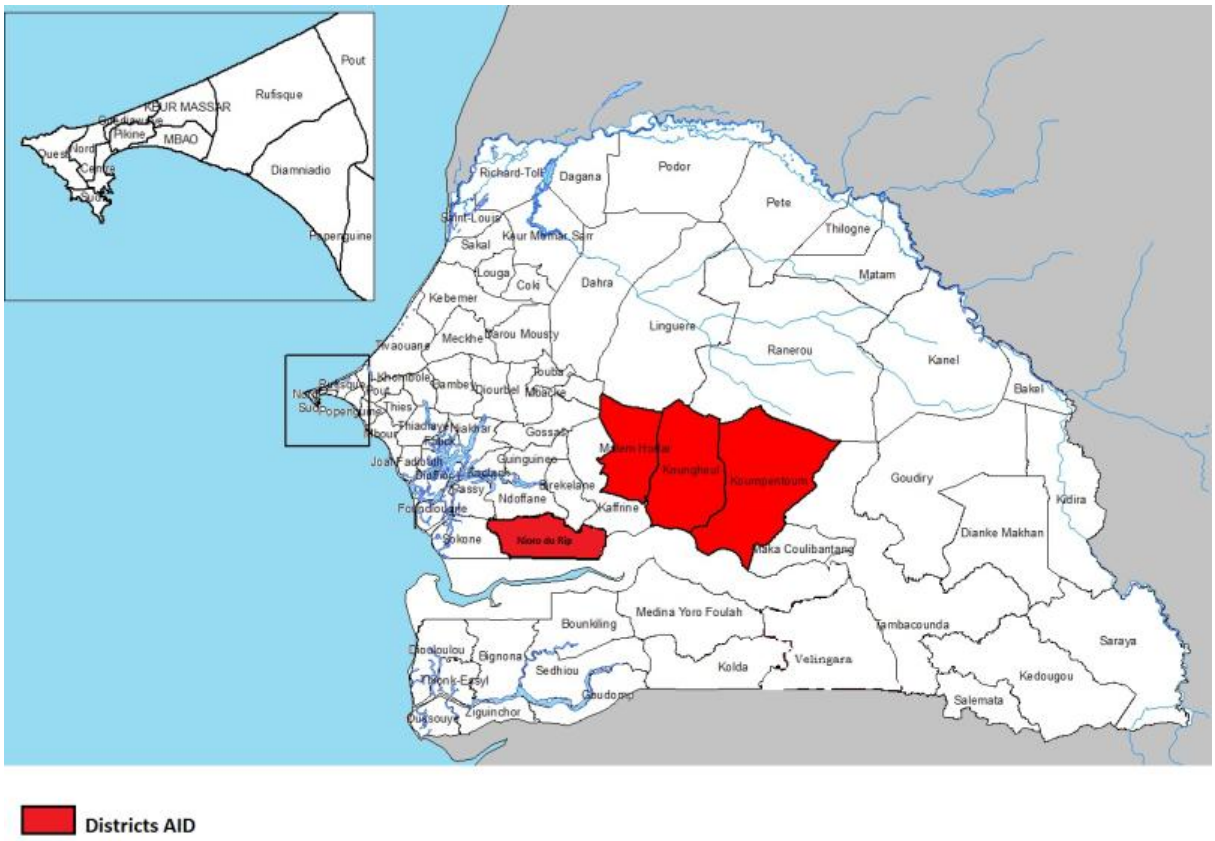
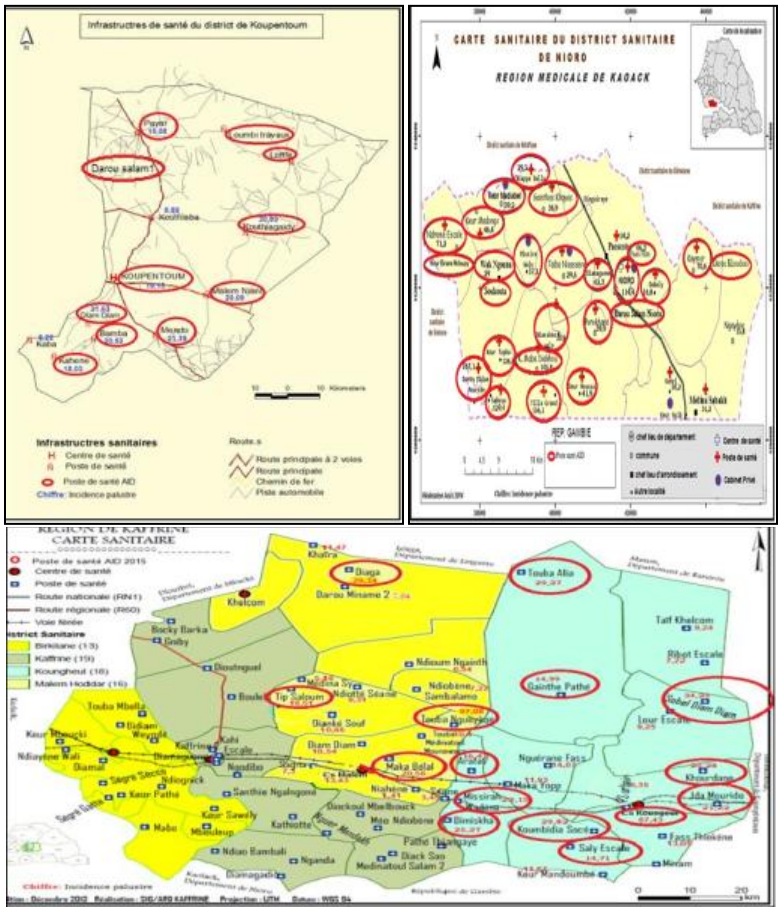


FIGURE 2. MAP OF SENEGAL PMI IRS HOT SPOTS



Health Posts IRS 2016

2. OBJECTIVES FOR 2016 IRS CAMPAIGN

In 2016, the main objective for the PMI AIRS Project in Senegal was to continue working with the Ministry of Health and Social Welfare, NMCP, PMI, and other stakeholders to achieve at least 85% spray coverage in the IRS target districts.

As in previous years, AIRS Senegal worked as an integrated team with the NMCP throughout the planning and implementation of the IRS campaign in the four districts. AIRS Senegal was responsible for IRS operations including M&E and environmental compliance (EC) inspections in collaboration with the DEEC and its regional offices covering the four target districts. AIRS Senegal also conducted the distribution and transportation of IRS commodities and personnel. In coordination with NMCP and SNH, AIRS Senegal organized training and supervision of operations in all four districts with SNH playing a key role. NMCP conducted IEC mobilization activities in all four districts with direct funding from PMI/Senegal.

In 2016, the PMI AIRS Project used an organophosphate, pirimiphos-methyl (Actellic 300 CS) in all districts and the project was expected to carry out the following activities:

- Support training, capacity-building, and advocacy at the national, regional, and district levels as a means of achieving IRS sustainability. This included building the capacity of the government, counterparts, and partners to lead a high-quality IRS campaign;
- Provide regular M&E support for the IRS program and periodic update on hot spot strategy evaluation;
- Carry out logistical assessments as needed and arrange all procurement, shipping, delivery, and storage of sprayers, spare parts, insecticides, and PPE;
- Ensure safe and correct insecticide application, thus minimizing human and environmental exposure to insecticides in compliance with the Supplemental Environmental Assessment amendment (SEA);
- Support NMCP and other local partners with coordination of IEC, sensitization, and mobilization activities to raise awareness and encourage acceptance of IRS;
- Assist NMCP in smoothly transitioning selected IRS responsibilities to districts, including development of communication plans, recruitment of spray personnel, development of district IRS micro-plans, development of training materials, supervision of IRS activities, and EC;
- Continue data collection and reporting via SMS for team leaders, the use of smartphones for IRS supervision in four districts, and the use of mobile soak pits at three operational IRS sites;
- Promote cost efficiency and innovations through due diligence and efficiency of operations; and
- Spray at least 85% of a target of 133,252 structures in the four districts, protecting a target of 523,962 residents.

3. PREPARATION FOR IRS CAMPAIGN

3.1 IRS CAMPAIGN PLANNING

Following the recommendations made by District Medical Officers (DMOs) during the 2014 evaluation meeting, IRS activities were incorporated into the four district health annual action plans for 2016.

Based on lessons learned and recommendations from end-of-spray evaluation workshops, and, in order to be well prepared for 2016 campaign, PMI AIRS organized a workshop on February 10- 12, 2016 in Mbour. As a result, the team identified ways to improve coordination in activity planning, integrated training, and orientation with implementing partners to harmonize supervision methods. In addition, PMI AIRS identified few operational innovations for next campaign that include community-based IRS piloted in Malem Hoddar, using Tyvek suits and a high performing scanner to send spray data from far reaching operational sites to the data entry center at the district level in Koungheul.

Under the NMCP's leadership, AIRS Senegal, SNH, *Université Cheikh Anta Diop de Dakar* (UCAD), and Senegal's IRS Steering Committee members, regional and district health managers, administrative and local political authorities, national and regional SNH managers, and SNEIPS participated in the National IRS Planning Workshop from April 28-29 2016. The objectives of the workshop were to share and validate the 2016 IRS implementation plan and to include IRS activities in the annual health action plans for each PMI-supported district. At this meeting, participants validated the IEC/IRS communication plan developed by NMCP with AIRS Senegal's technical assistance. The workshop resulted in a consensus on the IRS activities to be implemented during the 2016 IRS campaign in the four target districts based on the new focal spraying strategy and IRS innovations such as community-based IRS.

In collaboration with NMCP, PMI AIRS conducted an advocacy visit on February 21-25, 2016, to IRS target regions and districts, meeting with local authorities and advocating for local community participation (office space, operational sites, transport, community mobilization, refusal case management, etc). As a result, all operational sites and office spaces were available free of charge for the project in Koumpentoum and Koungheul. In Nioro, the project rented district office space and four operational sites. Table 2 lists the activities AIRS Senegal led or participated in planning and organizing the 2016 IRS campaign.

TABLE 2. 2016 IRS PLANNING AND ORGANIZATION

Areas	Activities implemented
AIRS staff orientation	• Regional workshop in Senegal on EC for PMI AIRS ECO (April 6-8, 2016) and field training for Mali new ECO. • Training on entomology in Senegal for the Technical Manager and NMCP entomologist (May 28-June 3, 2016) • Financial training for PMI AIRS finance managers and accountants in Tanzania (June 22-24, 2016)
IRS activities planning	• PMI AIRS workshop February 10-12, 2016, to validate IRS innovations for 2016 • National-level planning (April 28 – 29, 2016) • District-level planning (micro-planning), and development of spray calendar (May - June 2016)
Recruitment of seasonal personnel	• PMI AIRS temporary personnel: finance assistants, logistics assistants, data entry clerks • PMI AIRS site seasonal personnel: site managers, team leaders, spray operators • Auxiliary staff: drivers, storekeepers, repair technicians, washers, water suppliers
Personnel capacity-building	• Review of spray operator training guide • Review of existing training manuals and tools • Training of AIRS district staff, including finance assistants, logistics assistants, data entry clerks • Training of new SNH agents in three regions covering IRS (Kaffrine, Kaolack, Tambacounda) • Country-level IRS training of trainers attended also by DREEC • Gender training for new trainers • Physicians' and nurses' training on IRS-related poisoning case management
Environment	• Management of obsolete waste: plastic, electronic and scrap metal • Identification and selection of operational facilities at district and secondary sites • Implementation of mobile soak pit • Pre-inspection and validation for all IRS sites using smartphones • Letter report updated and submitted to HO and USAID for IRS EC • Monitoring secondary IRS site rehabilitation and inspections using smartphones • Inspect and issue certificates to all transport vehicles prior to signing of a rental contract • Training on environmental management of IRS campaign
M&E	• Updating of IRS data collection tools and mobilization data collection tools • Reviewing of IRS database and mobilization database • Developing scanner protocol for sending data to central data entry center • Data clerk's recruitment for IRS by AIRS and for IEC mobilization by districts; all of them were trained on data entry. Implementation of SMS for collecting and sending data • Updating the evaluation tools for hot spots assessment
Operations	• Advocacy for office and operational sites as community contribution to the project • Finding secondary sites and camping site • Deployment of project district personnel (finance assistants, logistics assistants, data entry clerks) • Micro-planning workshops in the four districts • Development of community-based IRS protocol and implementation schedule • Validation of spray calendars and communication plans • Building and rehabilitation of IRS sites in compliance with environmental standards • Production of training manuals and data collection tools • Seasonal personnel's pre-IRS medical examination • Training of spray operators and auxiliary staff (drivers, storekeepers, repair technicians, washers) • Training of Team Leaders on new data operations supervision file • Development of supervision plan for spray operations • Implementation of supervision tools, including smartphone supervision • Coordination and monitoring of spray operations • Monitoring of spray performance tracking sheet
Logistics	• Physical inventory of existing equipment

Areas	Activities implemented
	• Quantification of insecticide and IRS equipment • Equipment check to determine cleaning and repair needs • Needs assessment for local and international procurement • Transportation needs assessment • Training of logistics assistants and storekeepers • Dispatching and delivery of materials from the central warehouse to districts and secondary sites • Management of contaminated solid wastes
Communication	• Technical assistance to NMCP in reviewing the IEC plan, reviewing and developing IEC materials, IEC material production and distribution, and validating districts' IEC plans • Participation in IEC activities supervision including the supervision of HPN's orientation and IEC mobilizers and supervisors training • Participation in the various NMCP/IEC committee meetings and malaria training
Partnership	• Monthly tripartite meeting with NMCP coordinator, PMI team, and Abt COP • Weekly meeting between PMI AIRS Operation Manager with NMCP and SNH focal persons • Initial contact visits with strategic IRS partners: NMCP, SNH, DEEC, District Health Management Team (DHMT) local authorities, laboratories of vector and ecology, and Directorate of SOCCOCIM Cement Factory, Sodiaplast (recycling firm). • Empowering regional environmental officers for IRS EC inspections • IEC IRS Strategy Committee mainly composed of NMCP, Service National de l'Education et l'Information pour la Santé (SNEIPS) focal persons, and PMI AIRS IEC coordinator • Partnership development with micro-finance institutions for timely and secured payment of SOPs
Administration & Finance, Procurement	• 2016 budget preparation • IRS lease agreements—renewal • IRS operations participants' agreements—drafting and signing • Vehicle rental tender process •

3.2 LOGISTICS PLANNING AND PROCUREMENT

3.2.1 INVENTORY

Based on the 2015 post-spray inventory data and decisions on the 2016 spray target areas, the logistics coordinator quantified the needs for the 2016 season and worked jointly with the procurement coordinator on local purchases of IRS supplies and materials.

During the spray campaign, logistics assistants conducted an inventory at mid-campaign to secure appropriate stock in the districts. The team organized additional dispatches of materials to the secondary sites' storerooms every 10 days or as frequently as needed. In addition, stock cards and records were completed twice a day by site storekeepers for more traceability, thus enabling the logistics coordinator to have a daily update of stock in store.

During the 2016 spray campaign, organophosphates stock use was subjected to rigorous monitoring. AIRS Senegal developed stock cards for organophosphates inventory and stock disposal using first-expired, first-out (FEFO).

At the end of the 2016 spray campaign, all materials and equipment were counted and adequately stored at the district level and ultimately shipped to the central warehouse. Those operations were done in two steps: solid wastes were sent first and then the IRS material was sent after the campaign.

3.2.2 SERVICING OF EQUIPMENT

Hudson and Goizper pumps were also subject to preventive maintenance before their use in Koungheul, Malem Hoddar, Nioro and Koumpentoum. All Hudson pumps were equipped with a control flow valve (CFV) to meet the WHO recommendations and maintain consistent spay quality. The project also procured 242 Goizper nozzles to ensure high spray quality.

All spray operators in Koungheul, Malem Hoddar, and three sites in Nioro using Hudson pumps were trained on the importance of using CFVs, and they all used them under the supervision of a local supervisor.

In addition, the project serviced and deployed fire extinguishers and generators to all four districts prior to the start of the 2016 campaign.

3.2.3 PROCUREMENT

To estimate correct quantities of insecticide, IRS equipment, and other supplies required for the 2016 campaign, AIRS Senegal used data based on the structures found after the 2015 campaign, taking into consideration structures sprayed with the remaining carbamates. Specifically, 2016's organophosphate order was based on the remaining quantity of the insecticide, and for the complement needed for the campaign. A ratio of 3.4 structures per bottle was used, which was calculated from the 2015 spray campaign performance data. Using 2015 IRS structures made it possible to assess the exact number of spray needed for the 2016 campaign in a 20-day period, assuming that one spray operator sprays an average of 13 structures per day. A list of items procured internationally and locally to meet the needs of the 2016 spray round is included in Annex A.

3.2.4 DISPATCHING OF COMMODITIES

By June 4, 2016, local and international procurements were available at the central warehouse in Kaolack. AIRS Senegal then developed a dispatching plan and by June 7, 2016, all districts had received the appropriate quantities of IRS materials, 34 days prior to the start of the spray campaign.

During spray operations, AIRS Senegal's technical team members made supervision trips throughout the spray campaign to monitor stock management in the field storerooms. At the end of each trip, supervisors provided recommendations to the logistics assistants and storekeepers and coached them on addressing any identified shortcomings.

3.3 TRAINING

The AIRS Senegal team conducted jointly a series of trainings with the District Health Management Team (DHMT), Regional Office of Health Education and Information (BREIPS), and representatives from the NMCP for various spray personnel to prepare for the spray season as shown in Annex B. In total, AIRS Senegal funded the training of 793 people to deliver IRS, of whom 29% were female. The trainings and orientation sessions are described below.

In total, AIRS Senegal trained 1,034 persons, 303 were women representing 29%. From the total number of people trained for the 2016 spray campaign, AIRS Senegal hired 886 people, including where 279 women representing 31% (See Table 6 in Section 5.1). The difference between the number of people trained and the number of people hired is because the project works with numerous government supervisors who are trained by AIRS Senegal but not hired directly by the project.

3.3.1 ORIENTATION OF AIRS DISTRICT TEMPORARY PERSONNEL

After recruiting temporary district personnel (e.g. logistics and finance assistants), AIRS Senegal held an orientation workshop May 17-18, 2016, to build organizational and operational capacity of newly hired district staff, including logistics and finance assistants, to better execute their assignments at their

respective job posts. In total, seven temporary personnel were trained. In 2016, the team recruited an assistant storekeeper for the central warehouse in Kaolack, who helped with dispatching and conveying equipment to districts and operational sites. The workshop topics included:

- Managerial aspects at district level;
- Abt's code of conduct;
- District-level activity timeline;
- EC measures;
- IRS/IEC;
- Stock management
- Logistics organization management;
- Operations' financial procedures;
- Data collection organization;
- Techniques for supervising spray operations; and
- Roles and responsibilities
- Gender approach.

3.3.2 Smartphone Training for SNH Staff

In order to ensure the use of smartphones for better supervision of IRS activities AIRS Senegal and Dimagi, Inc. worked on the smartphone-based supervision tool taking into consideration lessons learned and recommendations from the 2014 and 2015 experiences. Next, Senegalese government staff were trained with support from AIRS Senegal and Dimagi. AIRS Senegal trained 53 SNH supervisors in all districts on smartphone use June 8-9, 2016.

The training covered the following topics:
- Revising supervision checklists;
- Method of smartphone use;
- Supervision reporting; and
- Guidelines for smartphone inventory management.

3.3.3 Training Newly Posted SNH Staff in IRS Districts

In 2016, new SNH personnel, who had not previously worked on IRS but were assigned to IRS regions/districts, were trained. This training took place in Kaolack May 9-13, 2016 to build the capacity of SNH staff who would train spray operators and supervisors. In total, 15 SNH agents were trained on the following topics:

- Overall vector control methods, especially IRS, their indications, and their limits;
- The various steps for IRS implementation at district level;
- Spray techniques and safety issues related to insecticide use;
- EC safety; and
- Gender approach in IRS to improve women's participation.

3.3.4 Trainers' Orientation

AIRS Senegal conducted a trainers' orientation for all districts from June 8-9, 2016, in Kaolack. The purpose of the orientation was to share and harmonize training methodologies to be used by SNH trainers for SOPs training as well as during supervision. In 2016, AIRS Senegal invited DREEC inspectors at the orientation session. In total 56 were trained including DREEC. AIRS Senegal designed a trainers' training manual highlighting spray operators' expected skills and the teaching methodology, including the following topics:

- Teaching methodologies and techniques;
- Household preparation for quality of spray,
- Guidelines for insecticide mixture;
- Guidelines for structure marking and zip ties;
- Using smartphones for supervision;
- Using and cleaning of Tyvek suits as PPE
- Community-based IRS approach
- Data Operation Supervision for Team Leaders
- Supervisory data collection tools and questionnaires;
- Spray performance tracking tools;
- EC and safety measures;
- MSP implementation; and
- Gender-inclusive approach.

3.3.5 Spray Operator Training (SOT)

Depending on the dates of spray operations' start-up in the four districts, SOT workshops took place June 20-24 in Koumpentoum and Koungheul, June 27-July 1 in Nioro, and July 14-18 in Malem Hoddar. As a result, 498 sprayers, 24 site managers, 100 team leaders, and 93 substitute sprayers were trained. Among these 715 IRS trained operational personnel, 458 are new to IRS operations.

Training covered the following topics:

- Spray techniques and proper management of insecticide;
- Data collection methodology;
- Household preparation for quality of spray;
- Guidelines for insecticide mixture;
- Guidelines for structure marking and zip ties;
- Sensitization of beneficiaries on IRS-related safety measures;
- Environmental compliance;
- Roles and responsibilities; and
- Sexual harassment policy.

3.3.6 Washers, Guards and Driver Training

In total, 49 washers, 48 guards, and 55 drivers were trained on the roles and responsibilities during an IRS campaign, code of conduct, and environmental safety.

3.3.7 Training of Site Managers and Storekeepers on Spray Performance Tracking Sheet

PMI AIRS trained site managers (24) and storekeepers (29) on the purpose and use of the revised Spray Performance Tracking Sheet, including the new file of data operation supervision for team leaders

introduced this year to improve supervision. Trainings were held June 25, 2016, in Koungheul and Koumpentoum, and July 2, 2016, in Nioro, and July 18, 2016, in Malem Hoddar.

3.3.8 Orientation of Site managers, Team Leaders

To improve field coordination, spray leaders (24 site managers, 100 team leaders) were trained on IRS management at the operational level in Koumpentoum, Koungheul, and Nioro on June 25 and in Malem Hoddar on July 2, 2016. The sessions covered the following topics:

- Procedures and code of conduct at site level;
- Roles and responsibilities of site managers and team leaders, and relationships with SNH supervisors;
- IRS supervision activities;
- Use of the error eliminator sheet; and
- Refresher of IRS guidelines for 2016 on chalk marking, use of zip ties on structures, triple rinsing of insecticide bottles, and use of CFVs

The trainings, led by the ECO, on installation and uninstallation techniques of mobile soak pits (MSPs) as well as on progressive rinsing were conducted on June 25 for Koumpentoum and Koungheul, July 2 for Nioro, and July 17 for Malem Hoddar. As a result, eight SNH local supervisors, four site managers, 20 team leaders, seven storekeepers, and 43 SOPs were trained.

3.3.9 Training of Site Managers and Team leaders on SMS and Smartphone Use

In 2016, AIRS Senegal trained site managers on the use of cell phones to report operational data (e.g. number of SOPs, number of rooms found, number of sprayed rooms, and amount of insecticide used) via SMS on a daily basis. One-day training sessions were conducted in Koumpentoum/Koungheul and Nioro/Malem Hoddar. Site managers were trained on how to use smartphones to fill out supervisory checklists. The following topics were covered in this workshop:

- Supervision checklists;
- Technical tools for smartphone and mobile phone use; and
- Rules of procedure for smartphone and mobile phone fleet management.

3.3.10 Health Workers' Training on Insecticide Poisoning Management

New assigned DMOs in Koumpentoum, Nioro, and Malem Hoddar were trained on IRS-related poisoning management on June 10, 2016, in Kaolack. At the district level, 19 health post nurses (HPNs) and midwives (six males and 13 females) newly posted in IRS zones were trained by their respective DMOs.

3.3.11 Training of Team Leaders On Directly Observed Spray (DOS) File

PMI AIRS trained Team Leaders on Directly Observed Spray (DOS) new file for one additional day after SOP training. In total 100 team leaders were trained, including 24 women. The following topics were covered in this workshop:

- Team Leaders' roles and responsibilities in IRS supervision activities;
- Use of the DOS file, including revision of all items;
- Supervision frequency for DOS file;
- How to account for the nature and number of red flags; and
- How to address issues for quick resolution.

4. IEC ACTIVITIES

Since 2014, IRS' IEC mobilization component has been the overall responsibility of NMCP. AIRS Senegal provides technical assistance, including strategy development, development and production of IEC tools, validation of IEC communication plans, and supervision of IEC activities. AIRS Senegal's IEC objectives for the 2016 spray were to continue supporting NMCP and other local partners with coordination of IEC, sensitization, and mobilization activities to raise awareness and encourage acceptance of IRS. In 2016, PMI AIRS transferred IEC data collection reporting to NMCP and district health centers. Each district health center provided a Data Entry Clerk (DEC) for IEC data collection and reporting. PMI AIRS provided technical assistance, including training and coaching in the field.

4.1 PREPARATIONS

AIRS Senegal provided technical assistance to NMCP in the following areas:

- Review of national IEC policy and tools;
- Production of IEC tools on NMCP request;
- Validation of district IEC plans;
- HPNs' orientation for IEC mobilizers' training;
- Supervision of IEC mobilizers' training by HPNs;
- Supervision of IEC activities implementation and mobilization; and
- Coordination and monitoring of mobilization data collection and reporting to the district health offices and the PMI AIRS office in Dakar.

4.2 HEALTH POST NURSES' ORIENTATION FOR MOBILIZATION

Under the supervision of NMCP and PMI AIRS IEC coordinator, DHMT facilitated orientation sessions for HPNs in the four target districts. The sessions were held June 28-30 in Koumpentoum, from June 29-July 1 in Koungheul, from June 30-July 2 in Nioro, and July 14-16 in Malem Hoddar. Overall, 56 HPNs including 16 women were oriented and the purpose was to prepare the IEC mobilizers for mobilization. The topics covered in this orientation included:

- An update on the counseling card, a job aid describing essential IRS messages for the IEC mobilizer;
- Guidelines for the campaign, especially for household preparation;
- Messages to be delivered during the mobilization;
- How to fill out data collection forms;
- Supervision of community IEC mobilizers;
- Structure identification and data entry;
- Ensuring mobilization data quality; and
- Training methodology.

Following this training, under the supervision of NMCP, SNEIPS and AIRS Senegal staff, HPNs conducted trainings for 925 IEC mobilizers and 101 community supervisors in the four districts.

TABLE 3. NUMBER OF MOBLIZERS AND SUPERVISORS TRAINED ON IEC

	IEC Mobilizers			Community Supervisors		
	H	F	T	H	F	T
Nioro	84	306	**390**	32	17	**49**
Malem	8	21	**29**	1	3	**4**
Koungheul	74	125	**199**	11	6	**17**
Koumpentoum	198	109	**307**	20	11	**31**
TOTAL	**364**	**561**	**925**	**64**	**37**	**101**

4.3 IEC ACTIVITIES

IEC activity planning and implementation was conducted at the district level. AIRS Senegal provided technical assistance in the validation process of communications plans, supervised the implementation of IEC activities, and helped build the local team capacity as recommended for the devolution. For example, this year, the district team was responsible for mobilization data collection and data recording. Overall, the results were satisfactory despite some persistent difficulties in urban areas.

Like last year, urban areas continued to be an issue for the project due to major refusals cases. Local, administrative, political authorities, district teams, and youth associations in some areas were actively involved in resolving refusal cases. Despite the increased involvement of authorities, we noted the same refusal rates as in 2015 (0.49%). This may be due to the fact that spraying took place in the rainy season and some people are reluctant to move their belongings outside.

As recommended, in some areas, IEC mobilizers accompanied SOPs the day of spraying, which contributed to the reduction of refusals or enabled some refusal cases to be brought to the attention of authorities for early case management. Most of the district teams were involved in the resolution of refusal cases in urban areas.

Districts have produced the daily IRS campaign journal, which details key IRS activities accomplished. In Koungheul district, youth groups volunteered, which helped beneficiaries prepare their households for spraying. In addition, the youth association accompanied spray operators in Koungheul Commune to inform beneficiaries and also helped solve refusal cases.

In previous years, IEC data recording was done directly by AIRS Senegal team. In 2016, NMCP selected data clerksat the district level that were trained by AIRS. Thus for the first time, the district team collected and recorded IEC data. Each DEC for IEC was in every district health center, where they entered IEC forms into the Access database and transmitted the results to the central office in Dakar. Each week, IEC data entered was checked by DEC supervisors, with the main difficulties being timeliness of IEC data in general. For example, data from Nioro and Koumpentoum was available nearly one month after the end of the spray campaign. It means that those data were not double checked because data entry supervisors could not verify them. PMI AIRS reported these W to NCMP in order to find a solution.

4.4 IEC SUPERVISION

AIRS Senegal's IEC coordinator was present in the field during the first few days of IRS to assist district teams during the startup of IEC mobilization. He helped with refusal case management, particularly in Koungheul and Koumpentoum districts.

The NMCP was in the field mainly in Koungheul during the two first days of the campaign to ensure that mobilization strategies put in place to overcome refusal cases in urban areas were fully applied and strengthened. Strategies included involving local and administrative authorities in the management of the refusal cases, ensuring that the district team and HPN responsible for the area are in the field to help mobilizers to solve refusal cases.

Table 4 shows some of the IEC campaign results.

TABLE 4. IRS SENSITIZATION RESULTS (HOME VISITS)

District	Households accepting IRS during home visits	Households refusing IRS during home visits	Number of women informed during home visits	Number of men informed during home visits	Number of persons informed during home visits
Nioro	13,175	106	43,155	25,164	68,319
Koumpentoum	7,856	39	23,865	18,516	42,381
Malem Hoddar	1,047	01	3,109	1,473	4,582
Koungheul	7,116	49	23,792	16,461	40,253
TOTAL	**29,194**	**195**	**93,921**	**61,614**	**155,535**

Source: PMI AIRS Senegal 2016 database

TABLE 5. IRS CAMPAIGN COMMUNICATION MATERIALS

Items	No. produced by NMCP (through AIRS Senegal)
Package of sheets laminated	300
Trainer's guide	100
IEC mobilizer's manual	995
T-shirts	3000
Streamers	70

5. IMPLEMENTATION OF IRS ACTIVITIES

5.1 SPRAY CAMPAIGN LAUNCH CEREMONY

On July 12, 2016, NMCP organized a "Media Conference" at the national level to report on the IRS campaign that began July 11, 2016. At the district level, launch ceremonies were organized and chaired by Prefects with the presence of local authorities and village and community leaders. Those ceremonies raised awareness about community needs and provided information on the importance of IRS.

The 2016 spray campaign began on July 11 in Koumpentoum, Koungheul and Nioro. The community-based IRS started in Malem Hoddar on July 21, 2016. Spray operations were completed within 20 operational days per district over 24 days total since not all districts sprayed on the same days.

AIRS Senegal sprayed organophosphates within in all districts. Spray operators used Goizper pumps in Koumpentoum and Nioro and Hudson pumps in Koungheul, Malem Hoddar, and in some areas in Nioro. In order to improve management of spray pumps, spray operators' roles and responsibilities were reviewed and progressive rinsing of spray pumps, previously performed by pump repair technicians, was reassigned to spray operators. Pump repair technicians were in charge of supervising the progressive rinse and measuring insecticide leftover after spraying. During supervision, efforts were made to minimize the return of mixed insecticide. As in 2015, beneficiaries reported being happy with the organophosphate product. Not only did the product protect households from mosquitoes carrying the malaria parasite, but it also helped households with pest control of other small insects.

In total, 886 seasonal workers hired by AIRS Senegal (including SOPs, site managers, team leaders, washers, storekeepers, assistant logisticians, accountants, repair technicians, security guards, drivers, and others) were deployed to the 24 sites in four target districts, as shown in Table 6.

The 24 sites were distributed as follows: 13 in Nioro, six in Koumpentoum, five in Koungheul. In Malem Hoddar with community-based IRS, local leaders provided operational centers free of charge for the project. At each operational site, AIRS Senegal deployed two to five teams of four to five SOPs. Spray teams worked six days per week with average hours of operation from 7 a.m. to 2 p.m. Before leaving for the spraying sites, all SOPs were provided breakfast by a person selected in collaboration with the local hygiene agent. In addition, SNH agents conducted daily supervision on the quality of food provided. Vans were arranged to transport SOPs to and from spray villages. After returning to the operational site, SOPs returned PPE, unused insecticide and empty bottles, cleaned themselves, and went home. In some remote operational sites, SOPs camped overnight (i.e. with communities providing lodging and the project covering food cost and other supplies). In Malem Hoddar, local community leaders provided horse-drawn wagons to transport SOPs and their equipment. Each wagon transports six operators.

Prior to the start of spray operations, 820 seasonal workers (including SOPs and substitutes, team leaders, site managers, washers, storekeepers, and repair technicians pumps) underwent a general medical examination to assess their medical fitness for IRS activities. Note that in 2016 medical check-ups were conducted by DMO in the four districts free of charge to the project. As per the project's policy and practices, all female personnel took a pregnancy test at the start of the spay campaign. After 15 days of spraying, no woman was tested positive for pregnancy. To minimize health risks, all SOPs received complete sets of PPE that included helmets, face shields, nose and mouth masks, long-sleeved cotton overalls, rubber gloves, pairs of cotton-rich stockings, robust gum boots, and neck covers. In Malem Hoddar, SOPs were provided with Tyvek suits as overalls and wet wipes for cleaning PPEs and to be able to clean their gloves for safe drinking.

TABLE 6. NUMBER OF PEOPLE HIRED

Position	Male (M)	Female (F)	TOTAL
SOPs	344	154	498
Operational site managers	21	3	24
Team leaders	76	24	100
Data entry clerks	11	10	21
Storekeepers	20	9	29
Finance assistants	3	1	4
Logistics assistants	2	1	3
Repair technicians	27	1	28
Washers	0	49	49
Guards	48	0	48
Drivers	55	0	55
Water suppliers	0	5	5
Office and operations sites cleaners	0	22	22
Total M/F Hire for IRS	607	279	886

5.2 Operation Coordination and Supervision

For adequate coordination of spray operations, there were regular meetings at site and district levels. Coordination and supervision activities are described below.

5.2.1 Coordination at Site Level

Coordination at site level was conducted daily and concerned all actors, namely: site managers, HPNs, community supervisors, and local SNH supervisors. All issues encountered during IRS implementation were discussed at the site level for an immediate solution. IEC mobilizers were informed of any change in spray calendars for better coordination in the field.

5.2.2 Coordination at District Level

Coordination at the district level was conducted under the leadership of the DMO or his/her representative and involved all supervision actors (central and regional level SNH and PMI AIRS team) and DHMT. Issues were also discussed during those meetings to come up with solutions and ensure smooth execution of activities on the ground.

5.2.3 Coordination at National Level

Senegal AIRS Chief of Party, PMI malaria advisor and NMCP coordinator established a regular consultative meeting or phone calls on IRS implementation updates. In addition PMI AIRS Senegal Operations Manager coordinated on a weekly basis with NMCP and SNH IRS focal persons all IRS implementation activities including planning, training and supervision. The IRS steering committee met for decision making as needed (waste disposal and the future of IRS in Senegal). PMI AIRS Senior Management team) met on daily basis to monitor IRS activities.

5.2.4 SMS JOB AIDS

In 2016, a list of job aids was developed and sent to SOPs regularly. Job aids included reminders related to SOPs' performance, safety and quality of spray, structure marking and sexual harassment.

5.2.5 OPERATIONS SUPERVISION

Supervision of the IRS campaign involved identification of potential problems, immediate correction of inadequacies, and problem-solving leading to improved program performance and helping to ensure a successful overall campaign. The IRS steering committee reviewed and validated the comprehensive followings IRS supervision checklist and supervision manuals for use by all supervisors during the 2016 spray operations:

1. Supervision manual
2. Training of trainers manual
3. Spray Operator Pocket Guide
4. Operator booklet
5. Site manager guide
6. Store monitoring plan
7. Team leaders guideline
8. District coordinator guide
9. Guide for logistics assistant
10. Storekeeper manual
11. Manual for pump repair technician
12. Guide for training on environment
13. Insecticide shipping guide
14. Manual on pesticide intoxication case management for physicians
15. Manual on pesticide intoxication case management for HPN
16. Guide for IEC mobilizers' trainer
17. Manual for IEC mobilizers
18. Manual on data collection

5.2.5.1 SUPERVISION AT SITE LEVEL

At the site level, each site had an average of three to four spray teams. Every team leader directly supervised the work of four to five spray operators. Site managers were in charge of overseeing team leaders' performance and observing the work of spray operators and other actors on site, including washers and security guards.

In 2016, the team leader supervision checklist was used to ensure effective supervision by the Team Leader in the field. The team leaders' supervision file was helpful and all related issues were addressed daily under PMI AIRS and partners' supervision. The percentage of red flags was generally not significant. False positive responses related to pumps leaking led to false intoxication warning.

In order to reduce the number of vehicles during the campaign, it was recommended that SOPs be seated with pumps between their legs. However, the inside of rented commercial vehicles was too tight for taller SOPs. A week after the start of the campaign, PMI AIRS rented larger vehicles in urban areas in Koungheul to improve transportation conditions.

Every site had one local supervisor assigned by SNH. After one week of supervision in a given site, those assigned SNH supervisors would rotate with their colleagues from other operational sites. At the end of the day, there were debriefing meetings with the team leader, site manager, and SNH supervisor to share the findings and lessons learned from the day and to make recommendations for the next day. However, in Koungheul, there were coordination issues and misunderstanding between team leaders, sites mangers and local SNH agents who were not trained and oriented in supervisory techniques based on new guidelines about mixing of insecticide and having SOP transport carrying spraying cans. When the AIRS team was made aware of this situation, immediate discussions took place with the SNH focal person; consequently, those untrained agents were removed from the SNH's supervision list.

5.2.5.2 Supervision at Regional and National Level

Representatives from the SNH regional offices and the central level performed supervision visits to assess the progress and any issues with the campaign and observe the performance of local SNH agents.

5.2.5.3 PMI AIRS Senegal Supervision

Since 2015, the working relationship among the AIRS Senegal team, DHMT, and local SNH significantly improved. Specifically, all AIRS Senegal technical staff worked in the field during the length of the campaign, performing close supervision and coaching all aspects of operations. They specifically focused on the supervision of spray techniques, EC, IEC mobilization, stock management, and handling of the insecticide. Careful and consistent supervision was a key factor of success during this spray campaign.

The Director of Disease Control, NMCP's Coordinator, IRS focal person at NMCP, and AIRS Senegal's Chief of Party conducted a joint two-day visit in the field to supervise IRS activities. The team observed all aspects of operations, including spray techniques, environmental compliance, warehouse, end-of-day activities, beneficiaries' appreciation, etc. They met the DHMT and local authorities (prefects, mayors) who described the impact of the IRS intervention in terms of malaria case reduction (according to HPNs); they mentioned the excellent collaboration between DMO and the project field team, particularly the District Coordinator in coordinating activities and solving refusal cases. The Director of Disease Control and NMCP Coordinator appreciated local authorities' substantial and sustainable contribution in providing facilities to the project during the campaign period. Local authorities recommended the continuation of the spray campaign and wished for its extension as well.

Two supervision visits were carried out by the Home Office Technical Program Manager and Finance and Contracts Administrator. They observed and made recommendations on IRS operations activities as well as on financial procedures.

While in the field, the AIRS Senegal team coached SNH officers, DREEC, and DHMT on how to conduct proper supervision using the smartphones for supervision. Supervision also focused on:

- Making sure spray calendars are implemented as planned and monitoring spray operators' daily performances to prevent any voluntary slowdown in operations by spray operators;
- Strengthening working relationships between various actors in the field;
- Management of refusal cases in close collaboration with local authorities; and
- Improving spraying techniques as needed.

Supervision had an important impact, including:

- Adhering to spray progress timelines in operational sites;
- Household preparation for quality of spray;
- Guidelines for insecticide mixture;
- Guidelines for structure marking and zip tying;
- Spray teams adhering to daily performance targets;
- No complaints from beneficiaries reported to authorities; and
- Refusal cases were managed successfully in spite of very few categorical cases.

One week after the start of the campaign, PMI AIRS assessed recurrent issues from supervision and made recommendations that all supervisor and partners in the field applied in order to significantly reduce errors and mistakes during the implementation phase.

Since 2014/ 2015, increased ownership of IRS by government authorities has been evident. In 2016, the mayors loaned all sites free of charge to the project in Koungheul and Koumpentoum districts. The prefect of Koungheul made visits to spray sites and the PMI AIRS office and showed appreciation for the IRS team's environmental compliance. During the district evaluation meeting, prefects chaired workshops.

Table 8 summarizes the spray operations supervision and monitoring schedule.

TABLE 7. SPRAY OPERATIONS SUPERVISION AND MONITORING SCHEDULE

Actors	Frequency	Supervised areas
District SNH staff	Daily visit during the entire period of spraying	Spraying techniques, environmental safety and compliance, spray operators' behavior; IEC messages delivered; Spray performance; and Spray organization in the field
SNH (regional and central)	2 visits for central-level and 2 for regional-level SNH – duration four days.	Spraying techniques, environmental safety and compliance, spray operators' behavior, supervision of SNH supervisors, IEC
Abt national and field office Abt Home Office	Daily visit during the entire period of spraying 2 visits (M&E and TPM)	Spraying techniques, environmental safety and compliance, spray operators' behavior, supervision of SNH supervisors, management of storekeepers, IEC message delivered, spray performance
NMCP	2 visits during the campaign	Field organization, environmental safety and compliance, partner relationships, supervision of SNH supervisors, IEC component
PMI/USAID, Directorate of Disease Control NMCP national level,	2 visits by IRS focal persons 1visit from central level 1 visit external EC inspection	Field organization, partner relationships, supervision, EC, management of storekeepers, availability and status of materials stock, IEC, spray performance, beneficiary satisfaction
DHMT	8 visits for IEC mobilization; 11 visits for spray operations	IEC, spray operations and beneficiaries' impressions; IRS operations in joint supervision with Abt staff; IEC mobilization
Local leaders (prefect, mayors, etc.)	01 visit throughout the campaign	IEC mobilization, oversight of entire IRS operations, solving refusal cases

5.3 SMARTPHONES FOR SUPERVISION

In an effort to improve, standardize, and automate supervision, AIRS Senegal and its subcontractor Dimagi, Inc. updated smartphone applications for daily SMS reporting and IRS operations supervision.

5.3.1 EQUIPMENT USED

AIRS Senegal distributed 54 Samsung Galaxy pocket phones to SNH supervisors, site supervisors, and project staff. The AIRS Senegal team along with Dimagi updated the mobile application components of the supervision forms on each phone and set up an email address where users would receive the daily reports for the supervisor's teams.

The following supervision forms were included in the Dimagi-supported smartphone application:

1. Spray operators' morning mobilization and vehicle inspection;
2. Structure preparation and observations on spraying techniques;
3. Spray operators' return at the end of day;
4. Storekeepers' performance monitoring;
5. Data Collection Verification (DCV) ; and

In addition to the Dimagi application, three checklists for EC inspection: using the Open Data Kit (ODK) Collect application: two for pre-IRS inspection related to site validation and one form for post-IRS inspection.

5.3.2 IMPLEMENTATION, STRENGTHS, AND CHALLENGES OF THE mHEALTH SUPERVISION

Local supervisors completed the forms on a daily basis. Site managers were in charge of spray operators' morning mobilization and their return to base. Central level supervisors (AIRS Senegal staff and SNH supervisors) and regional level SNH also completed sub-forms but did not systematically follow spray teams for a full day.

Dimagi sent automated reports from these supervision checklists to a list of stakeholders, which had been provided by AIRS Senegal. Every day around 6:00 PM supervisors would receive the supervision data as an e-mail, which they could access on their smartphone in a tabular format as well as an MS Excel attachment.

Some of the strengths of the smartphone for supervision included:

- SMS reports reviewed daily by M&E team before sharing with partners and stakeholders;
- Daily sharing of supervision reports with users and stakeholders in the implementation; and
- Automatic updates of the mobile application.

Table 9 summarizes challenges and solutions for system implementation.

TABLE 8. CHALLENGES AND SOLUTIONS FOR SYSTEM IMPLEMENTATION

Difficulties Encountered	Altenative Solutions Proposed and Implemented
SMS	
The SMS report generated by the CommCare platform by Dimagi, Inc. was difficult to understand and explore.	Development of a new Excel report template using data sent from the CommCare platform
Repetitive SMS alert sent to DC when SMS from team leader were not transmitted.	Dimagi was informed to stop the SMS alert.
High frequency of SMS jobs aids sent to SOPs.	Target the team leaders and sites managers and storekeepers for SMS jobs aids.
Mobile Application	
Network connection problems experienced in some areas (sending and receiving).	Move to areas where the network is available (sometimes at the end of the day smartphones are brought back to the district level to perform updates).

5.4 Spray Performance Tracking Sheet including DOS New File

In 2016, AIRS Senegal continued using the Spray Performance Tracking Sheet (SPTS) tool introduced in 2013 and reviewed in 2014 and 2016. The revision in 2016 includes team leader's data operations supervision in all four target districts. This tool allowed daily tracking of SOP performance and the use of insecticide with total supervision completed by team leaders and number of issues recorded. All issues were addressed daily under PMI AIRS supervision and other supervisors. After analyzing the data, site managers communicated feedback to the team leaders and provided recommendations and corrections as needed. They also shared the performance results with the DHMT and other partners on a daily basis.

Site managers were responsible for recording the performance data. They worked with storekeepers to input information on insecticide use on the SPTS on a daily basis. This information was available to DCs and shared with DMOs. In addition, AIRS Senegal synthesized the data and shared it every week with all partners including PMI, NMCP, SNH, the district health team, and PMI AIRS Home Office. This tool was highly appreciated by all stakeholders visiting spray operations during the campaign.

5.5 Logistics and Stock Management

In 2016, the lessons learned in 2015 in managing large quantities of batches of insecticides organophosphates were applied. To that end, district warehouses were supplied more frequently because of the space limitation for restocking and stock monitoring. In Nioro and Koungheul, facilities did not have enough space for insecticide storage at the district level; the quantity needed for the district was dispatched between the district warehouse and the bigger site stores.

As for the insecticide, a warning threshold was established in each district central storage facility based on the total insecticide stock for each site. From there, two pesticide re-stockings were carried out over the course of the campaign to avoid stock-outs or the potential for any stock-outs.

In the context of community-based IRS, AIRS did not recruit a site storekeeper. However, in close coordination with the Site storekeeper in Koungheul, team leaders were responsible for stock

management during the spray period of six days. The district has been provided at once with the full supplies of PPE and pesticide for the duration of the spraying. They ensured a tracking movement through the stock card.

5.6 Pilot Experience Community IRS in Malem Hoddar

In efforts to reduce IRS cost and build country capacity to lead IRS implementation, PMI AIRS in collaboration with NMCP piloted community–based IRS in Malem Hoddar. Locally initiated during a quarterly epidemiological data dissemination session in Diourbel, the idea of community-based IRS was introduced and discussed with NMCP. A protocol was developed and shared with key members of the IRS steering committee as well as with all partners during the IRS national workshop meeting. In collaboration with NMCP, PMI AIRS conducted an advocacy visit for community-based IRS to identify and ensure local community participation with regards to operational sites, transportation, and community mobilization.

As a result, we recorded great commitment from administrative authorities, political leaders, village chiefs and other community leaders. Spray operators' recruitment was done at the community level in order to minimize camping sites' cost and reinforce IRS acceptability. During the campaign, community leaders provided horse-drawn wagons to SOP team as means of transportation. In some villages community leaders provided meals to non-resident SOPs. The spraying in Malem Hoddar was completed in six operational days. However, because of heavy rain and geographical accessibility, a portion of one health post could not be reached to be treated until the end of the spraying period.

Fifty-one operators (36 SOP, 7 team leaders, 4 local supervisors and 4 pumps technicians) wore Tyvek suits. Thirty-six SOPs sprayed 3,808 structures with coverage of 95.1% of 4,006 structures found. The average rate of structures sprayed per day per SOP was 19.5. This high performance is due to the fact that SOPs are working in their community with very short distances to reach households. Local community leaders contributed with eight horse-drawn wagons (two per health post), each transporting six SOPs and material needed for spraying. Of the 12,791 people protected, 263 were pregnant women and 2,637were children under five.

A separate comprehensive document will be written about this experience.

Villages leaders meeting to mobilize horses for IRS in Touba Gueyenne Health Post (Malem Hoddar) (Photo: PMI AIRS Project)

Setting up a mat on the horse wagon to avoid the sitting area from being slippery

Storage area under the horse wagon to store spray equipment

6. POST-SPRAY ACTIVITIES

6.1 SUMMARY OF POST-SPRAY ACTIVITIES

Post-spray activities included campaign evaluation meetings at the site, district, and national level; demobilization of commodities; site rehabilitation; and solid waste management, which are covered in Section 9. Table 10 provides details on each post-spray activity.

TABLE 9. POST-SPRAY ACTIVITIES

Activities	Responsible Party	Results
Pregnancy tests	DMO	Completed
Site-level IRS evaluation	HPNs, SOPs' site managers, team leaders and SOP, religious and community leaders, elected officials and AIRS	Completed
District-level IRS evaluation	DHMT, HPNs, site coordinators, district high level authorities, religious and community leaders, local elected officials local media and PMI AIRS	Completed
National-level IRS evaluation	Country-level partners, local elected leaders, UCAD, SNH, SNEIPS, DMOs, PMI AIRS, local media	Ongoing
IRS site closeouts	PMI AIRS district staff	Completed
Data cleaning and archiving	M&E team	Completed
Waste disposal	PMI AIRS SOCOCIM, NMCP Sodiaplast, DEEC	Ongoing

6.1.1 POST SPRAY EVALUATION MEETINGS

At the post-spray evaluation meetings, participants identified strengths and limitations of the 2016 spray campaign planning and implementation.

6.1.1.1 STRENGTHS

- In collaboration with NMCP, AIRS Senegal's advocacy for offices and operational sites free of charge for the project;
- PMI AIRS workshop, which helped to prepare for the spray campaign and innovations;
- Administrative and local authorities' involvement in IRS;
- Great commitment of Malem Hoddar's community leaders for community-based IRS, providing horses for SOP transportation and meals to non-residents;
- Close supervision of spray operations at all levels provided by all stakeholders and partners (AIRS Senegal and PMI AIRS Home Office, SNH, NMCP, regional and district health offices, DEEC/DREEC);
- Data operation supervision file enabling Team Leaders to correctly supervise SOPs;
- Dispatching and coding of spray operators' materials by site managers and team leaders the day before the start of spray operations prevented delays that are common to first days of spraying;
- Making a DHMT member available to the program as an IRS focal point for better activity monitoring by the district;

- Medical checkup free charge for the project;
- Zero incidents and zero cases of poisoning;
- Promoting gender equity: 45% (including mobilizers) of those trained were women in 2016 versus 20% in 2014 and 41% in 2015;
- Shared SPTS and daily performance monitoring and DOS;
- Coordinated spray calendars with home visit (mobilization) schedules to ensure home visits occurred within 48 hours before spray;
- Involved local authorities in IRS implementation activities (micro-planning, supervision) and evaluation workshops for better IRS ownership and future transfer;
- Strengthened commitment from key stakeholders (SNH, NMCP, districts);
- Improved coordination at all levels for quick strategic decisions and management actions;
- Effectively involved DREEC agents in IRS campaign implementation;
- Improved use of SMS for reporting, supervision using smartphones, and use of mobile soak pits;
- Initiating job aids for operators' awareness during operations.

6.1.1.2 Limitations and Improvement Areas

- Capacity of MOH and, particularly, DHMT, to implement IRS activities along with the routine activities of the health center. The current human resources capacities at both the NMCP and district health offices will not allow these local organizations to fully implementation IRS operations.
- Low educational level of seasonal workers was noticeable among some spray operators and IEC mobilizers when filling out data collection forms.
- Inadequate use of zip ties. They are zipped on PPE, pumps etc.
- Frequent drop out of SOPs after training.
- Inappropriate vehicle for SOP transportation with pumps in few sites.
- Supervision conducted by SNH agents not trained in supervisors' training.
- IEC mobilization in urban areas: still relatively high number of refusals.
- Important quantity of mixed insecticide returned at the end of the day during the first 10 days in Nioro.
- Limited accessibility to some health posts due to heavy rain.

6.2 Demobilization of Commodities

Following completion of spray operations, the project moved the leftover insecticide, equipment, and PPE from the 24 operational sites to the three district-level warehouses, and then all leftover active charcoal empty bottles of insecticide and solid wastes were transferred to the main warehouse in Kaolack. Annex A details the post-spray inventory of the equipment and supplies available in the central warehouse.

7. ENTOMOLOGY

For the last several years, the Laboratory of Vector and Parasite Ecology (LEVP) of the Faculty of Science and Technology (FST) at the University Cheikh Anta Diop (UCAD) in Dakar has received a direct contract from PMI/Senegal for the implementation of entomological monitoring activities. Since 2015 LEVP was subcontracted through the PMI AIRS Project to continue the implementation of entomological monitoring activities. Entomological data are being collected in villages belonging to selected heath posts in hot spot areas and in non-treated areas. UCAD conducted cone bioassays one to two weeks after spraying with a susceptible strain of *An. gambiae* s.l. in the four IRS districts (Koumpentoum, Malem Hoddar, Koungheul, and Nioro). The purpose of the tests is to assess the quality of spraying.

Data on species composition, vector biting rates, and vector behavior have been collected in 24 sentinel sites (Table 11) from four IRS districts (Nioro, Koumpentoum, Koungheul, and Malem Hoddar) and three control districts (Ndofane, Kaffrine, and Tambacounda). Results of these collections will be added after receiving the UCAD report.

TABLE 10: SENTINEL SITES FOR ENTOMOLOGICAL SURVEILLANCE

District	Status	Health Post	Sentinel Villages	Geographical coordinates	
				Latitude	Longitude
Nioro	Hot Spots	Darou Salam	Bamba Diakhatou		
		Thila Grand	Ndramé Ndimb	13.604914°	-15.963954°
	Non-Hot Spots	Paos Koto	Paos Koto	13.783977°	-15.801159°
		Medina Sabakh	Camara	13°38'17.6"	15°57'48.2"
Ndofane	Control for Nioro	Tawa Mboudaye	Tawa Mboudaye	13°58'31.6"	16°12'15.5"
		Darou Mbitteyene	Darou Mbitteyene	13°59'01.5"	16°08'11.9"
Koumpentoum	Hot Spots	Koumpentoum	Village I	13.909582°	-14.503577°
		Méréto	Koumaré	13.905140°	-14.372731°
	Non-Hot Spots	Kouthiaba	Kouthiaba	14.177377°	-14.454830°
		Syll Serigne Malick	Syll Serigne Malick		
Tambacounda	Control for Koumpentoum	Koussanar	Koussanar	13.864912°	-14.080138°
		Sinthiou Malem	Ly Counda	13.791756°	-13.839031°
Koungheul	Hot Spots	Ida Mouride	Ida Mouride	13.988108°	-14.681809°
		Saly Escale	Pakala	13.831722°	-14.937530°
	Non-Hot Spots	Lour Escale	Touba Aly Mbenda	14.119182°	-14.754182°
		Maka yop	Nguerane Goumack	14.081030°	-15.016059°
Kaffrine	Control for Koungheul	Djokoul	Wey Naan	13.980534°	-15.219800°
		Kahene*	Malem Thierigne	14.056014°	-15.236700°
Malem Hoddar	Hot Spots	Maka Belal	Maka Belal	14.109558°	-15.234244°
		Touba Ngueyene	Touba Ngueyene		
	Non-Hot Spots	Dianké Souf	Dianké Souf	14.228570°	-15.334641°
		Ndioum Nguinth	Ndioum Nguinth		
Kaffrine	Control for Malem Hoddar	Ngodibo	Pété	14.096960°	-15.452728°
		Kathiote	Thiamene Kathiote		

Supervision was conducted by the AIRS Senegal Technical Manager in July to ensure the compliance of entomology SOPs related to mosquito collection in the field. A second supervision was done on August in collaboration with NMCP's entomologist to ensure the compliance of cone bioassay tests in the field.

The bioassay tests conducted in August in all IRS districts indicated that spraying was of good quality. The number of houses used for cone bioassays for each district is shown in Table 12. Results are summarized in Tables 13, 14, 15 and 16. Bioassays tests will be followed monthly in each district until the mortality of exposed mosquitoes drops below 70% for two consecutive months.

TABLE 11. NUMBER OF HOUSES USED FOR BIOASSAYS

	1 month after spray	
District	**Control**	**Test**
Koumpentoum	02	10
Koungheul	02	10
Malem Hoddar	02	10
Nioro	02	10

TABLE 12. CONE BIOASSAY RESULTS, KOUMPENTOUM

Village	Control				Exposed			
	Number		Mortality 24 h		Number		Mortality 24 h	
	M*	C*	M	C	M	C	M	C
Koumare	30	0	0%	N/A	90	60	100%	100%
Village1	30	0	0%	N/A	120	30	100%	100%
Subtotal	60	0	0%	N/A	210	90	100%	100%
TOTAL	60		0%		300		100%	

TABLE 13. CONE BIOASSAY RESULTS, KOUNGHEUL

Villages	Control				Exposed			
	Number		Mortality 24 h		Number		Mortality 24 h	
	M	C	M	C	M	C	M	C
Ida Mouride	0	30	N/A	3%	61	90	100%	99%
Pakala	30	0	0%	N/A	91	63	100%	100%
Subtotal	30	30	0%	0%	152	153	100%	99.3%
TOTAL	60		2%		305		99.70%	

* M= Mud C= Cement

TABLE 14. CONE BIOASSAY RESULTS, MALEM HODDAR

Villages	Control				Exposed			
	Number		Mortality 24h		Number		Mortality 24 h	
	M	C	M	C	M	C	M	C
Maka Bellal	32	0	0%	N/A	93	63	100%	100%
Touba Nguéyène	0	32	N/A	0%	32	123	100%	99,2%
Subtotal	32	32	0%	0%	125	186	100%	99.5%
TOTAL	64		0%		311		99,7%	

TABLE 15. CONE BIOASSAY RESULTS, NIORO

Villages	Control				Exposed			
	Number		Mortality 24 h		Number		Mortality 24 h	
	M	C	M	C	M	C	M	C
Bamba Diakhatou	35	0	3%	N/A	175	0	93%	N/A
Ndramé Ndimb	36	0	11%	N/A	68	100	100%	100%
Subtotal	71	0	7%		243	100	96.3%	100%
TOTAL	71		7%		343		97.20%	

8. MONITORING AND EVALUATION

Based on lessons learned from prior spray operations, AIRS Senegal made improvements to the M&E system for the 2016 campaign, including to:

- Emphasize accuracy of both the data collection and data entry processes through comprehensive trainings and supervision at all levels;
- Streamline and standardize data information flow to minimize errors and facilitate timely reporting and use of data for effective and better IRS operations;
- Improve data sharing with NMCP and other stakeholders in anticipation of NMCP ownership of IRS M&E by sharing spray progress on a daily and weekly basis. Ensure IRS data security and storage for future reference through establishment and enforcement of proper protocols.

8.1 DATA COLLECTION

The data collection closely followed the process described in the country work plan. The project employed 21 Data Entry Clerks (DECs), with 12 assigned to Nioro, five in Koungheul, and four in Koumpentoum. These DECs entered spray data while four DECs, recruited for IEC and entered mobilization data. Each of the DECs received a laptop that contained the AIRS Senegal Access database. DECs entered Spray Operator Forms into the Access database and transmitted the results to the central office in Dakar within 24 hours of the receipt of the data. The networking access built into the database, which used the Microsoft Access program, was able to provide automated real-time updates of spray progress reports both locally and at the PMI AIRS Home Office. Once entered, the paper forms were filed and archived at the data entry sites.

Each DEC for IEC was provided with an office space in every district health center. An Access database for IEC was uploaded onto their laptops. DECs entered IEC Forms into the Access database and transmitted the results to the central office in Dakar. Each week, IEC data entered were checked by DEC supervisors.

As in 2015, to reduce the variances between team leader summary forms and spray operators' data collection forms, a ratio of totals and details was established in the database. This approach enabled DECs to immediately identify errors on spray forms or in the data entry, and clean the data the same day it was entered.

8.2 PILOT TESTING THE USE OF A SCANNER USE FOR DATA TRANSFER

SOP data collection forms are usually forwarded to the district level by a vehicle used for IRS supervision. Some sites are very far from the district office and are difficult to reach given the nature of the roads that are chaotic in rural areas, especially during the rainy season. This leads to high transport costs and delays in data entry. Therefore, it was proposed to test the use of a scanner to send data via the internet from Touba Alia, which is 110 km to the operational site in Koungheul. In order for this approach to work successfully, electricity and a strong internet connection are necessary.

One team leader, one DEC and one DEC supervisor underwent a one-day training on how to use the scanner. The pilot was implemented using generator to provide electricity. The internet connection through the mobile operator Orange worked most of the time, but it was not steady. The IT specialist supervised the activity during the first three days. The first day, unfortunately, the generator was not

working and the data was not sent out until the second day when the generator was replaced. During the third day, data sheets could not be sent because the internet not connection was poor at best.

Once those problems were addressed and resolved, the data sheets were sent to Koungheul through the scanner. The traditional way of sending the data using a supervision vehicle was used if any of these above cited problems occurred again.

The difficulties encountered included:

- The instability of the Orange network in the site of Touba Alia;
- The generator was not working the first day.

This experience did not meet expectations because the requirements were not met, mainly due to non-availability of a working internet network. However, the technique was mastered by the team leader and DEC and could be used in areas where the internet network and electricity were available. The plan is to try to address the connectivity issue and use the scanner again during the 2017 spray campaign

8.3 MOBILE MHEALTH

In 2016, AIRS Senegal continued implementing mHealth activities on a routine basis to improve access to real-time information and allow the team and steering committee to better supervise the spray campaign. With the help of a subcontractor, Dimagi, Inc., AIRS Senegal implemented the SMS data reporting in all four spray districts and implemented the supervisory forms on smartphones in all districts as described earlier in this report. AIRS Senegal worked with Dimagi, Inc. to update the basic phones and smartphones, as well as to format the subsequent reports and guide preparation, training, and supervision.

8.3.1 SMS DATA REPORTING

In 2016, AIRS Senegal used an SMS data reporting system whereby team leaders would send, via SMS, their daily operational data.

The spray data was sent by the Dimagi, Inc. CommCare system in a simple MS Excel style format via email. The report format was reviewed and modified into a more user-friendly format and sent to the AIRS Senegal and Home Office staff, AIRS partners and the Steering Committee on a daily basis. This allowed the operations team and other stakeholders to receive and process the data immediately, and thus take urgent action, if needed.

Each day, team leaders would send an SMS with the following data for their teams:

1. Number of spray operators working/day/team;
2. Total number of rooms found/day/team;
3. Total number of rooms sprayed/day/team; and
4. Number of bottles used/day/team.

Users of the SMS system found it to be very user-friendly, and those who received the data were happy to have the data at their disposal on a daily basis.

For SMS data collection and reporting, DCs, site managers, team leaders, and storekeepers in the four districts were trained. Overall, 100 team leaders were trained for daily SMS data reporting. DCs' roles and responsibilities were to make sure team leaders sent their SMS data.

In total, 24 operational site managers and 29 storekeepers in all districts were trained on the mobile supervisory forms and SMS data reporting. In addition, 53 SNH staff (including four female assistants), one DEEC and three DREECs from Kaffrine, Kaolack, Tambacounda region were trained on the mobile supervisory form.

8.4 Data Quality Assurance

8.4.1 Data Collection/In-Field Verification

Data quality assurance activities were instituted for both data collection and data entry verification through updated supervisory tools and the standard database audit checks. AIRS Senegal's data quality assurance efforts significantly reduced the number of errors found on daily spray operator forms and in the M&E database, improving the overall quality of the data and IRS results. Table 17 describes which data quality assurance forms were used throughout the campaign, and the corresponding percentage of structures verified.

TABLE 16. SUPERVISORY TOOLS USED

M&E supervisory tools	Structures verified	Percent of errors found (number of errors divided by the number of records verified)
Error Eliminator	Completeness and accuracy of data: heading information (169,210 lines)	1.2%
	Completeness and accuracy of data: structure information (170,287 lines)	0.9%
	Logic Control (103,191 lines)	1.0%
Data Collection Verification	1,094 compounds	1.2%
Data Entry Verification	54,128 lines	0.7%

8.4.1.1 Error Eliminator

AIRS Senegal supervisors, team leaders, and site managers used the Error Eliminator (EE) daily to detect and correct common errors on SOP forms before they were transported to the data center. Common errors included arithmetic mistakes and failure to complete all data items on the data collection forms.

8.4.1.2 Data Collection Verification Form

AIRS Senegal senior management, local supervisors, and SNH Supervisors used the Data Collection Verification (DCV) tool to interview households to verify spray coverage data.

This year, the DCV was included in the smartphone supervisory application and supervisors and site managers used the forms each week; 1,094 compounds were visited using the DCV form. The most frequent types of errors were related to the counting of the population (the number of people found during spray operations is different from the number of people found during the verification process). Corrections were done by cross-checking the data recorded on the spray operator forms. Staff performed these verification visits within approximately two days of spraying and identified errors on a timely manner to correct mistakes and notify spray operators and team leaders to prevent repeat errors.

8.4.1.3 Data Entry Verification Form

The M&E and database managers and the database supervisors used the DEV tool to verify that the data entered into the database matched the data on the daily SOP forms. They found far fewer errors in 2016 compared to last year as a result of the in-field supervisory verification tools (i.e., Error Eliminator and DCV tools), and the data cleaning tool that compares spray totals to spray details and was installed on

every DEC's computer. In 2016, 54,128 lines were verified using the Data Entry Verification Form and 402 errors were identified and corrected. The DECs were re-trained when required.

8.4.1.4 Access Database Audit Locks and Data Cleaner

In addition to the database validation rules (e.g., the number of pregnant women in the structure cannot exceed the number of women in the structure), the database manager verified daily all data entered into the database. On a daily basis, the database manager would also send errors to the DECs and database supervisors for immediate cleaning. Each week, the M&E manager double checked data before sharing with the team. This practice allowed AIRS Senegal to check and correct for any DECs once all the spray data had been entered.

AIRS Senegal created reports of how these supervisory tools were used and the common errors to look out for; these reports were shared with the project home office regularly, which allowed the home office to follow up on any problems with data collection or data inconsistencies.

Improved data entry allowed for the production of weekly spray reports with the most up-to-date data.

8.5 Spray Results

The 2016 AIRS Senegal performance indicators are presented in a Monitoring and Evaluation Plan matrix in Annex C. Details of some key IRS indicators, such as number of structures sprayed and people protected are provided in the following sections of the report.

8.5.1 Spray Data

The total number of structures found by spray operators was 128,185 and the number of structures sprayed was 124,757. With that, the overall spray coverage was 97.3%, as shown in Table 18.

The total population protected by IRS in 2016 was 496,728, protecting 98.0% of the target population. Of these, 82,768 children under the age of five and 9,951 pregnant women were protected.

TABLE 17. IRS COVERAGE: ELIGIBLE STRUCTURES SPRAYED AND POPULATION PROTECTED IN TARGETED AREAS

Districts	Total # of eligible structures found by SOPs	Total # of eligible structures sprayed	% of total structures sprayed	Population protected	Pregnant women protected	Children under 5 protected	% of population protected	Eligible Rooms	
								Found	Sprayed
Koumpentoum	35,627	34,829	97.8%	120,391	2,620	20,955	98.2%	45,502	44,563
Koungheul	32,546	31,079	95.5%	104,585	2,277	17,859	96.1%	47,093	45,217
Malem Hoddar	4,006	3,808	95.1%	12,791	263	2,637	96.0%	4,832	4,622
Nioro	56,006	55,041	98.3%	258,961	4,791	41,317	98.9%	124,503	123,262
Total	**128,185**	**124,757**	**97.3%**	**496,728**	**9,951**	**82,768**	**98.0%**	**221,930**	**217,664**

8.6 Evaluation of Hot Spots

Since 2015, AIRS Senegal developed a monitoring and evaluation plan in collaboration with NMCP and PMI/Senegal to assess the effect of focal spraying in terms of value added compared to the previous

approach of blanket spraying. In 2016, the same protocol was conducted in the same health post as 2015. Specific objectives were to identify comparative advantages and drawbacks in the implementation of the hot spots approach versus blanket spray, to compare the costs of each approach, and to assess the effectiveness in achieving the objectives of each approach.

A separate report evaluating the focal spraying approach will be provided at the end of the monitoring of clinical data (December 2016).

8.6.1 INSECTICIDE CONSUMPTION

A total of 39,192 bottles of organophosphate (Actellic 300CS) were distributed to the districts, and 39,189 were used to spray 124,757 structures (Table 19) with **3.2** structures sprayed per bottle.

TABLE 18. INSECTICIDE USAGE AND SPRAY OPERATOR PERFORMANCE

District	# of bottles/sachets used	# of structures Sprayed	Average # of structures sprayed per bottle/sachets	# of rooms sprayed	Average # of rooms sprayed per /bottle
Koumpentoum	7920	34,829	4.4	44,563	5.6
Koungheul	8344	31,079	3.7	45,217	5.4
Malem Hoddar	782	3,808	4.9	4,622	5.9
Nioro	22143	55,041	2.5	123,262	5.6
Total Actellic	**39,189***	**124,757**	**3.2**	**217,664**	**5.6**

**Among the 3 remaining bottles, 1 empty bottle with manufacturer notice, 1 full and ½ full (accidentally opened).*

Overall, PMI AIRS sprayed 124,757 structures and, on average, SOPs sprayed 14.3 structures per day. The project also reports spray coverage by room because historically, the Government of Senegal records and reports IRS results by rooms. The total number of rooms sprayed was 217,664 with SOPs averaging 25.0 rooms per day as shown in Table 20.

TABLE 19. RATE OF SPRAY PROGRESS

Districts	Structures sprayed	Rooms sprayed	# of days	# of spray operator days	Average # rooms/day/SOP	Average # structures/day/SOP
Koumpentoum	34,829	44,563	20	1890	23.6	18.4
Koungheul	31,079	45,217	20	1864	24.3	16.7
Malem Hoddar	3,808	4,622	06	195	23.7	19.5
Nioro	55,041	123,262	20	4755	25.9	11.6
Total	**124,757**	**217,664**	**20**	**8704**	**25.0**	**14.3**

9. ENVIRONMENTAL COMPLIANCE

9.1 PRE-SPRAY ENVIRONMENTAL ASSESSMENT

9.1.1 BACKGROUND

AIRS Senegal operates under a Supplemental Environmental Assessment (SEA) amendment that was written and approved in 2015. The SEA covers the use of all WHO approved insecticides for IRS including pyrethroids, carbamates, and organophosphates for the period of 2015-2020. It also includes chlorfenapyr, which is currently under WHOPES review for IRS activities and is registered for similar use by the U.S. EPA.This SEA is applicable for IRS activities in Kaolack, Tambacounda, Kaffrine and Kolda.

In Senegal, all four target districts have more or less difficulty reaching all spraying areas due to road conditions and/or longer distances, particularly in the rainy season. To overcome these difficulties, those areas were identified and sprayed first, before the heavy rains begun. Areas of high population density and those most accessible were sprayed later. In 2016, all districts were sprayed - as planned - in July/August during the full rainy season. This period was chosen to cover the peak period of malaria transmission. In addition we avoided the Ramadan period where the sprayer performance is likely to be lower. As in 2015, AIRS Senegal has used camping sites and mobile soak pits in hard-to-reach areas.

9.1.2 PRE-SEASON ENVIRONMENTAL COMPLIANCE ASSESSMENT (PSECA)

In 2016, AIRS Senegal and DREEC conducted a PSECA in all four districts to evaluate compliance with current environmental regulations and established standards. The role of the DEEC/DREEC was to ensure prevention and control of nuisance and pollution as part of IRS implementation.

9.1.2.1 IDENTIFICATION OF NEW SITES AND CLOSURE OF SOAK PITS IN PREVIOUS SITES NOT SELECTED

In 2016, AIRS Senegal conducted site location assessments and produced detailed analyses for construction, rehabilitation, and upgrading of the operational sites based on a worklist generated from the smartphone checklist. AIRS Senegal's ECO coordinated the decontamination process, in close collaboration with HPNs.

In Malem Hoddar, with the new approach of community-based IRS, which didn't need an operational site, the one located in Ndioum Ngainth in 2015 was decontaminated and closed.

9.1.2.2 OPERATIONAL SITES REHABILITATION

Based on PMI Best Management Practices, the project set up 20 soak pits at the operational sites in the four target districts. AIRS Senegal put up fencing around the soak pit area and then fitted the fence with locks to keep out non-IRS personnel and animals. Soak pit areas were distributed as follows per district: Koungheul (5), Nioro (09) and Koumpentoum (6).

TABLE 20. CONSTRUCTION AND REFURBISHMENT OF OPERATIONAL SITES

District	# of operational sites	Refurbished Sites (soak pits, storage facilities, fencing, etc.)
Nioro	13	5 new soak pits constructed 3 soak pits refurbished 4 new mobile soak pits constructed 2offices and storage facilities rented 6 offices and storage facilities provided
Koumpentoum	6	3 soak pits refurbished 32 new soak pits constructed 1 new mobile soak pit constructed 6 offices and storage facilities provided
Koungheul	5	4 soak pits refurbished 1 new soak pit constructed 2 new mobile soak pits constructed 5 offices and storage facilities provided by sector authorities
Malem Hoddar	1(4 health posts)	4 new mobile soak pits constructed

9.1.2.3 SMARTPHONE ENVIRONMENTAL COMPLIANCE DATA COLLECTION SYSTEM

AIRS Senegal undertook two pre-environmental inspection trips in the four health districts. The first assessment was done two months before spraying started and the second a week before.

AIRS Senegal utilized a smartphone data collection system in 2016 for those inspections to record site characteristics, capture the GPS location, and take pictures of the site (storeroom exterior and interior, storage and condition of pesticide, if present, and condition of soak pit). The checklist and questions that were loaded onto the smartphone for this assessment were adapted from the checklists recommended in the PMI Best Management Practices Manual.

As a result of the generated worklist, the 24 sites, Malem Hoddar (4 health posts) and four central storage facilities in the four target districts passed all requirements in the first pre-campaign evaluation.

9.1.2.4 MOBILE SOAK PITS

In Senegal, all districts have temporarily inaccessible areas, particularly during the rainy season. In areas where operators must travel for more than an hour to reach a spray site, a mobile soak pit is a useful option for minimizing risk related to the transportation of insecticide, vehicle's accidents, and for potential reduction in cost of operations as well (i.e. fuel).

A specific training session on MSPs was conducted during the 2016 IRS EC management training organized in Kaolack in May for all SNH and DREEC agents, and in June-July 2015 for concerned team leaders, site managers, and storekeepers. Practical training on MSP use was implemented by team leaders for spray operators prior to the start of spray operations.

Eleven mobile soak pits were used in health districts of Koumpentoum (one MSP in Kouthia Gaidi), Malem Hoddar (4 in four health posts), Koungheul (two in Gainth Pathé), and Nioro (two in Keur Moussa and two in Keur Tapha) in areas that were deemed appropriate according to distances between households, number of spray operators per site, and accessibility.

Team leaders, maintenance technicians and spray operators were in charge of MSP installation, use, and area restoration in all sites. In addition to their role of maintaining spray cans, repair technicians were in charge of collecting all amounts of returned insecticide and completing related daily inventory forms. Spray operators were in charge of rinsing spray tanks and stocking the remaining insecticide and rinse water for the next spray day. Boots, helmets, face shields, and gloves were also cleaned by spray operators in containers with water and soap.

At the start of the campaign, AIRS Senegal's ECO supervised the installation and progressive rinsing in Kouthia-Gaidi, Gainth Pathé, Keur Moussa, and Keur Tapha; spray operators were able to correctly install, clean, and store MSPs. Waste water drainage was done correctly with the use of MSPs for removal of insecticide.

Advantages of mobile soak pits included: progressive rinsing was more easily implemented, the average number of structures spray per operator increased, and the total number of days needed to complete the spray campaign decreased. Disadvantages of mobile soak pits included: the granular activated carbon had to be imported since it was very expensive locally, camping conditions were uncomfortable in some villages, and food had to be provided by AIRS Senegal.

A specific training session on MSPs was conducted during the 2016 IRS EC management training organized in Kaolack in May for all SNH and DREEC agents, and in June-July 2015 for concerned team leaders, site managers, and storekeepers. Practical training on MSP use was implemented by team leaders for spray operators prior to the start of spray operations.

9.1.2.5 Pilot Testing the Use of Tyvek Coveralls and Wet Wipes for IRS

Traditionally, spray operators have worn cotton or polyester overalls which must be washed after each day of use. The overalls are washed separately by washpersons, which requires the use of significant amounts of water and detergent and subsequent treatment of the contaminated water.

In 2016, in order to reduce the need for wash water and the generation of contaminated wash water, AIRS piloted the use of Tyvek suits in Malem Hoddar district where the areas to be sprayed were fewer (4 operational sites) and where community-based IRS was implemented.

Fifty-one operators (36 SOP, 7 team leaders, 4 local supervisors and 4 pumps technicians) were provided Tyvek suits. In addition each operator had a supply of wet-wipes to wipe down their PPE for a mid-day break and at the end of the day thereby allowing them to safely re-hydrate.

From 150 Tyvek suits received, 108 were used by SOPs, team leaders and local supervisors during the six days of the IRS campaign. The same people used 1,256 wet wipes to clean up their PPE. The duration of use of Tyvek suits varied between one to six days. According to the results of the investigation, nearly 57% of the suits were used for four days or more (Fig 3). This means that on average, each operator has used up to two Tyvek suits and six wet wipes during the six days.

A questionnaire was developed to evaluate and collect the opinions of SOPs, team leaders and supervisors on the use of Tyvek suits compared to the traditional overalls and the utility of the wet wipes. The questionnaire was administered to 20 SOPs, two team leaders, two maintenance technicians, and four local supervisors.

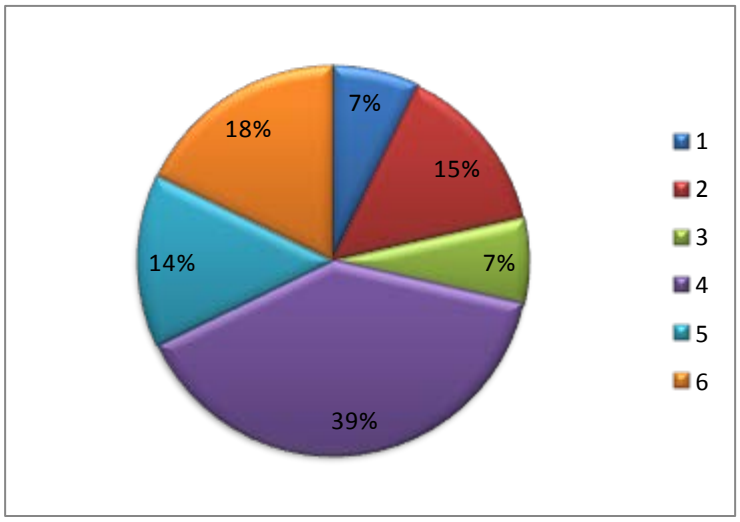
The results of this investigation showed that the use of this suit and wipes has:

- Reduced the need for water and detergent for cleaning;
- Eliminated contaminated wash water that must be treated, thus, eliminated the need for large soak pits;
- Eliminated the need to transport cloth overalls back to central soak pits for cleaning;
- Eliminated the need for washpersons to clean cloth overalls; and allows SOPs to drink water during

operations by cleaning their hands and face with wet wipes.

- For the relative comfort of using Tyvek suits compared to the cotton coverall on warm days, 54% of users stated to be more comfortable with Tyvek suits.

FIGURE 3. DURATION OF TYVEK USE



Challenges

- Purchase, distribution, and use of Tyvek suits and wet wipes;
- Getting various sizes of Tyvek suits to match with SOP size;
- Taking care when cleaning, dressing or undressing the overalls
- The use of Tyvek under rainy conditions.

Recommendations:

Based on cost analysis and lessons learned, we could continue the pilot test in coming year. As for the wet wipes, it could be extended to all spray operators to decontaminate hands before eating and/or drinking as needed.

9.2 INSECTICIDE

9.2.1 INSECTICIDE QUANTIFICATION

The steering committee and PMI decided to continue 2106 spray operations in the same districts as 2015 in the context of focus spraying. The insecticide order for 2016 was based on the remaining insecticide and the need assessment to cover the total target. No buffer was added.

The distribution of insecticide was based on the districts' needs.

TABLE 21. ASSESSMENT OF INSECTICIDE NEEDS

District	Koumpentoum	Nioro	Malem Hoddar	Koungheul	Total
Eligible structures*	36,655	59,570	4,458	32,569	**133,252**
No. of structures per bottle	3.4	3.4	3.4	3.4	
Insecticide bottles needed	10,781	17,521	1,311	9,579	**39,192**
Stock in place in 2015					**29,361**
Insecticide bottles procured					**9,831**

* Note: The quantification was based on the "number of structure" data available before the data cleaning was conducted.

9.2.2 INSECTICIDE CLASSES

Organophosphates were used in all districts in 2016. Insecticide selection decisions were made by PMI and NMCP along with Senegal's IRS Steering Committee based on entomological and parasitological monitoring data from 2015.

On April 2, 2016, AIRS Senegal received the required official authorization from the Ministry of Environment to use Actellic 300 CS for the 2016 IRS campaign. Prior to shipment, the insecticides underwent quality assurance and quality control testing by the manufacturers to ensure they were safe for spray in human households. 39,192 pirimiphos-methyl Actellic 300 CS bottles were distributed to the four health districts. In total, 39,189 bottles were sprayed with three bottles remaining (one empty with manufacturer notice, one full and 1 half full (accidentally opened during storage when one box failed down).

9.2.3 INSECTICIDE TRANSPORT

In 2016, AIRS Senegal received three 40-foot long containers holding 39,192 bottles of Actellic 300 CS. The shipping from the disembarking port to AIRS Senegal's central warehouse in Kaolack was carried out by a shipping company specializing on insecticide transportation. The pesticides were at the warehouse at on June 17, 2016, 23 days before the start of the campaign.

After the inventory check at the main warehouse, the project staff coded the insecticide boxes before dispatching them to district storerooms and operational site storerooms where bottles were subsequently serialized. Insecticide transportation from the central warehouse to the four district storerooms was supervised by AIRS Senegal's Logistics Coordinator. Drivers received appropriate training on safety measures for pesticide transport.

For the dispatching of the insecticides to districts, AIRS Senegal rented 10-ton watertight trucks. All environment compliance measures were observed.

9.3 Availability of Antidotes

IRS poison management is the responsibility of the Government of Senegal (GOS) through the NMCP in collaboration with health facilities in the concerned health districts. The pre-IRS inspection noted the availability of antidotes in all health facilities in the four districts except Wack Ngouna, which obtained a supply of Atropine a week before the spraying starts.

9.4 Seasonal Personnel Pre-IRS Medical Examination

In June 2016, for all districts, a total of 993 seasonal personnel (including 287 females) were examined as part of the pre-IRS medical check-up. These 287 females underwent pre-campaign pregnancy tests, five of whom tested positive.

9.5 Mid-Spray Environmental Compliance

9.5.1.1 Safety and Environmental Compliance

In collaboration with DREEC (Kaffrine, Kaolack and Tambacounda), AIRS Senegal conducted the mid-spray EC inspections during the spray operations in the four IRS districts. To conduct these inspections, AIRS Senegal used the EC smartphones. Overall, each DREEC conducted six inspection visits to Kaffrine, Kaolack, and Tambacounda.

Major findings during spray inspections were addressed immediately by the DCs with site managers, team leaders, and SOPs.

During the 2016 spray round, 220 females underwent a second pregnancy test in July 2016. All tests proved negative.

9.6 Post-Season Environmental Assessment

The AIRS Senegal team in collaboration with DREEC staff conducted post-spray inspections in all four target districts from August 7-13, 2016.

Using smartphones, data were recorded for each of the 24 IRS sites and all forms were uploaded to the cloud database, which is accessible by the ECO from the home office. After the IRS campaign, DCs contacted all landlords to inquire if their premises would be available for the next campaign so that repairs or temporary closings of soak pits could be made based on that information. The project successfully prepared all 24 sites for the off-season (note: four sites were sharing two soak pits during Nioro campaign): 20 soak pits were covered and locked, including soak pits that will be disposed of after three months (these sites will not be used for next year's operations). AIRS Senegal anticipates that some soak pits will be closed if corresponding health posts are no longer eligible for 2017 campaign. For soak pit disposal, the process will consist of four steps as follows:

- Demolition of soak pit and removal of its content;
- Backfilling and leveling soak pit hole with sand
- Reusing rubble stones for other soak pits construction
- Incineration of charcoal and sawdust

9.7 IRS WASTE DISPOSAL

At the operational site level, solid waste was inventoried separately into boxes and labeled. At the end of the campaign, all wastes were shipped to the district warehouse. At the district level, solid wastes were separated by items: 430 pairs of gloves and plastic sheets with holes were decontaminated by washing, sun drying, and packaged for disposal. 15,233 used masks and 39,189 empty Actellic bottles were packaged and transferred to the central warehouse in Kaolack.

A disposal plan was developed to dispose of more obsolete waste such as electronics (old Air Conditioner, generators, calculators) and other out-of-service materials or equipment. After approval, the electronic waste is sent to a government-owned agency (State Informatics Agency) called e-waste, specialized in repair and recycling; repaired items are given to schools as needed.

The 2016 IRS campaign generated contaminated solid wastes of 3,930 kgs composed of empty plastic bottles, gloves, Tyvek, wipes and masks. The masks and the Tyvek will be incinerated by SOCOCIM Cement Plant. This incineration process follows the authorization issued, by the Senegalese Ministry of the Environment and Sustainable Development and will be supervised by DEEC.

TABLE 22. INVENTORY OF CONTAMINATED SOLID WASTE

District		Contaminated items			
	Empty insecticide bottles	Masks	Gloves	Tyvek	Wipes
Nioro	22,143	7,746	387		
Koumpentoum	7,920	3,620	135		
Koungheul	8,344	3,573	157		
Malem Hoddar	782	294	56	108	1256
Total	**Bottles : 39,189**	**15,233**	**735**	**108**	**1256**

Regarding the disposal of MSPs, all MSPs were stored at AIRS Senegal's district storage facility. The activated carbon will be incinerated by SOCOCIM Industries along with other wastes after the campaign.

The remaining stock of insecticide one full bottle, which is set to expire on February 2018, will be used for next campaign and the half full will be discarded as it is already opened and cannot be reused for the next campaign.

10. IRS Country Capacity Assessment

In 2015, AIRS Senegal conducted training, capacity-building, and advocacy at the regional and district levels as a means of achieving IRS sustainability. The training is described in Section 3.3.1.

In 2016, AIRS Senegal continued to coach NMCP to increase their responsibilities in IRS implementation. NMCP managed the spray campaign's IEC activities with direct funding from PMI, but beyond these activities NMCP (including regional health teams) was minimally available for IRS implementation and operations management at the district level.

Besides working with NMCP, AIRS Senegal coached regional environmental agents by co-conducting field inspections. Updated checklists for the supervision were shared with SNH and NMCP for validation and AIRS Senegal continued to coach SNH supervisors on the use of smartphone. AIRS Senegal worked closely with SNH agents and DMO on data analysis in the field.

In 2016, DMO and DHMT were able to conduct the district micro-planning workshop with HPN and local authorities usually chaired by the prefect, the highest administrative authority in the district. During micro-planning, AIRS Senegal coached health post chief nurses to develop the spray calendar of health post catchment areas. AIRS Senegal also coached district agents in supervision using smartphone technology in order to build capacity in IRS implementing stages at the district level.

11. GENDER

In 2016, AIRS Senegal maintained and continued all gender activities done in 2015 in addition to innovations including "Badjénou gokh" (voluntary women in the community) and involving women's associations in the all IRS district meetings. These activities included:

- Putting in place a sexual harassment policy for all employees, including seasonal workers (if possible), to promote a respectful working environment;
- Including a gender message in job aids sent to SOP, team leaders, and site managers;
- Including "Badjénou gokh" (voluntary women in the community) in the all district meetings concerning IRS activities;
- Assigning a gender focal point in each district to better ensure and promote women's roles in IRS;
- Revising training and mobilization documents to include more pictures and information about women;
- Ensure women have accommodations, both at the sites and at camp sites where they feel safe and comfortable;
- Create an exit interview survey to give to male and female seasonal workers to better understand how both sexes perceive working with the project and how AIRS Senegal can improve working conditions.

Results:

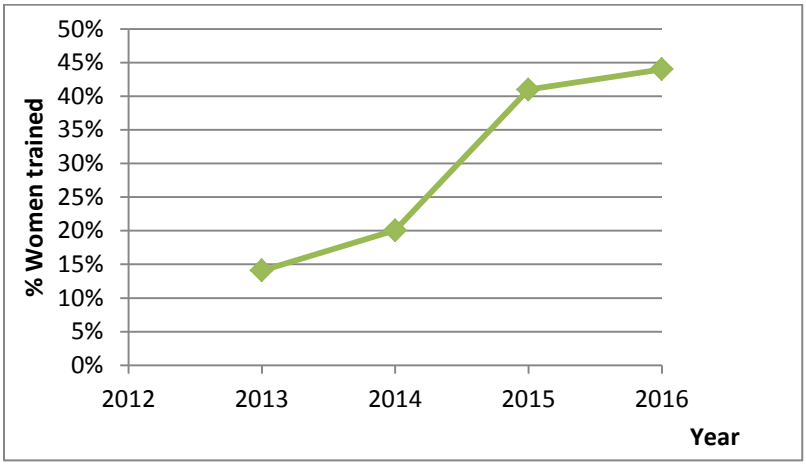
In 2016, PMI AIRS Senegal attempted to increase women's representation in the spray campaign. In total, AIRS Senegal and NMCP trained 2,060 persons. This number includes 1,034 persons trained by PMI AIRS Senegal and 1,026 IEC mobilizers trained by NCMP. Among this number, 901 were women representing 44%. Thirty-seven women were in supervisory roles among 101 IEC supervisors, representing 37%. Forty PMI AIRS supervisors in IRS were women among 191, reprensenting 21%. In total, 77 female supervisors (including IEC supervisors) were trained to lead IRS activities, representing 26% of 292 total supervisors. Several advocacy activities were conducted locally such as encouraging women to apply for all open positions during the national planning and micro-planning workshops.

Among the 1,034 trained by PMI AIRS Senegal, 886 people were hired including 279 women, representing 31%.

In Bamba operational site (Koumpentoum District) 57% of seasonal workers were female. The site manager and storekeeper were both female. After the IRS campaign, female SOPs organized a big IRS closing ceremony to create and sustain relationships between them.

Figure 4 shows gender results and the evolution of women's participation in IRS from 2013 to 2016. From 2013 to 2014, the rate of women participating in the IRS campaign increased from 14% to 20%, which did not include IEC mobilizers. In 2015 and 2016, women's participation increased from 41% to 44% taking into consideration IEC mobilizers in those two years. These results showed the efforts made by PMI AIRS to promote gender equality in IRS.

FIGURE 4. WOMEN TRAINED EVOLUTION FROM 2013 TO 2016 IN IRS OPERATIONS



12. MARKINGS AND ZIP TIES

In 2016, AIRS Senegal continued using chalk marking and zip ties to track households sprayed.

Chalk marking has been consistently implemented and well-supervised. Slight changes have been made for the use of zip ties. For cultural reasons, black zip ties were switched to white zip ties for houses that had been sprayed as black color was perceived by the beneficiaries as "bad luck" and did not want them on their structures. Consequently, white zip ties were attached to structures that had been fully sprayed (contrary to black zip ties that were used in 2015), black zip-ties were used to identify structures that would need to be revisited during mop-up, and red zip-ties were used to identify structures that were not sprayed that refused spraying. Overall, SOPs successfully attached zips as instructed.

However, there were still some challenges with the identification of the zip ties as they were too thin and very difficult to identify them from far away.

Chalk marking was correctly done by SOPs without any major issues. Markings were made at the top left side of the door of the structure. Only a few challenges were observed, which included poor chalk supply management by team leaders, resulting in a chalk shortage in some areas.

If zip ties are used in the future, we recommend increasing the size in order to have enough space to write important information, such as SOP ID and date of spray. We also recommend using white color zip ties for structures sprayed.

13. LESSONS LEARNED

- Following the needs assessment, quantification of insecticide, and distribution schedule, AIRS Senegal purchased sufficient quantities of equipment and insecticide in a timely manner and distributed them to all sites two weeks prior to the start of spray operations. Improved inventory management made it possible to avoid stock-outs. This approach to pesticide stock management was enhanced and reinforced during the trainings for the 2016 campaign.
- The presence of AIRS Senegal teams in the field for supervision during the entire campaign with systematic use of the supervision tools for spray operations monitoring and on-site problem solving greatly improved SOPs' performance.
- Periodic and regular meetings with AIRS Senegal, PMI, NMCP, SNH, and, occasionally, UCAD contributed to better IRS implementation in terms of management, leadership, and coordination of workshops and training activities.
- In 2016, 20 of 24 IRS sites were provided to the project free of charge as a means of community participation and ownership. In addition, some local authorities contributed to charges for site rehabilitation. In 2015, 11 out of 27 sites were provided free of charge by the community. AIRS should advocate for local authorities' support for future IRS campaigns.
- Coaching district health workers and environment officers on the implementation of an IRS project and transferring competencies to government agents contributed to the local long-term sustainability of IRS.
- Availability of a DHMT member as an IRS focal point for the campaign allowed better monitoring of spray operations by the district and consequently performance improvement (e.g. in Koumpentoum, Koungheul, and Nioro where debriefing meetings were coordinated by the DHMT).
- Settlement campsites and MSP pilot sites contributed to reducing travel time for spray teams, which led to increased performance.
- The use of smartphones for collecting and transmitting EC data allowed AIRS Senegal senior managers and key technical staff to be much more aware of site conditions.
- Putting in place the SPTS tool at each site allowed a visual daily monitoring of SOP performance and of insecticide use among the SOPs themselves and their supervisors at all levels. In addition, the tool created healthy competition among spray teams between sites in the same place.
- Site managers and team leaders were available the day before the start of the campaign to prepare material, coding, and packaging for each SOP in order to avoid any start-up delays on the first day.
- As in previous years, the use of the Error Eliminator form was required for all supervisors and extended to all data collected at site level.
- Using smartphones for spray supervision allowed teams to immediately address any shortcomings reported by supervisors. Actors on the ground could receive supervision reports at the same time as managers for anticipating shortcomings.

- Sufficient quantity of activated carbon is needed for mobile soak pit implementation.
- The inclusion of local authorities in IRS operations planning, supervision, and end-of-spray evaluation contributed to the success of mobilization and IRS acceptance by the population.
- The use of the smartphones for supervision substantially improved the SMS job aids.

14. RECOMMENDATIONS

- Highlight this year's community participation in order to better engage communities via local governments (IRS to be included in local government budgets).
- Discuss with IRS steering committee at the district level how to solve SOP drop-out after training.
- Incorporate community contributions into the financial planning of district IRS activities.
- Increase size of zip ties in order to have enough space to write important information like SOP ID, date of spray.
- Discuss with SNH to ensure local SNH agents are all trained and oriented on IRS new guidelines in order to minimize supervision issues with project seasonal workers (site managers and team leaders) and improve coordination with DC.
- Discuss with steering committee how to extend IRS community involvement to:
    - Promote a dynamic of sustainability and ownership of the strategy:
    - Share results and approaches with the regions, the Commons, Members, etc.;
    - Hold workshops/meetings for innovative financing;
    - Consider the views of local communities.
- Consider the findings from the satisfaction surveys about the socio-anthropological and socio-economic aspects of an IRS campaign.

ANNEX A. AIRS SENEGAL PROCUREMENT AND POST-SPRAY STOCK BALANCE

Procurement									
Item	Qty	Dispatching			Balance in Warehouses				Total Balance
		Koungheul	Koumpentoum	Nioro	Koungheul	Koumpentoum	Nioro	Kaolack	
Towels	877	218	221	438	0	0	0	0	0
Socks	1,4420	357	364	721	0	0	0	0	0
Soap 300g	144	36	36	72	3	7	0	0	10
Soap 125g	3,729	930	935	186	0	0	0	342	342
Bleach	24	8	6	10	0	0	2		2
Liquid Detergent	84	26	28	30	0	4	0		4
Powder Soap	4,435	1,128	1,090	2,217	0	0	0	47	47
Grease Pot 1kg	11	3	2	6	3	2	6	2	11
Adhesive Tape LM	22	5	5	11	2	0	0	0	2
Toothbrush	150	35	39	76	5	8	12	5	30
Markers	130	34	32	64	0	0	0	0	0
Inner Folder	2,000	500	500	1000	0	0	0	0	0
Flap Folder	863	252	237	374	0	0	0	0	0
Black Pencil	972	243	338	581	32	5	28	0	60
Eraser	910	330	329	548	12	7	24	47	78
Note Pad	863	252	237	374	0	0	18	24	42
Calculator	21	40	44	54	40	44	54	12	150
Log Book	10	6	5	13	0	0	0	1	1
Ruler 30 cm	29	8	7	13	8	7	13	47	75
Chalk Box (color)	93	30	20	43	0	0	0	0	0
Chalk Box (white)	133	40	33	60	0	0	0	0	0
Pencil Sharpener	916	243	243	430	0	0		47	47
Shower Cap	79	24	25	30	0	0	0	0	0

Procurement									
Item	Qty	Dispatching			Balance in Warehouses				Total Balance
		Koungheul	Koumpentoum	Nioro	Koungheul	Koumpentoum	Nioro	Kaolack	
International Procurement									
Face Shield	788	258	202	328	23	43	18	0	84
Nose Mask w/Filter	8,891	2,247	2244	4400	0	0	0	540	540
Organophosphate	9,840	3,024	2,996	3,820	1*	1**	0	1***	1
Head lamps	704	183	135	386	183	135	386	0	704

*Full bottle

**Empty bottle with manufacturer notice

***Half full, accidentally opened

ANNEX B. PEOPLE TRAINED FOR 2016 CAMPAIGN

Categories of people trained	Mobilization		Training for IRS implementation														Other trainings				TOTAL		
			Trainers' Training		Spray Operators' Training		Data Entry		Logistics & Finance Training		Technical Maintenance		IRS related poisoning management		PPE Cleaning		Fire Safety		Transport Safety				TOTAL GENERAL
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
MDO			3	0																	3	0	3
DEEC/DREEC			2	1																	2	1	3
Nurses/Midwifes													6	13							6	13	19
SNH Supervisor of Spray Operators			53	0																	53	0	53
Spray Operator					344	154															344	154	498
Substitutes Operators					60	33															60	33	93
Operational Site Manager					21	3															21	3	24
Team Leader					76	24															76	24	100
Data Entry Clerks					11	10															11	10	21
Storekeepers					20	9															20	9	29
Finances/Logistics Assistants					5	1															5	1	6
Maintenance Technicians					27	1															27	1	28
Washers															0	49					0	49	49
Drivers																			55	0	55	0	55

Categories of people trained	Mobilization		Training for IRS implementation														Other trainings				TOTAL		
			Trainers' Training		Spray Operators' Training		Data Entry		Logistics & Finance Training		Technical Maintenance		IRS related poisoning management		PPE Cleaning		Fire Safety		Transport Safety				TOTAL GENERAL
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Water suppliers ((women who supply water to sites where there is no running water)															0	5					0	5	5
Guards																	48	0			48	0	48
TOTAL M/F	0	0	58	1	564	235	0	0	0	0	0	0	6	13	0	54	48	0	55	0	731	303	1034
TOTAL/ Training	**0**		**59**		**799**		**0**		**0**		**0**		**19**		**54**		**48**		**55**		**1034**		

ANNEX C: INDICATOR MATRIX WITH RESULTS

Last Updated: 22 aout 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 1: Establish cost-effective supply chain mechanisms and execute logistical plans								
1.1 Procurement								
1.1.1 Number and percentage of insecticide procurements that had a pre-shipment QA/QC test at least 60 days prior to spray campaign	*Data source*: Project records – insecticide procurements *Reporting frequency*: Each spray campaign	By Spray Campaign	1; 100%	1;100%	1,100%	1,100%	100%	
1.1.2 Number and percentage of international insecticide procurements delivered in country, at port of entry, at least 30 days prior to the start of spray operations	*Data source*: Project records – international procurements *Reporting frequency*: Each spray campaign	By Spray Campaign	1; 100%	1;100%	1;100%	1;100%	100%	
1.1.3 Number and percentage of international equipment procurements, including PPE, delivered in country, at port of entry, at least 30 days prior to start of spray operations	*Data source:* Project records *Reporting frequency*: Each spray campaign	By Spray Campaign	1; 100%	1;100%	1;100%	1;100%	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	*Data source:* Project records *Reporting frequency*: Each spray campaign	By Spray Campaign	1; 100%	1;100%	1;100%	1;100%	100%	
1.1.5 Successfully completed spray operations without an insecticide stock-out	*Data source:* Project records *Reporting frequency*: Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
1.2 In-Country Exemption and Custom Clearance Process								
1.2.1 Complete exemption and clearance process within the minimum 2 weeks	*Data source:* Project records *Reporting frequency:* Each spray campaign	By Spray Campaign	Completed	Not completed[3]	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	*Data source*: Training records *Reporting frequency*: Each spray campaign	By Spray Campaign By Gender	35[4]; 100% M: 28 F: 7	33[5] M: 22 F:11	34[6]; 100% M: 23 F:11	32[7]; 100% M: 22 F: 12	TBD; 100%	

[3] Delay receiving DEEC authorization and longer customs procedures than usual
[4] 3 logistics assistants, 28 warehouse site managers, 3 district warehouses managers, 1 central warehouse manager
[5] 2 logistics assistants, 27 warehouse site managers, 3 district warehouses managers, 1 central warehouse manager
[6] 3 logistics assistants, 27 warehouse site managers, 3 district warehouses managers, 1 central warehouse manager
[7] 3 logistics assistants, 24 warehouse site managers, 3 district warehouses managers, 1 central warehouse manager, 1 central warehouse assistant (The number of sites decreases between the time of target setting and implementation in 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
1.3.2 Number and percentage of base stores where physical inventories are verified by up-to-date stock records	*Data source:* Project records *Reporting frequency*: Each spray campaign	By Spray Campaign	25[8]; 100%	31[9]	31[10]; 100%	28[11]; 90.3%	TBD; 100%	
1.3.3 Submit up-to-date inventory records 30 days after the end of each spray campaign	*Data source:* Project records *Reporting frequency*: Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
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	*Data source:* Project records *Reporting frequency*: Annually	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
2.1.2 Percentage reduction in project operational expenses per structure from the previous year, excluding insecticide costs.	*Data source:* Project financial records *Reporting frequency*:	By Spray Campaign	5%	10%[12]	5%	7%[13]	5%	

[8] 21 warehouses sites, 3 district warehouses , 1 central warehouse
[9] 27 warehouses sites, 3 district warehouses , 1 central warehouse
[10] 27 warehouses sites, 3 district warehouses , 1 central warehouse
[11] 24 warehouses sites, 3 district warehouses , 1 central warehouse
[12] cost comparison 2014 vs. 2015 : reducing costs per spraying day through households sprayed; structures sprayed; rooms sprayed, person protected and the number of vehicles used
[13] Cost comparison 2015vs. 2016: reducing costs per spraying day through households sprayed; structures sprayed; rooms sprayed, person protected and the number of vehicles used. The referred costs are based on spray planning and spray operations costs for the same period from January to August (2015 Vs 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
	Annually							
2.2 Support of Safety and Health Best Practices and Compliance with USAID and Host Country Environmental Regulations								
2.2.1 SEA/letter reports submitted on time based on schedule agreed upon with the-PMI COR team	*Data source*: Project records – submitted SEAs/ letter reports Reporting frequency: Each spray campaign	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
2.2.2 Number of spray personnel trained in environmental compliance and personal safety standards in IRS implementation	Data source: Project records – Training reports Reporting frequency: Each spray season	By Spray Campaign By Gender	1,000[14] M: 730 F: 270	1000[15] M:730 F: 270	925[16] M:675 F: 250	924[17] M: 651 F: 273	TBD	
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	46[18] M:27 F: 19	46[19] M:27 F: 19	51[20] M:30 F: 21	19[21] M:6 F:13	TBD	

[14] 539 spray operators, 91 substitute operators; 27 operational site managers; 109 team leaders; 31storekeepers; 30 pump technicians; 58washers; 73 drivers; 42 guards.
[15] 539 spray operators 91substitute operators; 27 operational site managers; 109 team leaders; 31storekeepers; 30 pump technicians; 58 washers; 73 drivers; 42 guards
[16] 487 spray operators; 98substitute operators; 27 operational site managers; 98 team leaders; 31storekeepers; 28 pump technicians; 52 washers; 58 drivers; 46 guards
[17] 498 spray operators;93 substitute operators; 24 operational site managers; 100 team leaders; 29 storekeepers; 28 pump technicians; 49 washers; 55 drivers; 48 guards
[18] 46 ICP
[19] 46ICP
[20] 51 ICP
[21] 19 ICP

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
2.2.4 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 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	55[22]; 100% 23 soak pits 32 warehouses	55[23]; 100% 23 soak pits 32 warehouse	58[24]; 100% 27 soak pits 31 warehouse	59[25];100% 20 soak pits 11 Mobile Soak Pits 28 warehouses	TBD; 100%	
2.3 Conduct Communications Activities and Community Mobilization[26]								
2.3.1 Number of radio spots and talk shows aired	Data source: Project records Reporting frequency: Per spray campaign	By Spray Campaign	NA	NA	TBD	NA	TBD	
2.3.2 Number of IRS print materials disseminated	Data source: Project records Reporting frequency: Semi-annually	By Spray Campaign By Type of printed material and message(s)	NA	NA	TBD	NA	TBD	

[22] 23 soak pits, 32 warehouse
[23] 23 soak pits, 32 warehouse
[24] 27 soak pits, 31 warehouse
[25] 20 soak pits, 11 MSP, 28 warehouses (There are less than targeted due to the combination of certain soak pits upon review before the beginning of the campaign.
[26] This section is managed by NMCP

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
2.3.3. 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	NA	TBD	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	136,473	133,252	133,252	128,185	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	116,002	130,170	113,264	124,757	TBD	
2.4.3 Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	Data source: Daily Spray Operator Forms Reporting frequency: Daily per spray campaign	By Spray Campaign	85%	97.7%	85%	97.3%	85%	
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	371,296 M: 183,517 F: 187,779 Pregnant women: 8,778	514,833 M: 254,643 F: 260,190 Pregnant women: 9,936	514,833 M: 254,643 F: 260,190 Pregnant women: 9,936	496,728 M: 245,184 F: 251,544 Pregnant women: 9,951 children<5:	TBD	TBD

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
		By children <5 years old	children<5: 71,171	children<5: 89,574	children<5: 89,574	82,768		
Component 3: Ongoing Monitoring and Evaluation and Quality Control Measures								
3.1 Submit PMI-approved M&E plan to PMI/SENEGAL 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 90 days of completion of spray operations	Data source: Spray operations reports Reporting frequency: Per spray campaign	By Spray Campaign	NA	NA	Completed	In progress	N/A	
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	23[27] 15 guidelines 8 checklists	25[28] 18 guidelines 7 checklists	25[29] 18 guidelines 7 checklists	26[30] 18 guidelines; 8 checklists	TBD	

[27] 15 guidelines, 8 check-lists
[28] 18 guidelines; 7 checklists
[29] 18 guidelines; 7 checklists
[30] 18 guidelines; 8 checklists

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
4.2 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	2	2	2	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	3[31]	2[32]	5[33]	6[34]	TBD	
4.4 Number of enterprises engaged through public-private partnerships	Data source: Project records – Activity reports Reporting frequency: Semi-annually	By Spray Campaign	4[35]	4[36]	5[37]	4[38]	TBD	

[31] 1 Hot spots strategy, 1 Evaluation of hot spots strategy, 1 Lessons learned from IRS 2014
[32] 1 Hot spots strategy, 1 Lessons learned from IRS 2014
[33] 1 Hot spots strategy, 1 Lessons learned from IRS 2014, 1 mHealth, 1 Zip ties, 1 MSP
[34] 3 presentations at Cape Town, 1 at EC training in Dakar, 1 at Tanzania during F&A training, 1 during COP workshop
[35] Anti-Poison Center, SOCOCIM, SODIAPLAST, E-déchets,
[36] Anti-Poison Center, SOCOCIM, SODIAPLAST, E-déchets,
[37] Anti-Poison Center, SOCOCIM, SODIAPLAST, E-déchets, ECOMAR
[38] Anti-Poison Center, SOCOCIM, ECOMAR, CERES LOCUSTOX

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[39]								
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	NA	NA	46	28 [40]	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	NA	NA	16[41]	16	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	NA	NA	46[42]	Not Available	TBD	

[39] This section is managed by UCAD (University Cheikh Anta Diop)
[40] Currently, 16 in IRS districts, 8 in control districts, 2 in Kedougou and 2 in Velingara. Activities will continue until 1 February 2017
[41] IRS districts sentinel sites
[42] All country sentinel sites for IRS entomology monitoring and entomological surveillance

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
5.1.4 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	NA	NA	15	Not Available [43]	TBD	
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	NA	NA	20[44]	20	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	NA	NA	80[45]	Not Available	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	NA	NA	75[46]	Not Available	TBD	

[43] Activities are planned on September and October 2016.
[44] Five rooms per district and four districts
[45] Bioassays are planned to be done for at least 6 months.
[46] Five insecticides for 15 sentinel sites

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 Support Epidemiological Malaria Data Collection and Analysis								
5.2.1 Collect routine epidemiological data	Data source: *Project Reports* Reporting Frequency: Annually	By Spray Campaign	NA	NA	Completed	N/A	TBD	
5.2.2 Number of targeted health facilities with routine epidemiological malaria data collection supported by the PMI AIRS Project	Data source: Epidemiological reports Reporting frequency: Annually	By Spray Campaign	24[47]	24[48]	24[49]	24[50]	TBD	

[47] 12 IRS health posts, 12 Non-IRS health posts
[48] 12 IRS health posts, 12 Non-IRS health posts
[49] 12 IRS health posts, 12 Non-IRS health posts
[50] 12 IRS health posts, 12 Non-IRS health posts

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 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 Spray Campaign By Gender Percentage of Women Trained	896[51] M: 767 F: 131 14,6%	893[52] M: 662 F: 231 26%	818[53] M: 605 F: 213 26%	793[54] M:565 F:228 29%	TBD	
6.1.2 Total number of people trained to support IRS in target districts	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Spray Campaign By Gender Percentage of women trained	1,394 M: 1,296 F: 98 7.0%	1287 M: 890 F: 397 31%	1,508 M: 1,041 F: 467 31%	1,034 M: 731 F:303 29%	TBD	

[51] 24 Regional health agents,, 42 SNH, 539 spray operators, 109 substitutes, 109 team leaders, 27 site managers, 46 nurses

[52] 21 Regional health agents , 1SLAP, 4 DREEC/DEEC,55 SNH, 539 spray operator, 91 substitutes, 109 team leader, 27 site manager, 46 nurses,

[53] 3 DREEC/DEEC,54 SNH, 487 spray operator,98 substitutes, 98 team leader, 27 site manager, 51 nurses

[54] 3MDO, 3 DREEC/DEEC,53 SNH, 498 spray operator,93 substitutes, 100 team leader, 24 site manager, 19 nurses

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
6.1.3 Number of women recruited for IRS employment	Data source: Project records – Recruitment reports Reporting frequency: Semi-annually	By Country By Percentage of women recruited	186[55] 21%	287[56] 30%	452[57] 30%	278[58] 36%	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	42[59] M: 40 F: 2 4.7%	42[60] M: 45 F: 0 0%	54[61] M: 50 F: 4 7.4%	53[62] M:53 F:0 0%	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 hire	1,077[63] M: 851 F: 226 21%	961[64] M: 674 F: 287 30%	901[65] M: 631 F: 270 30%	886 M:607 F:279 31%	TBD	

[55] Estimated number of women recruited based on percentage of women recruited last year: 21% of 885
[56] 148 spray operators, 25 team leaders, 4 site managers, 9 storekeepers, 58 washers, 5 water suppliers, 8 data clerks, 4 logistics +financial assistant managers, 25 cleaners, 1pump technician
[57] Estimated number of women recruited based on percentage of women recruited last year: 30% of 1,508
[58] 154 spray operators, 24 team leaders, 3 site managers, 9 storekeepers, 49 washers, 5 water suppliers, 10 data clerks, 1 logistics +financial assistant managers, 22 cleaners, 1pump technician
[59] 42 SNH agents
[60] 42 SNH agents
[61] 54 SNH agents
[62] 53 SNH
[63] people to be recruited in 2016
[64] 539 spray operators, 109 team leaders, 27 site managers, 31 storekeepers, 58 washers, 42 guards, 73 drivers, 5 water suppliers, 17 data clerks, 5 logistics +financials assistants, 25 cleaners, 30 pump technicians
[65] 487 spray operators, 98 team leaders, 27 site managers, 31 storekeepers, 52 washers, 46 guards, 58 drivers, 17 water suppliers, 22 data clerks, 6 logistics +financials assistants, 29 cleaners, 28 pump technicians

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
6.1.6 Number of women hired in supervisory roles in target districts (this number includes site supervisors, team leaders, M&E assistants and others who supervise seasonal staff)	Data source: Project records – Contracts signed Reporting frequency: *Semi-annually*	By Spray Campaign Percentage of women hired	14[66] 9%	45[67] 21%	189[68] 21%	40[69] 21%	TBD	
6.1.7 Number of staff (permanent and seasonal) who have completed gender awareness training	Data source: Project records – Training reports Reporting frequency: *Semi-annually*	By Spray Campaign Gender Percentage of women hired	19[70] M:11 F: 8 42%	17[71] M: 9 F: 8 47%	19[72] M:11 F: 8 42%	1,052[73] M:742 F:310 29%	TBD	

[66] Estimated number of women hired in supervisory roles based on percentage of women hired last year: 9% of 153 (87 team leaders, 21 site managers, 17 data clerks, 25 storekeepers, 3 logistics assistants)
[67] 25 team leaders, 4 site managers, 9 storekeepers, 1 pump technician, 2 data clerk supervisors, 4 logistics+ financial assistants,
[68] Estimated number of women hired in supervisory roles based on percentage of women hired last year: 21% of 901
[69] 24 Team leaders, 3 site managers, 9 storekeepers, 1pump technician, 2 data clerk supervisors,1 logistics and financial assistant
[70] Permanent staff Dakar and district
[71] 1 COP, 1 TM, 1 IEC Officer, 1 Proc Officer., 1 driver, 1 Admin Asst., 1 Accountant, 1 Log coord., 1 ECO, 1 M&E Mgr, 1 database Mgr, 4 districts coord., 1 IT Specialist, 1 OM
[72] Permanent staff Dakar and district
[73] 18 permanent staff; 1034 seasonal staff

Performance Indicator	Data Source(s) and Reporting Frequency	Disaggregate	Annual Targets and Results					
			Year 1		Year 2		Year 3	
			Target	Results	Target	Results	Target	Results
6.2 Capacity Building								
6.2.1 Number of government officials trained in IRS oversight	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Gender Percentage of Women Trained	24[74] M: 19 F: 5 20.8%	21[75] M:15 F: 6 28.5%	54[76] M:39 F: 15 28.5%	53 M:53 F:0 0%	TBD	
6.2. Implement all activities outlined in their yearly Capacity Building Action Plan	Data source: Project records – Capacity assessment reports Reporting frequency: Semi-annually	By Spray Campaign	Completed	Completed	Completed	Completed	Completed	
6.2.3 Senegal government implements at least one aspect of the IRS program independently.	Data source: Project records – MOUs Reporting frequency: Semi-annually	By Spray Campaign	NA	NA	TBD	NA	TBD	

[74] 7SNH (3BRH, 4 SBRH), 3DREEC, 6 (3BREIPS, 3MCR) , 8 Districts (MDO, IRS focal point)
[75] 7SNH (3BRH, 4 SBRH), 3DREEC, 3BREIPS , 8 Districts (MDO, IRS focal point)
[76] 54 SNH

ANNEX D: ENVIRONMENTAL MITIGATION AND MONITORING REPORT (EMMR)

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
1a. Pre-contract inspection and certification of vehicles used for pesticide or spray team transport.	During the pre-contract transportation vehicle inspections, vehicles with no supporting documents covering the period were identified. Vehicles presented during the inspection were used and any changes were reported and a new inspection done before use. The total number of vehicles inspected and validated was 57 vehicles (2 vehicles are changed during the campaign and this was done prior to the signing of contracts).	The inspection of vehicles being simultaneously done one week before spraying campaign. COP, ECO and district staff helped by respecting the laid standards. These vehicles were used during campaign. A certificate of completion was delivered to all vehicles.	The District coordinators all received comprehensive training on environmental safety measures. Logistic assistants were also trained and assisted with vehicle selection and training of drivers
1b. Driver training	Drivers were trained according to PMI AIRS BMP recommendations. Drivers were issued certificates of training completion. Cautious driving while transporting chemicals and spray operators (speed limit to 70km/h) was emphasized to all drivers. In case of a driver change, the replacement was immediately trained. 2 drivers were replaced during the	Vehicle owners wanted to attend the training as well as drivers and sometimes they raised questions that have nothing to do with the objectives of this orientation. The drivers are usually illiterate so they do not take notes during orientation. The training was conducted in a local language.	Make it clear to vehicle owners that this orientation does not concern administrative or financial aspects but rather the technical aspects of safe transportation. They are illiterate but the trainers have to be very clear before beginning the training by helping them to understand the focus of this orientation. Distribute brochures with pictograms for a better assimilation of

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
	campaign and they received training before starting. Overall 57 drivers were trained Before signing contracts and all conditions to be respected were highlighted.		recommendations
1c. Cell phone, personal protective equipment (PPE) and spill kits on board during pesticide transportation.	Providing telephone and PPE for all drivers could cause problems during the campaign; we assumed that in Senegal telephone is widely used by all adult. Driver owning a phone was part of selection criteria. Out of 850 inspections, 22 times drivers did not have their PPEs or phone representing 2,6% of incidents 63 times they did not have all the spill kits items in the car representing 7,4% of non-compliance	We have provided PPE to all drivers and this PPE will be worn only in case of a spill response. Wearing boots make the driving difficult because the drivers do not usually wear them and they were not comfortable driving with boots. Some supervisors do not phrase or translate the questions well to the drivers because most of them are not educated. Their questions must be very clearly spelled out so that the drivers can give correct answers. Supervisors should also explain to driver the issues for corrections	Keep the current format Drivers are equipped with masks, gloves, and boots for the loading and unloading as well as the transport of the pesticide, but they only wear that in the case of a pesticide spill. They are not allowed to handle the pesticides and contaminated materials. Note that all drivers have phones (which was required during the selection). We will identify and improve the training on specific issues as appropriate
1d. Initial and 30-day pregnancy testing for female candidates for jobs with potential pesticide contact.	For the 2016 campaign, the spraying was done in 20 days. First pregnancy test was done from June 10 to June 19 for Nioro, Koungheul and Koumpentoum and at June 26 for Malem. 292 were tested for pregnancy and 5 cases were positive Second pregnancy test was done from July 20 to July 27 for all districts except Malem (campaign duration was six	Women with positive pregnancy tests were not recruited.	.

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
	days). All tests proved negative.		
1e. Health fitness testing for all operators	Health fitness testing was done before the training of the operators: 993 seasonal personnel (including 292 females) were examined as part of the pre-IRS medical check-up. 09 (05 females) were inapt		
1f. Procurement of, distribution to, and training on the use of PPE for all workers with potential pesticide contact.	All workers who would potentially come in contact with the pesticides were trained on the appropriate use of PPE. 772 operations personnel were trained on PPE use (498 sprayers, 24 site managers, 100 team leaders, 29 storekeepers, 28 maintenance technicians 93 and substitute sprayers. In addition 49 washers, and 53 SNH agents and 3 DREEC staff were trained.		
1g. Training on mixing pesticides and the proper use and maintenance of spray pumps.	The presentation of pumps to be used and the demonstration on the procedure to be followed for the mixture were included in the operators training modules. The operators were trained on the progressive rinsing system of equipment and minor breakdown repairs. 772 operations personnel were trained (498 sprayers, 24 site managers, 100 team leaders, 29 storekeepers, 28 maintenance technicians 93 substitute sprayers.		

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
	In addition 49 washers, and 53 SNH agents and 3 DREEC staff were trained.		
1h. Provision of adequate facilities and supplies for end-of-day cleanup,	During the final PSECA inspections, all washing areas were inspected and 18 out of 20 were validated one week before the start of the campaign. The 2 other soak pits were validated after some adjustments 3 days before the start of the campaign. All other supplies were in place for rinsing. Out of all 841 inspections that were carried out, 5 times there was no water	There is always water in the rinse barrels but maybe the drums were not always full (recorded as no water): the washers must fill up the barrels after washing overalls.	There are some sites which have water shortage problem but we have recruited people to provide enough supply on daily basis
1i. Enforce spray and clean-up procedures.	Clean-up procedures were emphasized during the training, especially since last year the applicators themselves have been required to wash their pumps. The applicators were supervised by the team leaders and local supervisors during the rinsing phase. In all 841 end-of-day cleanup	The supervision of the rinsing phase by the team leaders was not systematic as at that time they were revising and finalizing data collected by spray operators.	Both SNH local supervisors and team

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
	inspections were carried out: 33 indicated that they were not supervised by team leaders		leaders are responsible and must closely be supervising SOPs during progressive rinsing of their pumps. This will be emphasized again during team leader's orientation
2a. IEC campaigns to inform homeowners of responsibilities and precautions.	Relays were trained on key messages of information but had insufficient time to enable them to prepare and insist on compliance with measures to prepare homes. Out of the 804 inspections on the preparation homeowner 21 cases of refusal are inventoried	The information transmitted by the mobilizers to the recipients was generally limited to the day of arrival of spray operators.	The mobilizers must take time to transmit the messages related to the benefits of IRS and household preparation measures to prevent some refusal cases
2b. Prohibition of spraying houses that are not properly prepared.	Ensure a better awareness of the beneficiaries of the preparation of rooms (carry belongings outside or putting heavy items in the center of the room) Respect scheduled dates of a given village - IEC mobilizers and SOPs will coordinate activities Out of the 804 inspections on the structure preparation, there were 2 instances of belongings not removed, 2 instances of food not removed, 6 instances of items on the eaves not removed, and 4 instances of animals not confined.		Household preparation is a big section of SOP and IEC training to better harmonize message.
2c. Two-hour exclusion from house after spraying	This is part of the information messages by the relays and refreshed by SOP. The supervision sheet provides a questionnaire in this sense to see whether the message has gotten		

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
	through. Of the 804 inspections submitted, only 3 households indicated not being informed of this prohibition.		
2d. Instruct homeowners to wash itchy skin and go to health clinic if symptoms do not subside.	This is part of the informed messages by the relays and refresh by SOP. The supervision sheet provides a questionnaire in this sense to see whether the message has gotten through. Of the 804 inspections submitted, only 4 households indicated not being informed of this instruction.		All health clinics address and phones were available in all operational sites.
3a. Indoor spraying only.	This aspect was highlighted during the operators training Only 7 instances of wrong surfaces being sprayed out of 804 inspections were reported.		The eaves are also to be sprayed
3b. Training on proper spray technique	Training of trainers was carried out to ensure the teaching quality Use of control valves for all pumps was required. Of the 804 inspections conducted, 33 (4,1%) of errors in mixing pesticide reported; 31 (3,9%) cases of correct spraying distance not respected; and 28 (3,5%) instances of not spraying recommended surfaces reported	Time was taken during TOT and SOP training to explain how to estimate the quantity of water needed to mix a bottle of insecticide. But the insecticide was not used during the practice session.	Need to demonstrate with real insecticide how to do the mixing during TOT. Need to emphasize on the spray speed and the spraying distance to ensure quality.
3c. Maintenance of pumps	Preventive maintenance was included in the planning, and during the campaigns, maintenance technicians assured the functionality of pumps Out of 804 inspections, 22 (2,7%) cases of leaking pumps were reported.	Lack of willingness by some spray operators to wash their own pump. Strengthening on washing pumps by SOP and rigorous maintenance of the pumps by technicians as needed	Pumps must be strictly managed by the spray operators: each applicator should be responsible for their own pumps to avoid certain technical problems. Each spray operator should sign a commitment with regards to the pump management.

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
4a. Choose sites for disposal of liquid wastes, including mobile soak pit sites, according to PMI BMPs.	All sites were provided with soak pits for the disposal of liquid waste. Camping (at Malem) sites had MSP for washing pumps, masks, gloves and helmet All soak pits were inspected and validated prior to the start of the campaign For the 841 inspections submitted, there were 18 instances of the soak pits not draining properly.		
4b. Construct fixed and mobile soak pits with charcoal to adsorb pesticide from rinse water.	This principle was used for the construction of soak pits : 20 fixed soak pits and 11 MSP were used		
4c. Maintain soak pits as necessary during season.	Soak pits were covered by a layer of cement after the campaign		
4d. Inspection and certification of solid waste disposal sites before spray campaign.	A cement factory (SOCOCIM), approved by the environment department (DEEC), agreed to the incineration of solid waste from the campaign. A plastic materials recycling factory (SODIAPLAST) agreed to collect plastic waste for recycling.		
4e. Monitoring waste storage and management during campaign.	The waste was regularly inventoried and sent to the central level before disposal at the end of IRS campaign 15,233 used masks, 39.189 empty Actellic bottles, 108 Tyvek suits and 1,256 wipes were packaged and transferred to the central warehouse		

Mitigation Measure	Status of Mitigation Measures	Outstanding issues relating to required conditions	Remarks
4f. Monitoring disposal procedures post-campaign.	Waste disposal was done under the supervision of the environment officers from the DEEC and Abt ECO.	Repeat the same procedure always, as this is very restrictive each year.	An agreement with the targeted partners must be set up during the entire project
5a. Maintain records of all pesticide receipts, issuance, and return of empty sachets/bottles.	An insecticide daily tracking sheet is used by the storekeeper. Team leaders were required to return all the bags / empty bottles at the end of the day.		
5b. Reconciliation of number of houses sprayed vs. number of sachets/bottles used.	The spray performance displayed at each site allowed a daily tracking of the applicators performance and the use of the insecticide.		
5c. Visual examination of houses sprayed to confirm pesticide application.	A zip tie displayed on eligible structures walls identified those treated. SOPs used chalk to mark the treated structures. After structures were marked as sprayed, 1,612 Data Collection Verification forms of confirmed pesticide applications were submitted.		
5d. Perform physical inventory counts during the spray season.	An inventory was scheduled every 10 days in all stores sites. An inventory was carried out every 10 days by site storekeeper and the assistant logistics coordinator		