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Indoor Residual Spraying (IRS 2) Task Order Four

2013 BENIN END OF SPRAY REPORT

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2013 BENIN END OF SPRAY REPORT

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ACRONYMS

ABE	Benin Environmental Agency (Agence Béninoise pour l'Environnement)
AIRS	Africa Indoor Residual Spraying
BMP	PMI Best Management Practices
CREC	Entomological Research Center of Cotonou (Centre de Recherche Entomologique de Cotonou)
DAGRI	Directorate of Agriculture
DCAM	Community Development and Environment Sanitation (Développement Communautaire et Assainissement du Milieu)
DDEHU	Departmental Directorate for the Environment, Habitat and Urbanism (Direction Départementale de l'Environnement, de l'Habitat et de l'Urbanisme)
DDS	Departmental Directorate for Health (Direction Départementale de la Santé)
DHAB	National Directorate of Hygiene (Direction de l'Hygiène et de l'Assainissement de Base)
EC	Emulsifiable Concentrate Formulation
ECM	Environmental Compliance Manager
ECO	Environmental Compliance Officer
EIR	Entomological Inoculation Rate
EMMP	Environmental Mitigation and Management Plan
HBR	Human Biting Rate
ICC	Inventory Control Cards
IEC	Information, Education, and Communication
IRS	Indoor Residual Spraying (Pulvérisation Intra Domiciliaire (PID))
LLIN	Long-Lasting Insecticide-treated Net
MAEP	Ministry of Agriculture, Livestock and Fisheries (Ministère de l'Agriculture, de l'Élevage et de la Pêche)
M&E	Monitoring and Evaluation
MoH	Ministry of Health
NMCP	National Malaria Control Program (Programme National de Lutte contre le Paludisme)
PID	Pulvérisation Intra Domiciliaire d'Insecticide
PMI	President's Malaria Initiative
PNLP	Programme National de Lutte contre le Paludisme
PPE	Personal Protective Equipment
SABS	South Africa Bureau of Standards
SHAB	Community Hygiene and Sanitation Service (Service de l'Hygiène et de l'Assainissement de Base)
SMS	Short Message Service
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

Under the United States Agency for International Development (USAID) Task Order Four, Abt Associates has assumed the role of lead implementing agent for the President's Malaria Initiative's (PMI's) Africa Indoor Residual Spraying (AIRS) project in Benin and 15 other sub-Saharan countries. With the primary goal of reducing malaria-associated morbidity and mortality via Indoor Residual Spraying (IRS), AIRS Benin completed its IRS campaign from May 20 through June 26, 2013, over 32 days within the scheduled time frame for completing the IRS campaign designated by the National Malaria Control Program (NMCP).

The IRS campaign covered all nine communes in Atacora Department in northern Benin. The 2013 IRS campaign was the fifth round of IRS supported by PMI in Benin, and the third round of IRS in the Atacora Department. (IRS campaigns before 2011 covered Ouémé Department in southern Benin.) It was the second round conducted by Abt Associates in the country for PMI.

AIRS Benin implemented the 2013 IRS campaign in close collaboration with PMI/Benin, and with several Beninese government partners, most notably the NMCP; the Ministry of Health (MoH); the Ministry of Agriculture, Livestock and Fisheries; the Ministry of Environment, Habitat and Urbanization; the Benin Environmental Agency; the National Directorate of Agriculture; the National Directorate of Hygiene; the Department Administrative Authorities of Atacora; and the department Directorate of Health for Atacora.

The 2013 IRS campaign marked the first time that an IRS campaign in Benin used organophosphate-class insecticides. The decision to use organophosphates was made because entomological surveillance data collected after the 2012 IRS campaign found that the malaria vectors had become less susceptible to carbamates-class insecticides. At an insecticide/commune selection meeting in November 2012, it was agreed that organophosphates would be used in five communes during the 2013 IRS campaign, though carbamates would be used (as in previous years) in four communes.

In 2013, PMI/Benin subcontracted the Entomologic Research Center of Cotonou (Centre de Recherche Entomologique de Cotonou (CREC)) directly to collect entomological surveillance data to evaluate the quality and effectiveness of the 2013 IRS campaign. CREC noted that the quality of the IRS was good 24 hours after spraying in districts sprayed with carbamates and in districts sprayed with organophosphates, with 100% mortality rates for mosquitoes coming into contact with walls that had been sprayed during the first day of IRS. One month after spraying (June, 2013), CREC reported that mortality rates for susceptible mosquitoes were greater than 97% on cement treated walls. The mortality rate of susceptible mosquitoes on cement treated walls was above 80% in July, two months after spraying. However, by August, three months after spraying, vector mortality rates had fallen below 80% (ranging from 49.09% to 76.79%). Table I provides a brief summary of the 2013 IRS campaign.

TABLE I: SUMMARY OF 2013 IRS CAMPAIGN

Number of communes covered by the PMI-supported IRS campaign	9 communes: Boukoubé, Cobly, Kérou, Kouandé, Matéri, Natitingou, Péhunco, Tanguiéta, and Toucountouna
Insecticide used	Carbamates: Boukoubé, Kérou, Natitingou, and Péhunco Organophosphates: Cobly, Kouandé, Matéri, Tanguiéta, and Toucountouna
Number of structures sprayed by spray operators	228,951
Number of structures found by spray operators	239,112
2013 IRS campaign spray coverage	95.75%
Population protected by 2013 IRS campaign	694,729
Number of people trained with US Government funds to deliver IRS	804

Listed below are some of the lessons learned from the 2013 IRS campaign.

- The 2013 IRS campaign benefitted from holding nightly coordination meetings between AIRS Benin staff and staff from the project's Beninese government counterparts. These meetings not only provided a forum for noting successes of the IRS campaign, and issues that needed to be resolved, but also provided an opportunity for the Beninese government staff to become more involved in the daily management of the IRS campaign.
- In 2013, AIRS Benin established a formal environmental inspection group that included AIRS Benin staff, and Atacora region and national environmental officials. The involvement of the Beninese government staff in the environmental inspections strengthened their capacity regarding environmental compliance issues concerning IRS.
- AIRS Benin noted that the 2013 IRS campaign coincided with the start of the rainy season in northern Benin (mid-May). Overall the rains caused minor delays that did not impact the timeline for completing the IRS campaign. However, some IRS campaign beneficiaries were hesitant to remove their possessions from their structures and place them outside in the rain or on damp ground, but it did not affect the spray coverage, as the total was 95.7%. This led to a few brief delays in spray operations, and required some persuasion from the spray operators to convince the beneficiaries to remove their possessions from their structures.

I. INTRODUCTION

Under its Task Order Four contract with the United States Agency for International Development (USAID), Abt Associates is the lead implementing partner for the President's Malaria Initiative's (PMI's) Africa Indoor Residual Spraying (AIRS) project in Benin and 15 other sub-Saharan countries. In December 2013, Abt completed its second round of spraying in Benin, covering all nine communes in the Atacora Departement in northern Benin. The overall goal of AIRS Benin in 2013 was to continue to reduce malaria-associated morbidity and mortality in all nine communes of Atacora Department by completing IRS for an estimated 222,000 eligible structures, thereby protecting as many individuals in Atacora as possible. The 2013 IRS campaign also marked the first time that AIRS Benin sprayed two classes of insecticide in Benin: the Emulsifiable Concentrate (EC) of organophosphate in five communes, and carbamates in four communes.

AIRS Benin completed its IRS campaign from May 20 through June 26, 2013, spraying for 32 days, within the scheduled time frame for completing the IRS campaign designated by the National Malaria Control Program (NMCP), which was the second week of May through the end of June. The 2013 IRS campaign was completed in three fewer days than the 2012 IRS campaign.

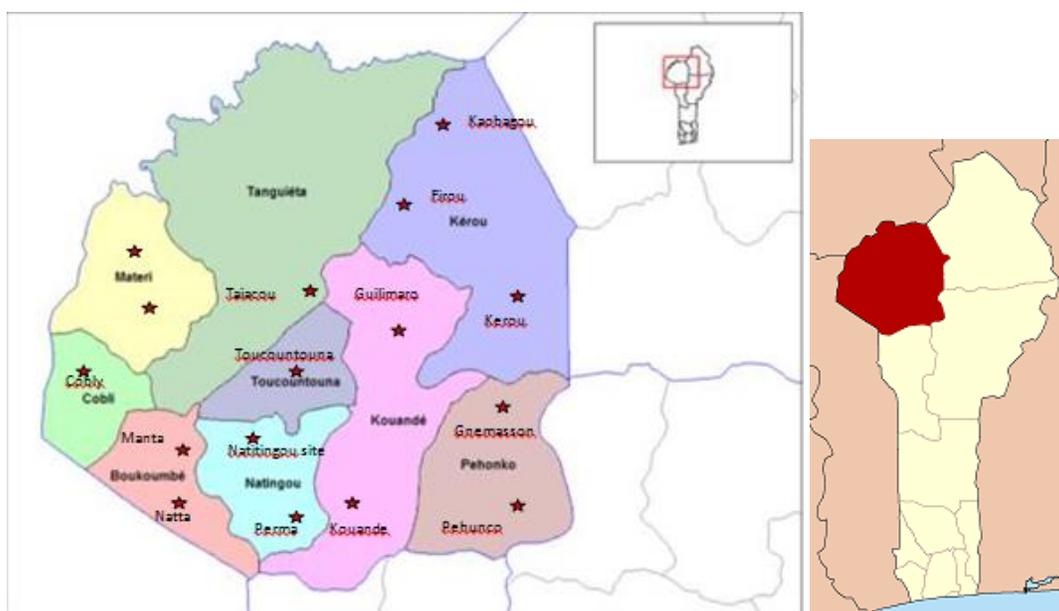
AIRS Benin implemented the 2013 IRS campaign in close collaboration with PMI Benin and several government agencies, most notably the NMCP, the Ministry of Health (MoH), the Ministry of Agriculture, Livestock and Fisheries (MAEP), the Ministry of Environment, Habitat and Urbanism, the Benin Environmental Agency (ABE), the National Directorate of Agriculture (DAGRI), the National Directorate of Hygiene (DHAB), and the Departmental Administrative Authorities in Atacora (particularly the Departmental Directorate for Health ((DDS)). Additionally, the Entomologic Research Center of Cotonou (CREC) continued to be a valuable Indoor Residual Spraying (IRS) partner. The research center was contracted directly by PMI Benin to complete entomological surveillance for the 2013 IRS campaign.

This report provides a description of the planning, implementation, and monitoring of the IRS campaign operations in 2013. The report also provides the results of the key indicators for which AIRS Benin is required to report to PMI, and the preliminary entomological surveillance findings of CREC regarding the 2013 IRS campaign.

2. COUNTRY BACKGROUND

The 2013 IRS campaign marked the fifth round of PMI-supported IRS in Benin, and the third round of IRS in the Atacora Department. The 2013 IRS campaign was also the second consecutive IRS campaign round that covered all nine districts of the Atacora Department (the 2011 IRS campaign covered seven of the nine districts). Please see Figure 1 to note the location of the Atacora Department in Benin, the nine districts in the Atacora Department where IRS was completed, and the location of the operation sites used to support the 2013 IRS campaign.

FIGURE 1: COMMUNES OF THE ATACORA DEPARTMENT OF BENIN



*Source: Rarelibra (online cartographer), for public domain use; stars represent operation sites.

Table 3 notes the estimated population of Atacora Department.

TABLE 3: ATACORA DEPARTMENT'S ESTIMATED POPULATION AND POPULATION DENSITY

Communes	Population from 2013 Census preliminary results*	Area (km ²)	Estimated population per km ²
Boukoubé	83,147	1,081	78
Kérou	98,315	3,769	26
Cobly	68,955	827	83
Kouandé	112,014	3,237	35
Matéri ***	111,003	1,719	65
Natitingou	104,010	1,348	77
Péhunco	78,173	2,008	39
Tanguiéta***	73,731	5,466	14
Toucountouna	39,989	1,068	38
Total Atacora Department	769,337	20,523	38

*** Only the area within Tanguiéta and Matéri Communes, which are not part of the Pendjari Biosphere Reserve, was covered by the IRS campaign in 2013.

2.1 OBJECTIVES FOR 2013 SPRAY CAMPAIGN

As stated in the 2013 AIRS Benin work plan, the three objectives of AIRS Benin for 2013 included:

1. Cover at least 85% of eligible structures found in all nine districts of Atacora Department.
2. Continue efforts to develop national and local capacity in organizing, planning, implementing, and evaluating IRS campaigns, with a goal of identifying a plan for sustainability.
3. Implement cost- and operation-efficient activities, to save funds and ensure ease of management.

Given these objectives, AIRS Benin aimed to cover an estimated 222,000 structures in Atacora during its IRS campaign and protect as many of the estimated 700,000 people living there as possible.

To achieve these objectives, AIRS worked with several partners, whose activities are summarized below.

- The NMCP validated IRS management tools, assisted with the planning of the IRS campaign, trained Information, Education, and Communication (IEC) mobilizers and spray operators, performed supervision during the IRS campaign, and helped to validate data collected during the IRS campaign. AIRS Benin also provided some education on malaria transmission, vector control strategies, and different available interventions.
- IRS Task Force members validated IRS management tools, and provided technical and operational advice for IRS implementation. These task force members included the NMCP, USAID, CREC, Institut de Recherche pour le Développement (French Cooperation for Development Research), National Committee of Agreement and Control of Phytopharmaceutical Products (Comité National d' Agrément et de Contrôle des Produits Phytopharmaceutiques), Regional Institute of Public Health, and the Ministry of Environment.
- CREC completed entomological surveillance activities under a subcontract with PMI/Benin.

3. PREPARATION FOR THE 2013 IRS CAMPAIGN

3.1 IRS CAMPAIGN PLANNING

Listed below are the activities that were undertaken to plan and organize the 2013 IRS campaign.

TABLE 4: IRS ACTIVITIES PLANNING

Dates	Activities	Participants or Stakeholders	Comments
Nov. 2012-March 2013	Development of 2013 AIRS Benin Work Plan	AIRS Benin and AIRS core team	Guidance was provided by PMI-Benin and PMI-Washington, leading to the final approved work plan in April 2013.
February-May 2013	Internal IRS Campaign Planning	AIRS Benin, NMCP	AIRS Benin staff met regularly between February and May to review the organization and planning for the IRS campaign, and made changes as needed. 2) The Plan of Action was finalized with the NMCP.
March 2013	IRS Task Force Meeting	NMCP, CREC, PMI/Benin, the Ministry of Health (MoH), DDS Atacora, and other IRS stakeholders	1) Partners discussed the IRS campaign for 2013 and the role of each stakeholder at the national and regional levels in completing the IRS campaign. 2) Validation of the 2013 IRS Plan of Action.
March 2013	Meeting with Atacora Department Authorities	NMCP, DDS Atacora, AIRS Benin, and nine mayors	1) At this meeting, participants reviewed the choice of communes to be sprayed with organophosphates and carbamates (from the insecticide meeting held in November), and also confirmed that all structures in the Pendjari Biosphere Reserve (within Tanguiéta commune) would not be sprayed during the 2013 IRS campaign.

Dates	Activities	Participants or Stakeholders	Comments
April 2013	Regional Partner Meeting	DDS Atacora, district medical doctors, and mayors of each commune	To discuss their roles in the IRS campaign, and to develop a calendar and schedule for the implementation of the IRS campaign. 2) To gain their endorsement of the spray campaign.
Late April 2013	IRS operation “micro” planning development	Nine commune coordinators, DDS Atacora, AIRS Benin, medical staff from each commune	To develop the exact schedule for when communities would be sprayed, and to ensure that all operation systems were in place to support the IRS campaign. To make certain that all health centers throughout Atacora Department were prepared to treat any potential health issues arising from the IRS campaign.

3.2 PRE-SPRAY ENVIRONMENTAL ASSESSMENT

3.2.1 PRE-SPRAY ENVIRONMENTAL INSPECTION

From February 4 to February 7, 2013, a pre-spray environmental inspection was performed by the AIRS Benin Environment Compliance Officer (ECO) and Logistics Manager, along with staff from the NMCP; MAEP; DDS Atacora; Departmental Directorate for the Environment, Habitat and Urbanism (DDEHU) Atacora; and Ministry of Environment, Habitat, and Urbanization. Details from the pre-spray environmental inspection are found in the Letter Report that AIRS submitted to PMI and USAID Washington in March 2013.

The key objectives of the pre-spray environmental inspection were to:

- Identify any environmental non-compliance issues for the proposed IRS operation sites, to develop and implement plans for remediating these issues.
- Identify locations for two new operation sites in Taiacou (Tanguiéta Commune) and Firou (Kérou Commune).

The inspection team used a checklist based on PMI’s Best Management Practices (BMP) for completing IRS, to note various areas that were in good shape, and areas where further infrastructure improvement was needed (such as refurbishing soak pits and store rooms).

The inspections resulted in refurbishing rinsing/wash areas, soak pits, and showers/toilets at all operation sites and at the AIRS Benin Central Warehouse in Natitingou (which was also used as an operation site for IRS activities in Natitingou village and the surrounding area in 2013). Due to the findings of the pre-spray environmental inspection, AIRS Benin also:

- Upgraded all storage facilities at all operation sites to include double lock systems, effective ventilation and hooks to hang spray pumps.
- Built barbed wire fences to enclose all rinsing areas/soak pits, to ensure people and animals could not access the rinsing/soak pit areas. The barbed wire was used instead of thatch fences, which had been used during the 2012 IRS campaign but had proven to be less durable than needed; community members had removed the fencing and used it for other purposes.
- Dug out, cleaned, and replaced gravel and stones that comprise the soak pits.
- Placed a cover made of thick red metal sheeting on top of each soak pit. The cover was locked into place via metal poles, to prevent theft and unauthorized persons/animals from coming into contact with the soak pit.
- Provided posters and booklets at each operation site on what to do in case of accidental exposure to insecticide, and protocol to follow in case of a fire. The booklets on toxic exposure were also provided to health workers throughout Atacora, IRS campaign warehouse managers and logistics assistants, and all drivers transporting insecticides for the IRS campaign.
- Shifted one of its operation sites from Tanguiéta-ville to Taiacou, since Taiacou is farther away from the Pendjari Biosphere Reserve, and the use of this operation site would have minimal impact on the flora and fauna inside the Pendjari Biosphere Reserve.
- After noting that the rinse area and soak pit at the new operation site in Kaobagou had been built incorrectly, AIRS Benin staff brought in new builders to reshape the rinse area and soak pit, and reinforce the rinse area with more concrete. The AIRS Benin Chief of Party and the visiting Technical Coordinator noted the issue several days before the IRS campaign began, and the campaign based out of that site was delayed by several days until the work could be completed. Figure 2 provides a good example of the red metal sheeting that was used to cover the soak pits.

FIGURE 2: EXAMPLE OF RED METAL SHEETING USED TO COVER SOAK PIT



Figures 3 and 4 show the condition of the soak pits/washing areas in Perma, Natitingou Commune, during the pre-spray environmental inspection, and after refurbishment.

FIGURE 3: SOAK PIT AND RINSING AREA IN PERMA (NATITINGOU COMMUNE), DURING PRE-SPRAY ENVIRONMENTAL INSPECTION (BEFORE REFURBISHMENT)



FIGURE 4: SOAK PIT AND RINSING AREA IN PERMA (NATITINGOU COMMUNE), AFTER REFURBISHMENT



Table 5 notes the location of each operation site for the 2013 IRS campaign, and whether the operation sites received store room, soak pit, fencing, or soak pit cover refurbishments and/or new construction, following the pre-spray environmental inspection.

TABLE 5: LOCATIONS OF OPERATION SITES

Communes	Operation site location (commune)	Facility type	Store room refurbished (*)	Soak pit refurbished and covered	Fencing rebuilt
Natitingou	Natitingou	Central warehouse	Yes (Y)	Y	Y
	Perma	Health center	Y	Y	Y
Toucountouna	Toucountouna	Health center	Y	Y	Y
Boukoumbé	Natta	Municipal building, provided by community	Y	Y	Y
	Manta	Health center	Y	New soak pit	Y
Tanguiéta	Taiacou	Youth center	Y	New soak pit	Y
Matéri	Matéri	Municipal building, provided by community	Y	Y	Y
	Dassari	Health center	Y	Y	Y
Cobly	Cobly	Health center	Y	Y	Y
Kouandé	Kouandé	Health center	Y	Y	Y
	Guilimaro	Health center	Y	Y	Y
Péhunco	Ouassa	Health center	Y	Y	Y
	Gnemasson	Municipal building, provided by community	Y	Y	Y
Kérou	Firou	Piece of land, provided by community	New store room	New soak pit	New fencing for operation site
	Kaobagou	Health center	Y	Rinsing area reinforced with concrete	Y
	Kérou	Municipal building, provided by community	Y	Y	Y

(*) Small maintenance according to the store room conditions: on roof, doors, windows, locks or floor.

3.3 USE OF SMARTPHONES FOR ENVIRONMENTAL COMPLIANCE

The 2013 IRS campaign in Benin marked the first time that an AIRS project country used smartphones for completing environmental compliance supervision and monitoring. The AIRS project worked with the Client Technology Center, another division of Abt Associates, to upload customized environmental compliance checklists on to the smartphones, for monitoring and supervision before, during, and after the IRS campaign. The checklists included prompts that used the smartphones' GPS system, to provide the exact latitude and longitude of any of the operation sites that were inspected for environmental compliance. These coordinates can then be used to map the exact location of the operation sites. Additionally, the checklists on the smartphones included a prompt that required AIRS Benin staff to take photos of soak pits, how Personal Protective Equipment (PPE) and insecticide were being stored in store rooms, and other aspects of the operation sites, to provide visual proof of any items that met environmental compliance standards, or needed further refurbishments (such as the condition of a soak pit). After the environmental compliance inspection, the results marked on the checklist (including the GPS coordinates and photos of operation sites) were promptly uploaded to an AIRS Benin environmental compliance database, using the smartphones' internet/data plan connection.

During a Short-Term Technical Assistance trip to Benin in March 2013, the AIRS project's Environment Compliance Manager provided one-on-one training to the AIRS Benin ECO on how to use the smartphone. In turn, the ECO trained other AIRS Benin staff, including the Operations Manager, the Technical Manager and Chief of Party, in order to ensure that other staff members could also complete environmental compliance inspections during their supervision of other aspects of the IRS campaign.

The smartphones were initially used during the two weeks before the IRS campaign, when the ECO (with support from the Operations Manager, Technical Manager, and Chief of Party) completed inspections at all 16 operation sites that were used during the 2013 IRS campaign. The uploaded data from the inspections was made available on the AIRS environmental compliance database after the inspection was completed, enabling AIRS staff to view the results of the inspections and note whether the sites were ready to support the IRS campaign and/or needed any refurbishments in order to protect the environment.

3.4 INSECTICIDE SELECTION

Following the 2012 IRS campaign, CREC reported that vector mortality rates for carbamate-sprayed walls had decreased, compared to what had been found in entomological surveillance data on Atacora collected in 2011. CREC also noted that the effectiveness of carbamates fell below 80% of the mortality rate for two months after spraying, and that the Ace-1 gene, responsible for vector resistance to carbamates, had increased (although the frequency for the Ace-1 gene remained low). Despite the increase in vector resistance to carbamates, CREC did note that carbamate remained effective in decreasing indoor vector-man contact when they compared the villages sprayed using carbamates with the control villages. Overall, CREC noted during its susceptibility testing in 2012 that the organophosphate class of insecticide was the most effective in Atacora Department.

Given this information and noting the expense of organophosphates and the limited budget for the 2013 IRS campaign, the NMCP, CREC, PMI/Benin, and AIRS Benin and other stakeholders met in October and November 2012 to discuss which insecticide classes to use during the 2013 IRS campaign, and the insecticide class that would be used in each commune in Atacora. The meetings concluded with the agreement to spray organophosphates in five communes and carbamates in four communes. Table 6 has information on the insecticide selection for each commune; the annex contains the official notes and documentation regarding the insecticide and commune selection for the 2013 IRS campaign.

TABLE 6: COMMUNE AND INSECTICIDE CLASS SELECTION FOR 2013 IRS CAMPAIGN

Communes	Class of insecticide to be used for 2013 IRS campaign	Rationale for insecticide class decision
Boukoubé	Carbamate	Commune selected by PMI/Benin, NMCP, AIRS, and CREC for spraying with carbamates in 2013
Kérou	Carbamate	Had earlier completed only one round of carbamate spray
Natitingou	Carbamate	Commune selected by PMI/Benin, NMCP, AIRS, and CREC for spraying with carbamates in 2013
Péhunco	Carbamate	Had earlier completed only one round of carbamate spray
Cobly	Organophosphate	Commune selected by PMI/Benin, NMCP, AIRS, and CREC for spraying with organophosphates in 2013
Kouandé	Organophosphate	Commune selected by PMI/Benin, NMCP, AIRS, and CREC for spraying with organophosphates in 2013
Matéri	Organophosphate	Commune selected by PMI/Benin, NMCP, AIRS, and CREC for spraying with organophosphates in 2013
Tanguiéta	Organophosphate	Commune selected by PMI/Benin, NMCP, AIRS, and CREC for spraying with organophosphates in 2013
Toucountouna	Organophosphate	Commune selected by PMI/Benin, NMCP, AIRS, and CREC for spraying with organophosphates in 2013

The number of IRS spray rounds was taken into consideration during the meetings, with the decision that since Péhunco and Kérou Communes had been sprayed only once (the first round of spraying took place in 2012 and had the least susceptibility to carbamates), they would receive a second round of IRS with carbamate class insecticides. Boukoubé and Natitingou were also selected as carbamate IRS communes, largely due to budgetary reasons, as both communes have larger populations and using carbamates in these two communes allowed enough funding in the 2013 IRS campaign budget to procure enough organophosphate to cover the remaining five communes in Atacora.

It is also important to note that the NMCP has decided that with regard to organophosphates, only a pirimiphos methyl formulation that has been approved by the WHO Pesticide Evaluation Scheme could be used for IRS within Benin. This meant that only the Emulsifiable Concentrate (EC) formulation of pirimiphos methyl (organophosphate) would be selected for use in Benin.

3.5 LOGISTICS PLANNING AND PROCUREMENT

3.5.1 PPE AND INSECTICIDE PROCUREMENT FOR THE 2013 IRS CAMPAIGN

In December 2012, AIRS Benin reviewed its inventory of IRS equipment and commodities at the Central Warehouse in Natitingou. Most of the PPE and spray pumps used during the 2012 IRS campaign remained in good condition and were available for use during the 2013 IRS campaign. Thereafter, AIRS Benin noted the quantities of damaged or non-reusable PPE and developed a list of PPE that AIRS

needed to procure locally and internationally. A full list of all PPE that was procured for the 2013 IRS campaign appears in Table 23 in the Annex.

For the 2013 IRS campaign, AIRS Benin procured 50 Goizper spray pumps. Goizper spray pumps have been used for insecticide spraying for agriculture, but have not been commonly used for IRS. The AIRS project looked into using Goizper spray pumps for several AIRS countries in 2013, given that the spray pump has fewer moveable parts than previously used devices in IRS, is sturdier, and includes a pressure regulator that allows the pump to maintain its pressure while it is being used for spraying, so that the spray stream from the pump is constant. Goizper pumps are also normally less expensive than the other spray pumps commonly used for IRS. Given that this was the first year for their use in Benin, AIRS piloted the use of the Goizper spray pumps in one commune, Toucountouna. Section 5 provides more information on the use of the Goizper spray pumps during the IRS campaign.

The inventory count in December 2012 also confirmed that 7,543 sachets of carbamates were in stock and usable for the 2013 IRS campaign. This included 4,362 sachets remaining from the 2012 IRS campaign, and 3,181 sachets that the AIRS Benin team received from AIRS Burkina Faso when the IRS program in Burkina Faso closed in December 2012. Following further forecasting activities, AIRS Benin noted that it needed a total of 32,855 sachets of carbamates (or an additional 25,312 carbamate sachets) to complete the 2013 IRS campaign and have buffer stock to guard against a stock-out. The shipment of the 25,312 carbamate-class insecticide sachets arrived in Benin on April 11, 2013.

Since AIRS Benin had not sprayed with the EC formulation of organophosphate before, the project procured 40,320 bottles of organophosphate to cover the five communes in Atacora. The procured amount of organophosphate bottles also included buffer stock. The organophosphate arrived in Benin in March 2013.

AIRS also received quality control test results via the South Africa Bureau of Standards (SABS) laboratories for the batches of carbamates and organophosphates shipped to Benin for use in the 2013 IRS campaign. SABS reported that all batches of the carbamates and organophosphates shipped to Benin were of good quality, and ready for use during IRS. The annex has the actual quality control test results from SABS.

3.5.2 PLANNING THE LOGISTICS AND TRANSPORTATION FOR THE 2013 IRS CAMPAIGN

The AIRS Benin team worked with the DDS Atacora in March to plan the logistics and transportation for implementing the 2013 IRS campaign. Several field visits were conducted with the DDS Atacora staff to meet with local authorities, identify transportation routes, and note areas with difficult roads. These field visits led to detailed transportation plans that allowed AIRS Benin to note the length of time it would take to send re-supply trucks from the central warehouse in Natitingou to the operation sites, and to note how long it would take spray operators to reach various communities. This information was also important for calculating that the IRS campaign could be completed over a six-week period.

3.5.3 DEVELOPMENT OF NEW OPERATION SITE IN FIROU

The field visits with the DDS Atacora also included identifying the location for a new operation site in Firou sub-commune. After the 2012 IRS campaign, as noted in the 2012 End-of-Spray Report, local authorities chose to make the site a house and placed a municipal worker inside. Therefore, AIRS Benin chose to develop a new operation site for the 2013 IRS campaign on land provided to the project by the local authorities. The operation sites (including the store room and soak pit) were built in early May 2013. Figures 5 and 6 provide photos of the new operation sites developed in Firou.

FIGURE 5: NEW STORE ROOM DEVELOPED AT THE OPERATION SITE IN FIROU



FIGURE 6: NEW SOAK PIT BUILT AT THE OPERATION SITE IN FIROU



3.5.4 DISTRIBUTION OF PPE TO OPERATION SITES

AIRS Benin organized the distribution of PPE and insecticide to all operation sites during the week before the IRS campaign started (May 12-May 18). This followed AIRS Benin’s refurbishment of all operation sites in April, the completion of the operation site in Firou, and confirmation from the AIRS Benin ECO and the AIRS project’s Environment Compliance Manager that all operation sites were environmentally compliant. Table 7 notes the distribution of key PPE items to each of the operation sites.

TABLE 7: DISTRIBUTION OF KEY PPE TO OPERATION SITES

Operation Sites	Overalls	Boots	Helmets	Pumps
Natitingou *	149	77	72	58
Perma**	132	85	74	54
Toucountouna	100	38	40	31
Nata	103	55	50	41
Manta	85	46	42	32
Taiacou	146	72	87	63
Matéri	137	76	66	51
Dassari	84	47	42	39
Cobly	125	72	70	50
Kouandé	138	55	54	36
Guilimaro	60	32	28	22
Ouassa	160	83	80	65
Gnemasson	54	38	27	19
Firou	36	21	17	12
Kérou	164	85	73	61
Total	1,673	882	822	634

* The Central Warehouse in Natitingou also served as an operation site during the campaign for the communities near Natitingou.

** Even though Birni is within Kouandé Commune, its equipment was put in the Perma operation site store room, which is closer to Birni (about 15km by road).

3.6 HUMAN RESOURCES

3.6.1 RECRUITMENT OF IRS CAMPAIGN SEASONAL STAFF

AIRS Benin placed job advertisements for some of the seasonal staff, including commune coordinators, storekeepers, logistics assistants, finance assistants, and data clerks, in Beninese newspapers in March and April. The IRS campaign supervisors and hygiene agents were selected by the DDS Atacora.

Spray operators, team leaders, pump technicians, and washers were recruited in each spray area by the local medical staff based on criteria developed by the AIRS Benin technical staff. All spray operators were required to be able to read and write, carry spray pumps for several hours per day, and to be certified by the district doctor that they were in good health to work. Additionally, all spray operators were required to be individuals respected within their communities, and have had experience working on community health activities. AIRS Benin gave priority to hiring spray operators that had performed well during the 2012 IRS campaign.

3.6.2 NUMBER OF SEASONAL STAFF HIRED

AIRS Benin hired 1,270 seasonal staff to implement the 2013 IRS campaign, which included 1,031 men and 239 women. Table 8 below provides a breakdown of the number of seasonal staff that were hired per district. Women are counted as hired under their initial employment position; if a woman had to change roles due to pregnancy she is counted as hired under her initial role.

TABLE 8: SEASONAL STAFF HIRED FOR THE 2013 IRS CAMPAIGN PER COMMUNE

Communes	Spray operators		Team leaders		District coordinators		IEC assistants		Data clerks		Storekeepers		Logistics assistants		Finance assistants		Washers		Service technicians		Supervisors (community)		IEC agents		IEC team leaders		Guards	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Natitingou	64	5	14			1					2							11	6	2	1	2	31	17	37	7	2	
Toucountouna	21	5	5			1					1							3	3			1	12	3	13	2	1	
Boukoubé	54	5	11	1	1						2							7	7		2		45	14	14	1	2	
Cobly	35	5	4	1	1						1							5	4	1	2		31	1	10		1	
Matéri	70		11	3	1						2							8	8		3		40	8	12	4	2	
Tanguiéta	44	5	8	1		1					1							5	6		1		25	8	8	1	2	
Kouandé	60	2	10	2	1						3							7	7		2		34	10	16		2	
Natitingou IRS Campaign Office								1	13	7			2		2	1												
Péhunco	47	12	9	3	1						2							7	3	4	2	1	15	2	14	1	2	
Kérou	45	14	9	2		1					2							7	7	1	2	2	27	5	8		2	
TOTAL M/F	440	53	81	13	5	4	0	1	13	7	14	2	2	0	2	1	0	60	51	8	15	6	260	68	132	16	16	
TOTAL	493		94		9		1		20		16		2		3		60		59		21		476					16

Noting the objective of USAID to increase women’s involvement in malaria control programming, AIRS Benin hired more women to work on the 2013 IRS campaign than it had done the year before. AIRS Benin hired and trained 147 women as seasonal spray staff, an 11% increase over the number in 2012. In total, 18.8% of those hired were women in 2013, compared to 16% in 2012.

Table 9 below denotes the proportion of women among several seasonal staff positions for the IRS campaign in Benin. Please see “Issues Encountered and Addressed during the 2013 IRS Campaign” in section 5 for additional information regarding the women employed by AIRS Benin for the 2013 IRS campaign.

TABLE 9: NUMBER OF WOMEN HIRED TO WORK ON 2013 IRS CAMPAIGN

Seasonal staff	Total seasonal staff hired	Total number of women	Proportion of women
Service technicians	59	8	13.6%
Washers	60	60	100.0%
Storekeepers	16	2	12.5%
Data clerks	20	7	35.0%
Commune coordinators	9	4	44.4%
Team leaders	94	13	13.8%
Spray operators	493	53	10.8%
IEC assistant	1	1	100.0%
Finance assistants	3	1	33.3%
Supervisors (community agents)	21	6	28.6%
IEC mobilizers	476	84	17.6%
Logistic assistants	2	0	0.0%
Guards	16	0	0.0%
Total number and proportion of women hired for the IRS campaign	1,270	239	18.8%

3.7 TRAINING

AIRS Benin organized 11 training sessions for all the IRS campaign’s seasonal staff to ensure that all seasonal staff were aware of their roles during the IRS campaign. Additionally, the training sessions covered the precautions that should be used when working with insecticides and what to do in case of an emergency (such as intoxication from insecticide). The trainings also reinforced the value of the staff’s work in preventing malaria transmission. All training materials were shared with and approved by the NMCP and Health Promotion and Protection Service of the Ministry of Health.

Training sessions were led by AIRS Benin staff, and their government counterparts, including staff from the NMCP, DHAB, DDS, and DDHU. CREC, local firefighters, and staff from Goizper's West Africa office also helped lead various training sessions.

A training of trainers was first completed for all commune coordinators and hygiene agents (who completed work as IRS supervisors) to allow them to lead the training of spray operators at each operation site, the week before the IRS campaign. All trainings took place from April 30 through May 19.

In total, 1,543 people, of whom 1,267 were men and 276 (17.9%) were women, attended trainings for the 2013 IRS campaign. Government and health center staff attended several trainings and acted as partners in supporting the IRS campaign on issues such as understanding intoxication treatment or IEC messaging. The reason more people were trained than were hired as seasonal staff is that 91 spray operators and team leaders were trained but not hired, as these individuals did not score high enough on the spray operator post-training test to qualify as spray operators. For the IRS operation AIRS Benin rent buses to transport spray operators from the operation sites to villages; their drivers were trained on environmental compliance especially on how to keep vehicles safe and what to do in case of accident or spilt insecticide. Even though the 69 drivers were trained for the IRS campaign they were not directly hired as seasonal staff. Table 10 provides a breakdown of the 1,543 people who were trained; among them 276 were women, totaling 17.9% of the trained personnel, which is 2% more than in 2012. Table 30 shows the number of people trained by type of training.

TABLE 10: NUMBER OF PEOPLE TRAINED BY INSTITUTION AND CATEGORY

Categories of institutions/ individual trained	Number of people trained for 2013 IRS campaign	
	M	F
DDS	3	
Community Hygiene and Sanitation Service (Service de l'Hygiène et de l'Assainissement de Sites, or SHAB) regional	1	
NMCP national	2	
NMCP regional	1	
DDEHU	2	
DAGRI		
CREC	1	
District coordinators	5	4
Health Zone Coordinator	3	
District chief doctors/other doctors	10	1
Chiefs of health post/midwife	40	20
Hygiene agents	31	12
Spray operators	603	75
Data clerks	13	7
Storekeepers	14	2
Logistics assistants	2	
Service technicians	57	8

Categories of institutions/ individual trained	Number of people trained for 2013 IRS campaign	
IEC agents	394	84
Washers		62
Drivers	69	
Guards	16	
IEC assistant		1
TOTAL M/F	1,267	276
TOTAL/ trainings		1,543

3.7.1 BRIEF DESCRIPTION OF TRAINING ACTIVITIES

Training of Trainers

Hygiene agents and commune coordinators were trained on spray methods, completing data collection forms, and providing IEC to notify IRS beneficiaries on how to prepare their structures before the IRS campaign, and the protocol to follow after the IRS campaign. The hygiene agents and commune coordinators, in turn, trained spray operators at the 15 primary operation sites the week before the IRS campaign.

Spray Operators Training

All spray operators traveled to their assigned operation sites, where they received training over four days on all aspects of spraying a targeted structure. The trainings included two days in the classroom regarding spray techniques, gaining familiarity with PPE and protocol for completing spray operations; and two days for practicing the spray technique with water on the walls of the operation sites. At all spray operator training sessions, a pre-test and post-test were administered. Spray operators who scored the highest on the post-test were selected to become the team leaders for each spray team. In areas where organophosphate was sprayed, spray operators also learned new procedures for mixing the organophosphate and cleaning organophosphate bottles, and precautions for spraying with organophosphates.

Goizper Spray Pump Training

As noted earlier in the report, the Goizper spray pump was piloted in Toucountouna Commune during the 2013 IRS campaign. Since the Goizper spray pumps is different than the other spray pumps that AIRS Benin has used during past IRS campaigns, one of Goizper's Regional Managers traveled to Benin to lead part of the spray operator training at the Toucountouna operation sites. The Goizper Regional Manager trained the spray operators, hygiene agents, and commune coordinator implementing IRS in Toucountouna Commune on the assembly and correct use of a Goizper spray pump. Spray operators also completed practice exercises for two days with the Goizper spray pump under the Goizper Regional Manager's supervision, to assure they fully understood how to use and maintain the spray pump. The Goizper Regional Manager also provided training for the service technicians based in Toucountouna Commune on how to repair the Goizper spray pump, and for the storekeeper at the Toucountouna operation sites on how to store Goizper spray pumps. The Goizper Regional Manager stayed in Atacora Department for an additional week to monitor the first week of the IRS campaign and the use of the Goizper spray pumps. Please see section 5 for more details.

FIGURE 7: SPRAY OPERATORS PRACTICING SPRAY TECHNIQUE IN TOUCOUNTOUNA COMMUNE WITH GOIZPER SPRAY PUMPS



Data Capture Training

Data clerks gained familiarity with the IRS campaign data entry forms and the database used for uploading all IRS campaign data. Data clerks also practiced entering data at the AIRS Benin data entry center in Natitingou.

Logistics Training

The logistics assistants and storekeepers were trained on inventory management, the value of completing and updating stock cards, and the correct protocol for storing PPE and insecticide. Additional training was provided for storekeepers in areas spraying with organophosphate, on how to store the full and empty organophosphate bottles.

Spray Pump Maintenance Training

Service technicians and storekeepers learned to identify the different components of spray equipment, and to maintain and repair equipment in case of default. The training also covered progressive rinsing of the spray pumps, since the service technicians are responsible for rinsing the spray pumps at the end of each IRS campaign day.

Washer Training

Washers learned techniques to wash and rinse PPE correctly.

Fire Security Training

The Natitingou fire brigade trained IRS campaign drivers, storekeepers, and guards on the fire risks associated with the IRS campaign, the correct use of fire extinguishers, and what to do in case of a fire emergency.

FIGURE 8: NATITINGOU FIRE BRIGADE LEADS TRAINING ON THE CORRECT USE OF FIRE EXTINGUISHERS FOR DRIVERS, GUARDS AND STOREKEEPERS



Transport Security Training

Drivers and seasonal logistics staff learned correct methods to secure and safely handle insecticides. Participants also learned how to manage an insecticide spill.

Management Training for Insecticide Intoxication Cases

Medical and health agents (39 nurses and 15 physicians) from the nine communes of Atacora Department were trained on how to manage cases of potential intoxication from contact with carbamate and organophosphate. The course focused on the mechanism of inhibition of acetyl cholinesterase, physiological implications of this inhibition, clinical diagnosis of intoxication, and case management of poisoning, including symptoms and antidotal treatment. The training was led by the AIRS Benin Technical Director, using a presentation developed by the head of the toxicology department of the University of Abomey-Calavi. (Due to a scheduling conflict the head of the toxicology department from the University of Abomey-Calavi was unable to lead this training in 2013.)

FIGURE 9: NMCP STAFF MEMBER REVIEWING SPRAY OPERATOR TRAINING



4. ADVOCACY/IEC ACTIVITIES

Before and during the IRS campaign, AIRS Benin organized an information, education and communication campaign for behavior change to prevent malaria. AIRS Benin shared malaria vector control information with beneficiaries, mainly IRS guidelines and benefits. Different actors at the community level were involved in activities (teachers, local leaders, town criers, community health workers), and many channels of individual and mass communication were used (local radio, town criers, flyers, and door-to-door communication). AIRS Benin also worked with mass media channels, produced and distributed various promotional materials, and directly reached out to individuals through door-to-door mobilization, to inform the population of the Atacora Department about the 2013 IRS campaign. All communication activities and key messaging were discussed and planned with the NMCP, and were reviewed and approved by the Departmental Service of Public Health.

In February 2013, the AIRS Benin team reviewed its IEC materials from the previous IRS campaign and adjusted its IRS training manuals. The IEC materials included leaflets distributed to persons living in the targeted structures, messages broadcast on the radio, and messages delivered by town criers that included information on IRS involving organophosphates. AIRS Benin particularly wanted to note that unlike carbamates, organophosphates sprayed on structures have an odor, and the walls sprayed by organophosphates tend to be white after initial application.

4.1 DESCRIPTION OF ADVOCACY/IEC ACTIVITIES

The Advocacy/IEC activities completed in 2013 included the following:

United States Ambassador Visit to Toucountouna: On March 12, 2013, His Excellency the US Ambassador to Benin, Mr. Michael Raynor, visited Toucountouna Commune to learn about IRS programming, as part of a tour of USAID-supported projects in northern Benin. Upon his arrival, Ambassador Raynor met with the Prefect of Atacora Department, the Mayor of Toucountouna Commune, the National Coordinator of the NMCP, the Director of Health Services for Atacora Department, and several traditional leaders and community members. The Ambassador asked community members whether they continued to experience malaria outbreaks in the area. They responded that the number of malaria cases had decreased, and that the disease was not as much of a concern. Other community members thanked the US Ambassador for the support the US Government has provided for ensuring the completion of IRS in their community. Ambassador Raynor addressed community members and administrative and traditional leaders at the Centre des Jeunes et Loisirs in Toucountouna, thanking everyone for their support of PMI's malaria activities. He noted the results of previous IRS campaigns to protect people in Toucountouna Commune and the Atacora Department from malaria, and urged everyone to accept future IRS campaigns, sleep under insecticide-treated nets, and follow other measures to prevent and successfully treat malaria.

FIGURE 10: US AMBASSADOR MICHAEL RAYNOR VISITING TOUCOUNTOUNA COMMUNE



Advocacy activities and Community mobilization

From the week before the IRS campaign started and through the end of the IRS campaign, the National Coordinator of the NMCP and staff from the DDS and AIRS Benin met with commune administrators to go over the IRS campaign schedule and reinforce the benefits of IRS. In turn, commune administrators and AIRS Benin staff spoke with community leaders to ensure beneficiaries were informed and ready for the IRS campaign. Additionally, several meetings were held with community leaders, particularly the village chiefs and public criers, to answer their questions about the IRS campaign and provide information to promote it. Information was also provided on the schedule of the IRS campaign, the activities the beneficiaries should complete to make structures ready for IRS, and the protocol to follow once their structures were sprayed. In total, 1,035 community leaders (from the Atacora Communes) participated in IRS advocacy activities, including 37 chiefs of sub-communes, 548 village chiefs, 104 religious leaders and 289 town criers

In May, AIRS Benin staff also met with 200 primary school teachers, and provided them with information on IRS and malaria prevention. AIRS Benin asked teachers to relay this information to their students, and where possible develop school lessons on malaria prevention and treatment.

Door-to-Door Mobilization

Four hundred seventy-six IEC agents were hired for the 2013 IRS campaign. All received a two-day training in late April, to go over: messaging and effective communication techniques, the identification of structures, and how to complete the mobilization data collection cards. The IEC agents then went to all of the communities within the nine spray communes on May 6-17, and traveled household-to-household to notify IRS campaign beneficiaries about the upcoming IRS campaign. IEC agents explained the benefits of IRS for malaria prevention, answered questions about the IRS campaign, informed beneficiaries about how to prepare their structures for spraying and what to do after the spray operation, and provided leaflets related to the IRS campaign.

In Kérou, Péhunco, Natitingou, and Boukoumbé Communes, the IEC agents explained that a new insecticide type, organophosphates, would be used in their communities during the 2013 IRS campaign.

FIGURE 11: IEC AGENT COMPLETING DOOR-TO-DOOR MOBILIZATION



IRS Card Distribution

Concurrent with the door-to-door mobilization, IEC agents identified eligible structures for the IRS campaign, provided IRS cards for every household, and noted the number of people who lived in/used each eligible structure. This was recorded on IEC mobilization forms, and the data was entered into the AIRS Benin database. This data was important for:

- Noting the location of each eligible structure, and key information on the number of individuals that sleep in the structure, to provide a more accurate target for the IRS campaign planning
- Applying a code to each structure identified in order for AIRS Benin to follow up on whether the structure was sprayed during the IRS campaign, and/or identify the location of the structure in case of an emergency

Town Criers

AIRS Benin worked with 449 town criers, who walked through a community the day before the houses would be sprayed, and announced when the IRS campaign would begin the next day. They urged community members to accept IRS in their eligible structures, reminded everyone how to prepare their structures for the IRS campaign, and what to do after their structures are sprayed.

Radio Broadcasts

Six radio stations in Atacora were used for broadcasting IEC messages. All radio messages were broadcast in French and in local languages. Additionally, AIRS Benin staff and commune and department officials participated in call-in shows and on-air presentations on IRS. In urban areas radio stations broadcast the IRS schedule for the different parts of the city that would be covered by the IRS campaign the next day. Various broadcasts also stressed the benefits of IRS in helping to control malaria. Additionally, local radio stations covered the IRS campaign launch and closing ceremonies.

4.2 RESULTS OF IEC ACTIVITIES

Residents living in nearly all structures (99.5%) visited by the IEC agents agreed to have their structures sprayed during the IRS campaign. The 99.5% varied from the 95.74 reported to have been sprayed, because during the campaign some beneficiaries were absent from their structures and the spray operators were not able to spray the structure.

The most common reasons why residents were not mobilized was:

- Beneficiaries were not at home during the mobilizer's visit; in these instances the beneficiaries were usually working in their fields.
- In some areas, potential beneficiaries would not allow the IEC agents to enter their household because the agents were unknown to the family. There are sensitive issues about men or woman entering into a home where woman are present. This is a cultural issue.

Table II provides details on the results of the door-to-door mobilization completed by the IEC agents.

TABLE II: OVERVIEW OF DOOR-TO-DOOR MOBILIZATION RESULTS²

Communes	Structures found	Number of structures where potential beneficiaries were not sensitized	Men sensitized	Women sensitized	Total population sensitized	Main reason for not sensitizing
Boukoubé	29,997	164	25,040	27,960	53,000	Beneficiaries not at home.
Cobly	25,527	1	20,664	23,755	44,419	Beneficiaries believed IRS was too much effort, and did not want to take part in IRS or IEC mobilization.
Kérou	29,114	897	36,729	40,508	77,237	Structures' residents not at home.
Kouandé	37,738	95	44,703	48,865	93,568	Structures' residents not at home.
Matéri	40,825	128	32,415	35,127	67,542	Structures' residents not at home.
Natitingou	34,971	139	35,298	40,727	76,025	Structures' residents not at home.
Péhunco	32,334	5	45,412	47,571	92,983	Structures' residents not at home.
Tanguiéta	20,399	2	20,553	23,194	43,747	Cultural issues: potential beneficiaries not allowed to let IEC agents into their household.
Toucountouna	13,674	9	7,745	9,960	17,705	Cultural issues: potential beneficiaries not allowed to let IEC agents into their household.
Atacora	264,579	1,440	268,559	297,667	566,226	

²AIRS Benin entered door-to-door mobilization data only by total line per mobilization form; mobilization data was not double-entered.

During the IEC activities more people and households were found and sensitized than were found during the spray campaign because some residential buildings had been converted to granaries between the time of mobilization and the time of the spray.

For the 2013 IRS campaign, AIRS Benin decreased the number of paid radio programs in its community radio scope of work, to increase the budget for person-to-person IEC efforts. Despite the reduction

in the number of paid contracts, local radio stations voluntarily broadcast more programs than in 2012, indicating their commitment to support the IRS, and actually increasing the number of radio spots.

Table 12 notes the number of radio programs that were aired and the frequency of the radio programs.

TABLE 12: IEC ACTIVITIES CONDUCTED BY RADIO STATIONS

Activities	Number of Broadcasts
Short radio spots (French and national languages)	3,239
IRS schedule announcements/invitations for local leaders to attend IRS planning meetings (French and national languages)	2,485
Debates and discussion shows	82
IRS campaign information covered in local news stories	31
Interviews of IRS campaign staff	25
News magazine shows describing malaria and methods to treat and prevent malaria	14

Table 13 summarizes the numbers of IEC materials that were distributed.

TABLE 13: NUMBER OF IEC ACTIVITIES MATERIALS DISTRIBUTED IN 2013

Activities	Number of items
T-shirts distributed (*)	476
Caps distributed (*)	120
Leaflets distributed	109,990

(*) 2012 leftovers; new caps and T-shirts were not ordered in 2013.

4.2.1 RAPID ASSESSMENTS OF IEC ACTIVITIES

In June 2013 an IEC assistant conducted a rapid assessment of the IEC activities' role in informing community members about the IRS campaign and ensuring their readiness for the campaign. The IEC assistant randomly selected 167 households in Kérou, Kouandé, Tanguiéta Boukoubé, Natitingou, and Toucountouna, and interviewed the heads of the households, or other persons that were present during the IEC mobilization activities. The interview was completed via an evaluation form designed by the AIRS Technical Manager. (The IEC assistant was a temporary staff member that the DDS had selected to support the AIRS Technical Manager.) Results of the assessment included:

- 127 (76%) persons noted that they received IRS information through the town crier, 76 (45%) by radio, 8 (5%) from schoolchildren, 15 (9%) from the village chief, and 64 (38%) by spray operators.
- 165 (98.8%) persons were informed of IRS during IEC mobilization, and were aware of the IRS campaign before their structures were sprayed.
- 159 (95.2%) persons, due to the IEC mobilization, had completed the necessary precautions to make certain their structures were ready for spraying (moved furniture and belongings out of the structures, made sure animals were not allowed to access the structure, etc.) before the spray operators arrived.

The results of rapid assessment of the IEC activities showed that interpersonal communication and radio had increased beneficiaries' adherence to precautions to be taken before, during and after IRS operation as AIRS Benin found that communities were receptive to having their households sprayed. AIRS Benin will use these findings when designing the IEC activities for the 2014 campaign.

5. IMPLEMENTATION OF IRS CAMPAIGN ACTIVITIES

5.1 SPRAY CAMPAIGN LAUNCH CEREMONY

The official IRS campaign launch ceremony was held on May 21, 2013. The launch ceremony featured speeches by various dignitaries, including the USAID/Benin Mission Director, who spoke on the continued partnership between the United States government and the government of Benin to prevent and control malaria. The prefect for Atacora-Donga also gave a speech noting the efforts and importance of the Beninese government in confronting malaria, and then officially announcing the start of the 2013 IRS campaign.

Other attendees of the launch ceremony included staff from the national and regional NMCP, the PMI/Benin Centers for Disease Control and Prevention Resident Advisor, DDS staff members, mayors from various communes, staff from district health centers, and various community and religious leaders.

5.2 SPRAY OPERATIONS

The 2013 IRS campaign was implemented from May 20 through June 26, 2013. Spray teams were deployed Monday through Saturday of each week. Sunday was designated as a day off for rest, fixing spray equipment, and catching up on data entry. The 493 spray operators were divided into 94 spray teams, each composed of five to six spray operators. Each team was supervised by a team leader, responsible for his/her team's performance and organization. The number of spray teams per district was determined by the estimated number of targeted eligible structures found in each district (based on the number of structures found by spray operators during the 2012 IRS campaign). A breakdown of the distribution of spray teams is found below in Table 14.

TABLE 14: DISTRIBUTION OF SPRAY TEAMS BY COMMUNE

Communes	No. of spray teams	No. of eligible structures found by spray operators in 2012
Matéri	14	30,987
Natitingou	14	31,263
Kouandé	12	31,997
Boukoubé	12	25,211
Péhunco	12	26,985
Kérou	11	28,465
Tanguiéta	9	15,948
Cobly	5	19,439
Toucountouna	5	11,642
Total	94	221,937

5.3 IRS SPRAY CAMPAIGN SUPERVISION

5.3.1 IRS CAMPAIGN SUPERVISION BY AIRS BENIN STAFF

The AIRS Benin staff, notably the Chief of Party, Operations Manager, Technical Manager, ECO, Logistics Manager, Monitoring and Evaluation (M&E) Manager, and Database Manager, based themselves in Natitingou during the IRS campaign. The entire AIRS Benin staff traveled to the field each day of the IRS campaign to provide direct IRS campaign supervision, and monitor and observe the work of the spray teams, washers, service technicians, data clerks, and all other seasonal staff, to ensure that the IRS campaign was completed correctly and efficiently. Some of the specific technical and operations supervision activities completed by the AIRS Benin staff included:

- Observing the spray operators to make sure they informed beneficiaries about the IRS campaign, sprayed a structure correctly, and filled in their spray cards
- Ensuring that appropriate quantities of PPE and insecticide were available at the operation sites for the use of spray teams
- Making sure that stock cards and inventory forms were completed correctly and matched inventory in stock at each operation site's store room
- Reinforcing the importance of environmental compliance best practices for the storage, use, and disposal of PPE and insecticide
- Making certain that seasonal staff were paid on time
- Resolving the concerns of beneficiaries, the community, seasonal staff, and DDS
- Checking that IRS campaign data was of high quality and entered daily and efficiently

AIRS Benin staff collected information in each district about when rains occurred during the 2013 IRS campaign, how long the rains lasted, and whether the rains affected the IRS campaign (find more information on this issue in the annex).

The AIRS Benin team had closely followed the field activities and the daily progress of the spray teams, using daily updates that the commune coordinators sent via short message services (SMS) to the AIRS Benin Operations Manager. These messages noted the estimated number of structures sprayed each day (based on the coordinator's review of the spray cards turned in daily), and any issues that arose in the field. This reporting allowed the AIRS Benin team to track its progress as compared to the IRS program's schedule, and to identify any IRS campaign issues that needed a quick resolution from the AIRS Benin team.

A nightly debriefing and coordination meeting was organized by the AIRS Benin team and IRS campaign supervisors from the departmental NMCP and DDS staff. The meetings provided a forum for AIRS Benin and their government counterparts to update each other on IRS campaign progress, and discuss various issues/adjustments that needed to be addressed or resolved for the following day.

FIGURE 12: NMCP AND DDS STAFF MEMBERS PARTICIPATING IN DAILY COORDINATION MEETINGS



5.3.2 IRS CAMPAIGN SUPERVISION BY BENINESE GOVERNMENT STAFF

Approximately 50 Beninese government staff from national, departmental, and district health and environment offices provided daily supervision of spray operations in the field during the IRS campaign.

Table 15 provides a breakdown of the supervision activities performed by the Beninese government staff during the IRS campaign.

TABLE 15: BREAKDOWN OF SUPERVISION BY BENINESE GOVERNMENT AGENCIES

Government Level	Office	Number of People	Supervised Activities
National	NMCP	6	IEC and enumeration activities, environmental compliance (pre-spray, mid-spray and post-spray inspection), spray operations, Monitoring & Evaluation and data collection, IRS trainings
	DHAB	1	Environmental compliance (pre-spray, mid-spray, and post-spray inspection), spray operation, IRS trainings
	DAGRI	1	Environmental compliance (pre-spray, mid-spray and post-spray inspection)
Departmental	NMCP-Atacora	1	IEC and enumeration, environmental compliance (pre-spray, mid-spray, and post-spray inspection), spray operations, Monitoring & Evaluation trainings
	DDEHU	2	Environmental compliance (pre-spray, mid-spray, and post-spray inspection), spray operations, IRS training
	DDS	1	Spray operations, IEC and enumeration, IRS training

Government Level	Office	Number of People	Supervised Activities
	The Monitoring, Evaluation and Planning Service	1	IEC and enumeration, spray operations, Monitoring & Evaluation, IRS trainings
	Health Promotion and Protection Service	1	IEC and enumeration, spray operation, Monitoring & Evaluation, IRS trainings
	The Community Hygiene and Sanitation Service (SHAB)	2	IEC and enumeration, environmental compliance (pre-spray, mid-spray, and post-spray inspection), spray operation, IRS trainings
District	Health Zone Coordinator	3	IRS training, spray operations
	District Chief Doctors	9	IRS training, spray operations
	Hygiene Agents from District Health Centers	22	Spray operations, quality of the spraying, environmental compliance by spray operators and washers, IEC during campaign

5.4 USE OF GOIZPER SPRAY PUMPS

As previously noted, AIRS piloted the use of Goizper spray pumps in the IRS campaign in the Toucountouna Commune. This decision was made both because of the experienced and strong spray operator teams in the commune and because Toucountouna was designated to be sprayed with organophosphates, which work better with the Goizper spray pump. Organophosphates come in a liquid form that works well with the smaller opening at the top of the Goizper spray pump, whereas fitting a carbamate sachet into the Goizper spray pump is difficult.

Overall, the AIRS Benin staff and the spray operators that used the Goizper spray pump were very satisfied, and noted that the ability of the Goizper spray pumps to carry out IRS was equal to that of the other spray pumps that AIRS Benin used during the 2013 IRS campaign and during previous IRS campaigns. As noted in Table 20, the spray operators in Toucountouna sprayed 5.62 structures per bottle of insecticide, which was the best usage rate of insecticide in any of the communes in Atacora Department.

AIRS staff and the Goizper Regional Manager distributed a survey to spray operators asking them to compare the performance of the Goizper spray pumps with that of pumps used in the past. The spray operators noted:

- The Goizper spray pump was easier to use since it had fewer parts to keep track of, and the pressure regulator meant the spray pump had to be pumped and pressurized only once until the spray tank was empty. The spray operators saw this as an advantage over other spray pumps used for IRS, which need to be continuously pumped in order to maintain the spray tank's pressure.
- The opening located on top of the spray tank made it easier to pour the organophosphate liquid insecticide into the spray pump.
- The solid plastic spray tank is in one piece, unlike other spray pumps that have several joint pieces and often leak. Additionally, the spray operators noted that because it has only a few parts, the Goizper spray pump rarely breaks down, and is easy to fix.
- The Goizper spray pump was lighter than other spray pumps used during the 2013 IRS campaign, and the two shoulder straps made it much easier to carry.

- As was evident from the consistent and even spray coming from the pump at all times, the calibration of the spray pump and its nozzle were precise.

5.5 MID-SPRAY ENVIRONMENTAL INSPECTION

During the spray campaign, the AIRS Benin ECO worked with the NMCP, DDS, Community Hygiene and Sanitation Service (SHAB), DDEHU, and the AIRS Benin Logistics Manager to set up an inspection team to complete a mid-spray environmental inspection of all operation sites and spraying activities. The inspection team used a checklist form that was based on PMI's BMP manual (with the ECO using the mid-spray inspection form on one of the project's smartphones).

The inspection team reported the following findings during their mid-spray inspection:

- The majority of storekeepers were found to be wearing PPE properly within the store rooms.
- All storekeepers conducted accurate and up-to-date inventory control, had completed their stock cards, and had safely stored and organized records for pregnancy tests. None of the storekeepers were found eating, drinking, or smoking in the store rooms.
- Eleven out of the 16 store rooms were found to be in good condition, with double-locked doors, and insecticide stored correctly on pallets. However, a few minor issues were noted during the mid-spray inspection at the following store rooms:
 - The temperature record was not updated at the Materi store room. The inspection team retrained this storekeeper to record the store room's temperature in the morning and afternoon.
 - At the Manta store room, insecticide boxes were stacked more than two meters high. The inspection team worked with the storekeeper to reorganize the insecticide boxes on more pallets, and reduce the height of all stacks of insecticide boxes to less than two meters.
 - At the Firou store room, boxes of empty insecticide sachets were stored directly on the ground instead of on pallets. The inspection team worked with the storekeeper to put the boxes of empty insecticide sachets onto other pallets.
 - Barrels for storing solid wastes were not correctly labeled at the Natitingou and Dassari store rooms. The inspection team directed the storekeepers to immediately take out a marker and label the barrels.
- The inspection team found that nearly all of the households that were visited during the mid-spray environmental inspection were well informed about the IRS campaign, and knew the correct procedures to remove items from structures that would be sprayed, and the amount of time to wait before entering a sprayed structure. The households were also aware that all dead mosquitoes and insects found in the houses needed to be swept out and buried in holes at least 50cm deep. The inspection team did find two households in Kaobagou (Kérou Commune) that had not been informed about the correct procedures to follow before and after the IRS campaign. Consequently, the inspection team worked with spray operators to provide this information to these households.
- Spray operators wore their PPE correctly while completing their work. The inspection team found that the spray operators in the carbamate communes mixed insecticide in the spray pumps correctly. The spray operators in the organophosphate districts were noted as completing their insecticide mixing correctly, including the triple rinsing of organophosphate bottles. However, it was noted that there was greater risk of spilling the insecticide coming from the organophosphate bottle, since it is in liquid form and must be poured into the spray tank (in the course of which it could splash off the spray tank and onto the ground). The inspection team recommended purchasing more plastic sheets for future IRS campaigns, and to have the spray operators mix organophosphate into

their spray pumps on top of the plastic sheet. The inspection team did not observe any spray operators eating, drinking, or smoking.

- At all operation sites the inspection team checked the end-of-day IRS campaign clean-up activities and noted that the progressive rinse to clean the spray tanks was done correctly. The inspection team also noted that rinsing areas at all operation sites were built solidly and the shape of the rinsing areas was ideal for catching any effluent and letting it drain into the soak pit. However, the inspection team did note a puddle of effluent in the rinse area at the Gnémasson operation sites. It was determined that the tube connecting the rinse area to the soak pit was not built at a steep enough angle. Thereafter, AIRS Benin hired builders to refurbish the soak pit tube at a steeper angle. The refurbishment took one day to complete. Upon further inspection trips, AIRS Benin staff noted that the rinse area at Gnémasson now drained well.
- The inspection team found that all drivers were compliant with AIRS project requirements, and wore PPE while driving any vehicle that contained insecticides. Additionally, all vehicles were provided with first aid kits and instructions for cleaning up an insecticide spill.
- The inspection team did find small quantities of insecticide on the floor of 8 out of the 60 IRS campaign buses inspected. The leaks were due to spray operators' not depressurizing their spray pumps after completing spraying before boarding the IRS campaign bus to return to the operation sites. The inspection team provided this information to the AIRS Benin team commune coordinators, who, in turn, notified all spray operators to make sure to depressurize their spray tanks after completing spraying. Additionally, the inspection teams observed the drivers of the 8 buses correctly cleaning the leaked insecticide on the buses' floors.

For further information, see the annex's summary of the findings of the mid-spray environmental inspection.

5.6 STOCK MANAGEMENT DURING THE IRS CAMPAIGN

AIRS Benin used inventory control cards (ICC) to keep track of each item in the Central Warehouse and operation sites. Storekeepers updated the ICC daily regarding the movement of stock from each store room. Storekeepers were also required to conduct daily routine physical stock counts to ensure that the actual stock in store rooms matched the ICC record.

At the beginning of each IRS campaign day, insecticide sachets/bottles were issued to team leaders only, who documented the number of sachets/bottles that they received. Thereafter the storekeeper immediately entered the amount provided to the team leaders on the ICC to ensure accurate stock balances.

At the end of each IRS campaign day, spray operators turned in their stock of sachets/bottles (used and unused) to the team leader, who collated these and submitted them to a storekeeper. The storekeeper recorded the full sachets/bottles on the ICC as a positive adjustment, and updated the stock balance; and registered the used sachets/bottles on a daily utilization record form. The data on this form helped AIRS Benin calculate trends in use of insecticide. To validate the insecticide inventory, storekeepers worked with AIRS Benin logistics staff to compare the ICC for the unused insecticide sachets/bottles with the daily utilization records. This comparison also allowed the AIRS Benin team to note if spray operators were using too little or too much insecticide during their spraying, and if various operation sites needed more insecticide.

FIGURE 13: INSECTICIDE STOCK COUNT IN PEHUNCO



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

Additionally, the storekeepers prepared a comprehensive weekly stock report and submitted it to the AIRS Benin Logistics Manager, who then generated aggregated total stock balances for the IRS campaign and noted where PPE and insecticide needed to be sent from the Central Warehouse, to prevent stock-outs.

5.7 ISSUES ENCOUNTERED AND ADDRESSED DURING THE 2013 IRS CAMPAIGN

AIRS Benin and its stakeholders did not have any insecticide poisonings or spills, nor were any injuries reported. AIRS Benin found that communities were very receptive to having their households sprayed. The AIRS Benin team even noted that beneficiaries in the districts sprayed with organophosphate liked the smell of the recently sprayed rooms, as the odor proved to them that the insecticide was working.

Listed below are some of the issues encountered over the 2013 IRS campaign:

- During the pregnancy test screenings one week before the IRS campaign (required by the BMP), AIRS Benin noted that seven women tested positive. Furthermore, during pregnancy tests completed during the first week of June, two women tested positive, and one woman refused to take the pregnancy test. These women were re-assigned to seasonal staff positions where they would not be in the vicinity of the insecticides used during the IRS campaign, namely as IEC mobilizers. (The policy was that women would receive medical check-ups and pregnancy tests before being hired by AIRS Benin, as well as follow-up pregnancy tests three weeks after being hired. Those found to be pregnant were not assigned to work as spray operators, maintenance agents or washers, but rather were kept away from handling insecticides, and assigned to mobilize communities during the campaign.)
- During a PMI trip for the 2013 IRS campaign, it was noted that spray operators using the 125g sachet of carbamates were filling their spray tanks to only the 8-liter mark of their 10-liter spray tanks. This led to spraying a higher concentration of insecticide on a structure's walls. AIRS

Benin noted that since the first IRS campaign in Benin in 2008, before AIRS Benin worked in the region, the spray operators had been directed to fill their tanks with 8 liters only, and spray a higher concentration of insecticide. This was due to early evaluations of IRS programming in Benin that had noted that many targeted structures were built out of mud,¹ which is particularly porous. The theory was that a higher concentration of insecticide sprayed on the walls would compensate for the high absorption of the mud/banco walls. However, this is against the manufacturer's instructions. Both PMI and AIRS agreed that spraying a higher concentration of insecticide during the 2013 IRS campaign was unnecessary, as there is no new information indicating that the walls of structures in the Atacora Department affected the strength of the insecticide sprayed. After further discussion, the AIRS Benin team agreed to make sure all 125g sachets of carbamate are mixed with 10 liters of water during future IRS campaigns, which will lead to more-efficient use of carbamate.

- The spray operators noted that 3,479 eligible structures originally found during the mobilization phase were transformed into rooms to store grains before the spray operators arrived to complete IRS. These structures were not sprayed, and were removed from the total number of eligible targeted structures for the IRS campaign.
- Spray teams based out of the Kaobagou operation site began their work one week late due to needed refurbishments of the soak pit at the operation site. Fortunately, because only one spray team was based out of the Kaobagou operation site, the Kaobagou operation site was completed in a timely fashion, and ended by the beginning of June.
- On May 24 and 25 the IRS operations were halted due to instructions from the DDS-Atacora. The Ministry of Health had instructed all regional health directorates to ensure the implementation of the WHO-led expanded program of immunization against polio throughout Benin on May 24 and 25. Due to the importance of the polio immunization campaign, the DDS and Ministry of Health decided that they did not want to create any confusion with spray operators visiting the same households as the polio immunization campaign. After further discussions between AIRS Benin, the DDS, and the NMCP it was determined that the IRS campaign would be scheduled for an additional day, to allow the spray operator teams to catch up with the work that they were unable to complete during the polio immunization campaign.

¹ Mud wall or banco is a wall built using a traditional technique, mixing sand and water without cement. This kind of wall is very porous.

6. MONITORING AND EVALUATION OF 2013 IRS CAMPAIGN

M&E for the 2013 IRS campaign closely followed the processes outlined in the 2013 AIRS Benin Work Plan, the M&E Plan and the M&E Concept Paper developed by the AIRS core team. M&E activities were led by the AIRS Benin M&E and Database Managers.

The AIRS Benin project continues to use the Microsoft Access database designed by the AIRS Benin M&E Manager in 2012. The AIRS Benin database uses several logic checks and controls to validate data entries and minimize data entry error.

6.1 DATA MANAGEMENT

IRS campaign data was entered each time a spray operator visited a structure. This includes noting on the spray operator card if a structure was not sprayed, as well as the reason why that was the case.

Data quality assurance protocols were followed to check the accuracy of all spray operator data collected. After the end of each IRS campaign day, the spray operators provided their completed spray operator cards to the team leaders. The team leaders then checked the accuracy of the spray operator's cards, and assured that all totals on the spray operator cards added up correctly. Thereafter, the team leaders sent the spray operator cards to the commune coordinators to complete a final check and validation of all spray operator cards. The commune coordinators sent the spray operator cards to the data entry center in Natitingou, where data clerks processed the cards and entered the data on them into the AIRS Benin database.

Additionally, the M&E Manager and Database Manager checked the accuracy of data entered by data clerks daily, by randomly selecting 10% of the spray operator cards collected during a week and checking the information on the spray operator cards as compared to the data entered into the AIRS Benin database. Then, three times per week, beneficiaries were randomly selected out of the database, and thereafter AIRS Benin staff traveled to the field and interviewed beneficiaries, to compare data entered into the database and the actual sprayed structures located within a beneficiary's household.

6.2 DATA QUALITY ASSURANCE

Data quality assurance activities were instituted for both data collection and data entry verification through newly developed AIRS project supervisory tools and the standard database audit check. AIRS found that these forms helped formalize self-audits of the IRS campaign's data to ensure better data quality and reduce the number of errors found on Daily Spray Operator Forms and in the M&E database. Although AIRS Benin has only anecdotal evidence, data entry clerks mentioned that the Spray Forms came from the field with less data missing and fewer errors in logic.

Table 16 indicates the number of forms used for each data quality assurance tool and the percentage of forms checked.

TABLE 16: NUMBER OF SUPERVISORY TOOLS USED

M&E supervisory tools	Number of forms used	Percent verified
Error Eliminators	1,672	3.5% of spray forms
Data Collection Verification	574 (8,610 structures)	3.6% of structures found
Data Entry Verification	116 (14,692 lines of data)	6.1% of structures found

Error Eliminator

AIRS technical staff, supervisors, team leaders, and government staff used the Error Eliminator Form on a daily basis to detect and correct common errors on mobilizer and spray operator forms before they were transported to the data center. Common errors included arithmetic mistakes and failure to complete all data points on the data collection forms: 1,672 forms were used, and 3.5% of structures were checked.

Data Collection Verification Form

AIRS technical staff, supervisors, and government staff (national, regional, and local) used the Data Collection Verification (DCV) tool to interview households to verify spray coverage data. Staff visited and interviewed residents from 8,610 structures (3.6%) during the campaign. Common data collection inconsistencies were primarily due to a variance in the population-protected count. Staff performed these verification visits within approximately two days of spray and identified errors in enough time to correct mistakes and notify spray operators and team leaders via SMS to prevent repeated errors.

Data Entry Verification Form

The M&E and Database Managers used the Data Entry Verification tool to verify that the data entered into the database matched the data on the Daily Spray Operator Forms. Significantly fewer errors were found this year compared to last year, as a result of the in-field supervisory verification tools (i.e., Error Eliminator and DCV tools) and the new database data cleaner that was programmed and installed before the campaign began. A total of 14,692 lines/structures (6.1%) were checked in the “details” section and also the corresponding “totals” sections. Out of these, errors were detected in only 1,589 lines/structures (10.8%). These errors were corrected and the data entry clerk was re-trained if required.

In addition to the Data Entry Verification Form, the database enforces several validation rules (e.g., the number of pregnant women in the structure cannot exceed the number of women in the structure). Furthermore, AIRS Benin also provided each data clerk with their own data cleaner tool. This tool allowed the data entry clerks to run error reports and correct data entry mistakes each day before leaving the office. Due to the sufficiency of staff and time, data was entered and cleaned in “real-time” (within 24 hours of spray) daily.

At the end of every week, the AIRS Benin M&E Manager and Technical Manager provided feedback regarding errors found on spray operator cards, and gave recommendations to the AIRS Benin Operations Manager, commune coordinators, and spray team leaders, in order to minimize future data errors on the spray operator cards.

6.3 NUMBER OF STRUCTURES COVERED BY THE 2013 IRS CAMPAIGN

The 2013 IRS campaign sprayed 228,951 structures of the 239,112 structures found. Spray coverage was well over the 85% minimum threshold, as coverage was 95.75% for the total number of eligible structures found by spray operators. Table 17 describes the overall spray coverage rate.

TABLE 17: SUMMARY OF IRS COVERAGE

Total number of eligible structures found by spray operators	239,112
Total number of eligible structures sprayed by spray operators	228,951
Spray coverage	95.75%

6.4 POPULATION PROTECTED

A total of 694,729 people, including 349,856 men and 344,873 women, were protected by the IRS campaign. Those protected included vulnerable populations: 134,045 children under five years old, including 66,258 males and 67,787 females; and 19,818 pregnant women. Table 18 provides a breakdown of the total number of people protected by IRS per commune.

TABLE 18: PEOPLE PROTECTED BY THE IRS CAMPAIGN PER COMMUNE

Communes	Total population protected			Children <5 years protected			Pregnant women protected
	Men	Women	Total	Male	Female	Total	
Boukoubé	35,433	35,649	71,082	6,436	6,424	12,860	1,414
Cobly	31,129	31,217	62,346	5,247	5,461	10,708	1,311
Kérou	51,181	47,609	98,790	10,069	10,223	20,292	3,963
Kouandé	49,646	48,613	98,259	9,797	10,388	20,185	2,758
Matéri	43,893	45,350	89,243	7,982	8,018	16,000	1,820
Natitingou	51,124	51,353	102,477	8,389	8,135	16,524	2,391
Péhunco	48,205	44,658	92,863	10,456	11,055	21,511	4,727
Tanguiéta	22,498	22,673	45,171	3,899	4,082	7,981	797
Toucountouna	16,747	17,751	34,498	3,983	4,001	7,984	637
Totals	349,856	344,873	694,729	66,258	67,787	134,045	19,818

Overall, 10,161 eligible structures found by spray operators during the IRS campaign were not sprayed, leading to an estimated 15,465 people who were unprotected by the IRS campaign. The leading reason for not spraying a structure during the IRS campaign was beneficiaries' not being at home.

6.5 USE OF LONG-LASTING INSECTICIDE-TREATED NETS (LLINs)

As required by the NMCP, spray operators collected data on the number of people in Atacora (particularly children under five years old and pregnant women) sleeping under LLINs. Spray operators asked for this information at each structure that was sprayed, recorded it on the spray operator card, and entered it into the AIRS Benin database.

Among the 694,729 people protected by IRS, it was noted that 613,099 (or 88.3% of the people protected) slept under LLINs. Table 19 provides a breakdown of the LLIN data collected by the spray operators (per the direction of the NMCP):

TABLE 19: LLIN USE IN STRUCTURES COVERED BY THE IRS CAMPAIGN, PER COMMUNE

Communes	Total number of people sleeping under LLINs	Total number of children under 5 years old sleeping under LLINs	Total number of pregnant women sleeping under LLINs
Boukoubé	64,381	11,750	1,249
Cobly	61,999	10,585	1,275
Kérou	92,311	19,269	3,740
Kouandé	71,133	15,591	2,169
Matéri	84,406	15,272	1,684
Natitingou	85,096	14,090	1,946
Péhunco	84,874	20,068	4,512
Tanguiéta	37,542	6,908	657
Toucountouna	31,357	7,425	591
Total	613,099	120,958	17,823

6.6 INSECTICIDE USE AND SPRAY OPERATOR PERFORMANCE

A total of 29,062 sachets of carbamate were used to spray the 116,272 eligible structures in the four communes where the IRS campaign sprayed carbamate. In the five communes where organophosphates were sprayed, 21,178 bottles of organophosphates were used to spray the 112,679 eligible structures. Overall, the spray operators in all communes sprayed an average of 15 structures per day, and 4.56 structures were treated per insecticide sachet/bottle.²

Table 20 provides a breakdown of the average number of structures covered by one sachet/ one bottle, per district.

TABLE 20: INSECTICIDE USED PER COMMUNE

Communes	Number of carbamate sachets used	Number of organophosphate bottles used	Number of structures sprayed	Number of structures covered (sprayed) per sachet/bottle
Boukoubé	5,998		26,087	4.35
Cobly		4,148	22,734	5.48
Matéri		6,064	31,761	5.24
Toucountouna		1,915	10,759	5.62
Tanguiéta		3,121	15,502	4.97

² Please note that one sachet of carbamate and one bottle of organophosphate are both formulated to cover an average of 250m². Therefore it is reasonable to compare and report on the spray coverage of the carbamate and organophosphate used for the 2013 IRS campaign concurrently.

Communes	Number of carbamate sachets used	Number of organophosphate bottles used	Number of structures sprayed	Number of structures covered (sprayed) per sachet/bottle
Natitingou	10,991		31,201	2.84 ³
Kouandé		5,930	31,923	5.38
Péhunco	6,541		29,315	4.48
Kérou	5,532		29,669	5.36
Total	29,062	21,180	228,951	4.56

³ In Natitingou Commune there is a significant urban population, and on average most houses in Natitingou town (the largest city in the region) usually contained more rooms per structure, and larger rooms per structure. This led to spray operators' needing to spray more insecticide to fully cover an average structure in Natitingou.

7. ENTOMOLOGY

As described above, CREC was subcontracted directly by PMI Benin to complete entomological surveillance for the 2013 IRS campaign. Since most entomological surveillance results for the 2013 IRS campaign will be reported in the final entomological report written by CREC, this section provides a brief explanation of entomological surveillance that was completed before, during and after the IRS campaign.

CREC collected its data at four sentinel sites for IRS: two in Natitingou and Péhunco Communes, where carbamates were sprayed; and two in Tanguiéta and Kouandé Communes, where organophosphates were sprayed. A control site was set up in the Copargo Commune (a commune in Donga Department, which borders Atacora Department to the north, and has the same climate and topography).

7.1 ENTOMOLOGICAL SURVEILLANCE BASELINE

In February and April 2013, CREC collected baseline data for the IRS campaign. Baseline data noted that *Anopheles (An.) gambiae* was the most prevalent vector species (96.9%) in Atacora. *Aedes aegypti* and *Aedes vitatus* were also found, but accounted for a small percentage of the vector species found in Atacora.

Since the baseline was completed during the dry season, human biting rates for *An. gambiae* were low (34.8 bites per person per month). CREC noted a high endophagic behavior⁴ of *An. gambiae*, as the vector species was twice as likely to feed inside a structure as outside of a structure. This may also explain the high endophilic behavior⁵ (near 100%). The infectivity of *An. gambiae* was also noted as high (24.7% of *An. gambiae* captured and analyzed via ELISA were found to have the *P. falciparum* circum-sporozoitic antigen). The *An. gambiae* that were collected were found to have a high parous rate⁶ of 66.7%.

7.2 INITIAL BIOASSAY TESTING

At the beginning of the IRS campaign, a quality control study was carried out to check the efficacy and homogeneity of insecticide treatment. A susceptible colony of *An. gambiae* was used to assess the quality of spraying and insecticide persistence after spraying as per the WHO recommendation. Bioassays were performed 24 hours after IRS activities according to the WHO procedures, with a susceptible strain exposed to carbamate-sprayed walls (mud and cement walls, the predominant building materials in Atacora Department) at sentinel sites in two villages in Natitingou Commune. A susceptible strain was also exposed to organophosphate-sprayed walls (also on mud and cement) at sentinel sites in two other villages in Tanguiéta Commune. CREC noted that the bioassay data showed 100% mortality for all mosquitoes exposed to the sprayed walls at all sentinel sites, after 60 minutes. This showed that the initial spraying completed by the spray operators was of good quality, and the sprayed insecticide was effectively killing mosquitoes.

⁴ Endophagic refers to the preference of the mosquitoes to feed indoors.

⁵ Endophilic refers to the preference of mosquitoes to rest indoors.

⁶ Number of female mosquitoes ready to produce an egg raft.

One month after the initial spraying of the sentinel sites (T1; June, 2013), CREC noted from its bioassay tests that the carbamate and organophosphate continued to be effective on the sprayed walls. In Tanguiéta (organophosphate commune) CREC noted 100% mortality of exposed mosquitoes within 60 minutes on both mud and cement walls. In Natitingou (carbamates commune), CREC noted 100% mortality for exposed mosquitoes on cement walls, and 97% mortality for mosquitoes on mud walls.

Two months after spraying the initial sentinel sites (T2; July 2013), CREC noted from its bioassay tests that the carbamate and organophosphate continued to be effective on the sprayed cement walls, and met the minimum criteria for effectiveness (80% mortality of exposed mosquitoes). In Natitingou (carbamate commune) CREC found 76% mortality of mosquitoes exposed to mud walls, and 82% mortality of mosquitoes on cement walls. In Tanguiéta (organophosphate commune), CREC noted 76% mortality of mosquitoes exposed to mud walls, and 85% mortality for mosquitoes on cement walls.

However, the efficacy of both insecticides declined to less than 80% mortality for both cement and mud walls at the Natitingou and Tanguiéta sentinel sites, three months after spraying (T3; August 2013). In Natitingou (carbamate commune) CREC found 62% mortality of mosquitoes exposed to mud walls, and 77% mortality for mosquitoes on cement walls. In Tanguiéta (organophosphate commune) CREC noted 49% mortality of mosquitoes exposed to mud walls, and 56% mortality of mosquitoes on cement walls.

Figure 14 and 15 note the percent mortality of susceptible strains to carbamate and organophosphate at T0 through T3.

FIGURE 14: PERCENT MORTALITY OF SUSCEPTIBLE STRAIN AFTER 30-MINUTE EXPOSURE TO CARBAMATE VIA WHO BIOASSAY CONE TESTING, AT T0 (24 HOURS AFTER SPRAYING IN MAY), T1 (JUNE), T2 (JULY) AND T3 (AUGUST)

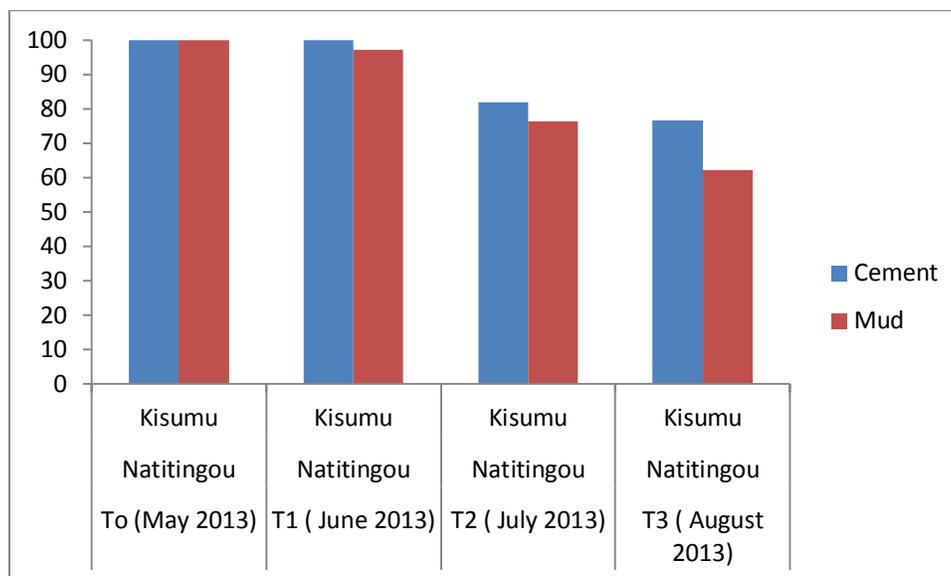
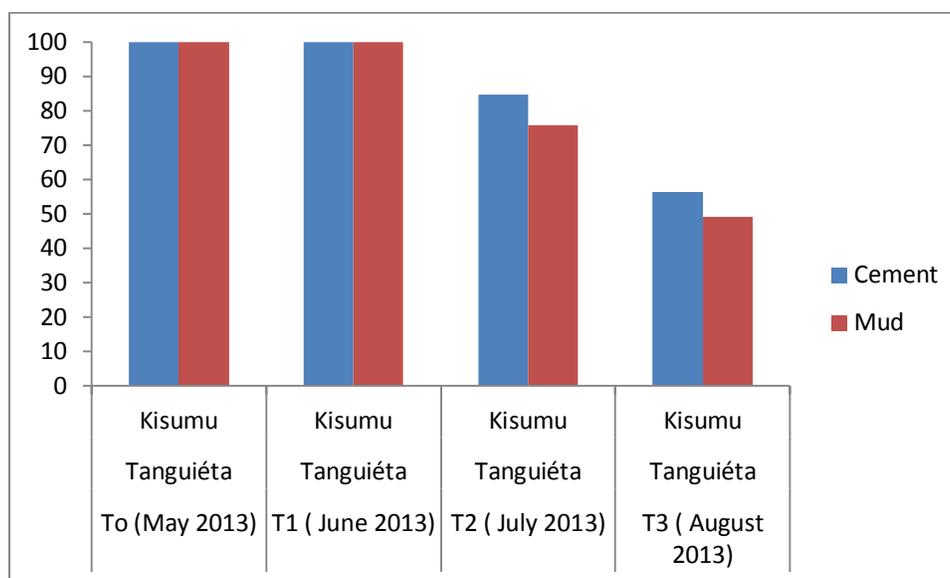


FIGURE 15: PERCENT MORTALITY OF SUSCEPTIBLE STRAIN AFTER 30-MINUTE EXPOSURE TO ORGANOPHOSPHATE VIA WHO BIOASSAY CONE TESTING, AT T0 (24 HOURS AFTER SPRAYING IN MAY), T1 (JUNE), T2 (JULY) AND T3 (AUGUST)



7.3 OTHER PRELIMINARY ENTOMOLOGICAL SURVEILLANCE FINDINGS

Other results of entomological surveillance include:

- Among the 384 *An. gambiae* captured in June and August, only 78 were caught at the Natitingou, Pehunco, Kouandé and Tanguiéta sentinel sites, as compared to the 306 *An. gambiae* collected at the control sentinel site in Copargo.
- *An. gambiae* were captured inside 76 percent of inside structures (236 mosquitoes in an area with a total of 306 structures) in Copargo Commune. In contrast, in the sentinel sites in Tanguiéta, Pehunco, Kouandé and Natitingou, these mosquitoes were captured inside only 17% of structures, 13 out of 78.
- The Human Biting Rate (HBR) trends were noted as the following in the carbamates sentinel site, the organophosphates sentinel site, and the control sentinel site:

TABLE 21: HUMAN BITING RATES

**The shift in vector man biting contact can be possibly explained by the repellent effect because of the insecticide or the killing effect of the insecticide.*

Communes		June	August	Total/Average	
Communes treated by bendiocarb (Natitingou + Pehunco)	Inside	Total mosquitoes caught	5	3	8
		Nb human catches	8	8	16

		Nb night catches	2	2	2
		HBR/night	0,31	0,19	0,25 (*) Average Rate
	Outside	Total mosquitoes	23	12	35
		Nb human catches	8	8	16
		Nb night catches	2	2	2
		HBR/night	1,44	0,75	1,0949(*)Average Rate
Communes treated by pirimiphos methyl (Tanguiéta + Kouandé)	Inside	Total mosquitoes	2	3	5
		Nb human catches	8	8	16
		Nb night catches	2	2	2
		HBR/night	0,13	0,19	0,156 (*)Average Rate
	Outside	Total mosquitoes	18	12	30
		Nb human catches	8	8	16
		Nb night catches	2	2	2
		HBR/night	1,13	0,75	0,938 (*)Average Rate
Control (Copargo)	Inside	Total mosquitoes	190	42	232
		Nb human catches	4	4	8
		Nb night catches	2	2	2
		HBR/night	23,8	5,25	14,5 (*)Average Rate
	Outside	Total mosquitoes	61	13	74
		Nb human catches	4	4	8
		Nb night catches	2	2	2
		HBR/night	7,63	1,63	4,625(*)Average Rate
() = Average					

CREC conducted further analysis via ELISA methods, looking for the circumsporozoite protein antigen for *P. falciparum* in the head and thoraxes of *An. gambiae*. It found the following entomological inoculation rate (EIR) trends:

- As indicated in the Table 22, in June, the EIR at the end of the IRS campaign was 50 times lower at surveillance sites treated with carbamates than in the control district. A circumsporozoite protein antigen for detecting *P. falciparum* infection was not found in the heads/thoraxes of *An. gambiae* from communes sprayed with organophosphates and analyzed by ELISA methods in June.

- In June, the results for the EIR in communes treated with carbamates were: 0.063 infective bites per man per night, or 1.89 infective bites per man per month, vs. 0 for districts treated with organophosphates.
- In June, the results for the EIR in control commune surveillance sites were: 3.14 infective bites per man per night, or 94.2 infective bites per man per month.

TABLE 22: INFECTION RATE FOR *P.FALCIPARUM* CALCULATED BY CIRCUMSPOROZOITE PROTEIN (CSP) ELISA FROM THE HEADS AND THORAXES OF *AN.GAMBLIAE* CAPTURED IN JUNE AND AUGUST 2013

Communes		June	August	Total/Average
Communes treated with bendiocarb (Natitingou + Péhunco)	Thorax	28	15	43
	Thorax +	2	2	4
	IS	0,07	0,13	0,09
	HBR/night	0,88	0,47	0,67
	EIR	0,063	0,063	.06
Communes treated with pirimiphos methyl (Tanguiéta + Kouandé)	Thorax	20	15	35
	Thorax +	0	1	1
	IS	0,00	0,07	0,03
	HBR/night	0,63	0,47	0,55
	EIR	0	0,031	0,02
Control (Copargo)	Thorax	30	47	77
	Thorax +	6	11	17
	IS	0,20	0,23	0,22
	HBR/night	15,69	3,44	9,56
	EIR	3,138	0,805	2,111

8. POST-SPRAY ACTIVITIES

8.1 CLOSING CEREMONY

On June 26, the final day of the 2013 IRS campaign, a closing ceremony was held in Natitingou. The ceremony was hosted by the DDS, with representatives from the MoH/NMCP, the nine spray communes and health staff from all spray areas. The ceremony provided an opportunity for AIRS Benin to thank all seasonal spray staff, PMI, and the national, departmental, and communal government staff involved in the planning, supervising, and implementation of all IRS campaign activities.

Journalists from Le Matinal newspaper attended the closing ceremony; the newspaper published an article about the ceremony and the IRS campaign in its July 3 national edition.

8.2 POST-SPRAY MEETING/REVIEW

Just after the IRS closing ceremony on June 26, AIRS Benin held a meeting with the nine commune coordinators to analyze the IRS operation, review the successes of the IRS campaign, and examine areas that may need improvement. The results of this meeting can be found in the lessons learned and recommendations section of this report.

8.3 POST-SPRAY ENVIRONMENTAL ASSESSMENT

The post-spray environmental inspection was performed from July 8 through July 11 by an inspection team led by the AIRS Benin ECO. Like the first inspections, this one is compliant with the USAID's 22 CFR 216 Code and based on PMI's best management practices. The inspection team included staff from the DDS Atacora, DDEHU, and MAEP. The main objective was to determine that operation sites were properly closed and to note any environmental issues that needed to be resolved before the 2014 IRS campaign. The findings of the post-spray environmental inspection included:

- All of the IRS campaign commodities (including PPE and insecticides) were transported back to the Central Warehouse in Natitingou for storage until the 2014 IRS campaign.
- All secondary store rooms were washed thoroughly with water and soap, except in Kerou, where the Ministry of Agriculture uses this facility to store pesticides.

Although the Ministry of Agriculture owns the Kerou store room, it is used by AIRS Benin during the IRS campaigns. After the campaign was over and the PPE and insecticide had been transferred to the Central Warehouse, the rural development manager locked the Kerou store room. However, AIRS Benin had not been aware that the manager had in fact placed herbicides—Cottonex (fluometuron and prometryn) and Glyphogan (glyphosate) for cotton cultivation—in the facility while spray operations were ongoing; AIRS Benin learned of this incident only later, when the post inspection was to take place. Fortunately, the whole building had many offices and different rooms used to keep agricultural equipment and pesticides, so the substances did not come into contact with each other when they were stored in the same facility.

- All rinsing/wash areas at operation sites remained in good condition. The soak pits also remained in good condition and all were covered and thoroughly secured via two locks. The new barbed wire enclosures around the rinse areas and soak pits were intact. However, AIRS Benin did note that

doors of most rinsing areas were removed and secured inside store rooms to prevent theft of the doors during the “off-season.”

- The relationship between AIRS Benin and the owners of the store rooms (municipal governments and the DDS) remains strong, with both parties displaying interest in allowing AIRS Benin to use the store rooms next year. However, further discussion will need to take place regarding the status of the operation site in Kérou.

For further information please reference the annex section for a summary of the findings of the post-spray environmental assessment.

8.4 SOLID WASTE DISPOSAL

During the 2013 IRS campaign, the project generated the following amounts of solid waste:

- 29,062 empty sachets of carbamate
- 22,594 used respiratory masks
- 1,052 used operator bags
- 21,180 empty bottles of organophosphates
- 3,544 used plastic gloves

8.4.1 DISPOSAL METHODS

In order to minimize environmental risks regarding the disposal of the solid wastes, three different disposal methods, based on PMI BMP from USAID 22 CFR 216 Code and the Environmental Mitigation and Monitoring Plan (EMMP), were used to dispose of solid wastes. These were incineration, recycling (for solid wastes with high-density polyethylene, mainly organophosphate bottles), and burying used gloves (since they are composed of low-density polyethylene) at the Client Technology Center landfill in Ouessè (Ouidah). AIRS Benin made sure the ECO was present at all disposal processes, and received confirmation letters noting when the disposals occurred.

8.4.2 INCINERATION OF SOLID WASTE

AIRS Benin completed the incineration of carbamate sachets and used respirator masks from the 2013 IRS campaign from July 9 to 11. For the third year, the IRS program in Atacora used the incinerator at St. Jean de Dieu Hospital in Tanguiéta. The incinerator had already been reviewed by the AIRS ECO for its capacity, its ability to reach high enough temperatures (900 -1,000 degrees Celsius) for incineration of IRS solid wastes, and its low level of smoke emissions. All loading of solid waste and the actual incineration were closely supervised by the AIRS Benin ECO, the field logistician, and staff from the DDS and DDEHU. Overall, the incineration took place without any issues.

8.4.3 RECYCLING OF EMPTY BOTTLES

AIRS Benin was able to develop an agreement with the environmental NGO Community Development and Environmental Sanitation (Développement Communautaire et Assainissement du Milieu (DCAM)) in Bethesda, a non-profit NGO located in Cotonou, to recycle the empty organophosphate bottles. DCAM Bethesda’s work focuses on improving environmental well-being, via promoting safe water and waste disposal and improved sanitation, and assuring safe disposal of agriculture wastes. DCAM Bethesda also has over 20 years’ experience organizing and promoting recycling in Benin. After triple-rinsing all of the empty organophosphate bottles at the AIRS Benin central warehouse in Natitingou, AIRS Benin transported the 21,180 empty organophosphate bottles to the DCAM Bethesda warehouse and recycling plant in Cotonou, on July 7, 2013. Thereafter, staff from DCAM Bethesda crushed the organophosphate bottles into fine particles, and collected the bottles into 40kg sacs from

July 12 to 25. The fine particles will be melted down at DCAM Bethesda's recycling plant and molded into electrical wiring covers in August-September.

FIGURE 16: BOTTLES OF ORGANOPHOSPHATE CRUSHED BEFORE BEING RECYCLED



FIGURE 17: BAGS OF RECYCLED ORGANOPHOSPHATE BOTTLES



8.4.4 BURYING WASTES AT A LANDFILL

The used rubber gloves from the 2013 IRS campaign contain low-density polyethylene that when incinerated releases gas by-products that are carcinogenic. Therefore the AIRS project's Environmental Compliance Manager has advised all project countries to thoroughly wash the gloves and contact local authorities to find out the safest place to dispose of them. AIRS Benin thoroughly washed the 3,544 used rubber gloves, which were then safely buried on September 18, 2013 at Ouessè Sanitary Landfill Site by the Technical Direction (DST) of Cotonou municipal government, under the supervision of the NMCP and AIRS Benin.

All environmental compliance activities are summarized in the EMMP table (see Table 31) and are in line with PMI-BMP and 22 CFR 216 Code.

8.5 POST-SPRAY INVENTORY

Starting mid-July, as PPE and insecticide were returned to the Central Warehouse in Natitingou, the AIRS Benin Logistics Manager and warehouse managers completed an inventory of all remaining commodities from the 2013 IRS campaign. The results of the inventory are found in the annex.

8.6 POST-SPRAY CAMPAIGN RADIO PROGRAMS

During the week after the IRS campaign was completed, radio stations throughout Atacora continued IRS messaging, chiefly broadcasting information on the benefits of using structures covered by the IRS campaign, and noting that beneficiaries should not apply paint, plaster, or other materials to walls within a structure that had gotten IRS.

8.7 POST-IRS CAMPAIGN STAKEHOLDER MEETING

On November 21, AIRS Benin held a working session with the NMCP to review the 2013 IRS campaign. The meeting provided an opportunity for AIRS and the NMCP to discuss the results of the IRS campaign, key areas to be improved, and most notably how to ensure that the NMCP and DDS become more involved in the daily management of the IRS campaign, with the possibility of having the NMCP and DDS manage IRS in one district during the 2014 IRS campaign.

9. LESSONS LEARNED AND RECOMMENDATIONS

9.1 CHALLENGES AND LESSONS LEARNED

Administration and Logistics

- The procurement of organophosphates for the 2013 IRS campaign proved to be more expensive than initially forecasted in the work plan. One bottle of the organophosphate EC (including shipping) ended up costing \$30, instead of what was forecasted in the work plan, \$20.60\$ (also included shipping). Included in this cost was the issue of filling complete pallets to be shipped. The manufactures charged for complete pallets instead of the exact bottle amount requested, therefore the cost increased. Initially, AIRS decided to ship the organophosphate EC to Benin via sea, since this was done for Ghana in 2012, and led to significant cost savings. Unfortunately, the organophosphate manufacturer experienced some difficulties with the production of the organophosphate EC order for Benin, and was unable to fulfill the order until the end of March. Knowing that sea shipments can take about a month at a minimum, and with the IRS campaign scheduled to start in less than six weeks, AIRS decided it was best to send the organophosphate EC to Benin via air, in order to assure the insecticide was in country to allow time for it to clear customs. Since air shipments are more expensive, this led to the increase in the cost of the procured organophosphate EC.
- To help save project costs, some AIRS Benin staff members traveled by bus between Cotonou and Natitingou. Since the bus tickets cost around \$16, this was a good savings, as the cost of filling up the project vehicle with enough fuel to travel between Cotonou and Natitingou is around \$160.

M&E

- AIRS Benin implemented the field M&E supervisory tools (Error Eliminator, Data Collection Verification, Data Entry Verification Forms) one week after the spray campaign started. For the next year, the training needs to include instruction on using these tools, which will be used by all teams of supervisors throughout the spray campaign.
- Tracking the number of structures sprayed in each village versus the number of targeted structures found in 2012 by communes allowed the M&E team to trace coverage rate by village. This made it easier to make rapid corrective actions to improve if needed.

IEC

- The involvement of various community actors (town criers, religious leaders, local administrative leaders, and teachers) helped to ensure interest in and understanding of the IRS campaign. Overall AIRS was able to spray over 18,000 more structures than in 2012, which was partly attributed to better acceptance except in Kérou of IRS in the Atacora Department. In urban areas, people are more reluctant to accept IRS, mainly because they do not want to move their possessions out of their houses into the open, where they can be viewed by their neighbors. AIRS will need to better sensitize the population and possibly hire more mobilizers in urban areas to help move furniture out of structures more quickly.

Logistics

- Due to the difficulty in getting fuel in Kérou, AIRS Benin will need to improve the planning of fuel procurements to ensure fuel can be procured from nearby areas. Alternatively, AIRS Benin may consider setting up or renting a tank with fuel in Kérou and assigning a financial assistant to manage the daily consumption.

Environmental Compliance

- In 2013, AIRS Benin continued performing inspection activities with a group of departmental and national environmental officials. This helped build their capacity and their understanding of the importance of environmental compliance as a part of IRS.
- Protocols should also be established and provided to health centers to ensure they inspect operation sites during the non-spray months and note their condition. This information will help note what type of refurbishments many need to take place before the next IRS campaign.

Operations/Trainings

- On May 24 and 25 the IRS operations were halted because of the national polio vaccination campaign. This led to the NMCP extending the IRS campaign by one day.
- AIRS Benin noted that the 2013 spray campaign coincided with the start of the rainy season in northern Benin (mid-May). Overall, the rains caused minor delays that did not impact the timeline of the IRS campaign. However, some beneficiaries were hesitant to remove their possessions from their structures while it rained. This often led to spray operators' waiting until it stopped raining, and then helping to remove possessions in eligible structures to start spraying the structure.
- Additionally, in some areas the rains caused some individuals to go to their fields to begin planting. These individuals frequently returned to their structures when they found out spray operators were in their community and were scheduled to spray their structures.
- Good collaboration between AIRS Benin and the DDS, DDEHU, and mayors of the spray communes led to government staff becoming more interested and involved in the planning of the IRS campaign, and participating in IRS campaign supervision. This was noted during the active participation of DDS and DDEHU staff during review meetings held by the AIRS Benin team, three times per week during the IRS campaign.
- Although most of the government staff that completed supervision activities did an adequate job, AIRS Benin did note that some of the hygiene agents (provided to AIRS Benin by DDS Atacora, and hired as sector coordinators) were not as committed as most of the other supervisors. A supervision monitoring system would be very useful for identifying inadequate supervisors and helping them improve their supervision and monitoring efforts.
- In some spray areas, spray operators did not mark if a structure had been sprayed. For all future IRS campaigns, AIRS Benin will require spray operators to mark each structure sprayed, and will require team leaders and other IRS campaign supervisors to ensure that marking is accurate, so that structures not sprayed can be identified (for possible spraying later in the day or during any mop-up activities in the spray area).
- AIRS Benin will assure when using 125g sachets of carbamates that they are mixed with 10 liters of water, as this concentration is sufficient for spraying eligible structures, and leads to more efficient use of the insecticide. Previous training before the AIRS contract suggested mixing 8 liters in 10 liter pumps due to more porous structures in the region, which led to higher concentration of insecticide but spraying less surface space.

Entomology

- CREC has continued to complete high-quality entomological surveillance for the IRS campaign, and was very active in the field in assessing and ensuring the quality of the IRS campaign. However, CREC did not produce an entomological report noting its findings until September (four months after the initial entomological work). For future IRS campaigns, the funding agent for CREC may need to better outline dates for the submission of entomological campaign data. This data is key for helping AIRS and PMI understand the effectiveness of the IRS campaign.

9.2 RECOMMENDATIONS

The recommendations listed below are suggestions to help the AIRS Benin team improve the efficiency and effectiveness of IRS programming for future IRS campaigns.

1. Immediately after the completion of the 2014 work plan in December, AIRS Benin should begin working on detailed “micro” plans for how all activities for the 2014 IRS campaign will be completed. This document should be revised as the team develops new ideas throughout the months leading up to the IRS campaign.
2. During mobilization, IEC agents should mark all eligible structures with an indelible marker. This will allow the spray operators to note eligible structures that need to be covered during the spray campaign. During the spray campaign, AIRS Benin should instruct spray operators to mark all structures that were sprayed, noting the date and providing the operator’s ID number.
3. Although the NMCP and DDS were involved in all steps of the IRS campaign from planning and training (especially the training of trainers) to supervision and coordinating IRS logistics, AIRS Benin would like to further involve the NMCP and DDS in the day-to-day management of IRS implementation. AIRS Benin would like to enhance NMCP and DDS staff’s IRS campaign management skills, and make sure the NMCP/DDS can manage the IRS campaign in at least one commune during the 2014 IRS campaign, and possibly more communes in future years.
4. AIRS Benin should further involve IEC agents during the IRS campaign for door-to-door mobilization in urban areas, to help move furniture out of houses quickly, and to provide more information on IRS.
5. The M&E team should work on integrating the M&E supervisory tools into the training of trainers to ensure they are used throughout the campaign, and effectively.
6. AIRS Benin should work closely with the MoH to plan ahead for any national health events that might delay the IRS campaign.
7. AIRS Benin should continue to recognize the value of women’s participation in all positions with the IRS campaign. AIRS Benin will develop a strategy that any woman who tests positive for pregnancy during the IRS campaign and whose job duties would put her in contact with insecticide (spray operator, storekeeper, team leader, district coordinator, etc.) will be re-assigned to a new position where she can continue to contribute to the IRS campaign, and not come into contact with insecticide. Reassigned positions may include IEC agents that can accompany spray teams and assure that structures are prepared before the spray operator arrives. This arrangement will be implemented after the first medical checkup for women who respond to recruitment criteria such as ability to read and having physical capacity.
8. As most of community members start their field work mid-May the IRS operation will begin the last week of April in 2014 to avoid rains and absence of residents due to field work.

9. In Kérou IEC activities will be reinforced by crisscrossing every quartier and putting a town crier or a team leader to sensitize the concerned communities. This close community mobilization will be supported by mass media messages through the local radio station. On the other hand the IRS operation will start earlier in the morning before people go to their field work.

10. ANNEX

10.1 ADDITIONAL FIGURES AND TABLES

TABLE 23: IRS COMMODITIES AND INVENTORY

Item	Initial stock before IRS campaign	Number of items procured	Stock before campaign	Used/ unusable stock after IRS campaign	Usable stock remaining for 2014	Notes
Insecticide (FICAM-Bendiocarb)	7,543	25,312	32,855	29,062	3,793	
Insecticide (Atelic-EC)	0	40,320	40,320	21,180	19,140	
Spray pumps X-PERT (Hudson)	707	0	707	63	644	63 pumps were determined to be damaged after the IRS campaign, and cannot be used in 2014.
Spray pumps IK12 VC (Goizper)	0	50	50	0	50	
Overalls	1,682	0	1,682	1	1,681	One overall was damaged and cannot be used for future IRS campaigns.
Vest	295	100	395	5	390	5 vests were damaged.
Helmet	700	800	1,500	204	1,296	204 helmets were found to be damaged after the IRS campaign and cannot be used in 2014.
Gumboots	829	100	929	02	927	One pair of gumboots was found to be damaged after the IRS campaign and cannot be used in 2014.

Item	Initial stock before IRS campaign	Number of items procured	Stock before campaign	Used/ unusable stock after IRS campaign	Usable stock remaining for 2014	Notes
Gloves for spray operator	1,220	1,000	2,220	1,918	302	
Gloves for washer	99	0	99	24	75	
Respirator mask	7,160	25,000	32,160	23,160	9,000	
Operator flashlight (head lamp)	45	800	845	845	0	
Stock-keeper flashlight	10	0	10	1	9	One was found to be damaged.
Tee-shirt (used for mobilization)	460	0	460	458	2	
Caps (used for mobilization)	417	0	417	180	237	
First aid kits	92	0	92	80	12	Most of the first aid kits were returned, but in most cases some of their contents had been used (such as bandages and eye drops). AIRS does not need to replace all first aid kits but it does need to restock the kits with these items, to make them complete.
Thermometers	19	18	37	0	37	
Fire extinguishers	22	0	22	1	21	One was damaged, and cannot be used in 2014.
O ring for spray tube	479	0	479	0	479	
Filters	485	0	485	411	74	
White washers (spare part for pumps)	226	0	226	121	105	
Nozzles 8002	299	0	299	99	200	

Item	Initial stock before IRS campaign	Number of items procured	Stock before campaign	Used/ unusable stock after IRS campaign	Usable stock remaining for 2014	Notes
Face shield for helmets	22,312	800	1,023	943	80	Due to wear and tear, will need to purchase more face shields for 2014.
Helmet cap	220	800	1,020	620	400	
Leaflets	107,990	45,000	152,990	109,990	43,000	
Spray regulator	150	0	150	0	150	
Pregnancy test kits	180	200	380	333	47	
Generators	1	0	1	0	1	
Buckets for spray operators	500	75	575	32	529	32 buckets were broken during the 2013 IRS campaign.
Plastic buckets for dustbin (100L)	141	10	151	2	149	2 were broken during the 2013 IRS campaign.
Two-component hose/Goizper	0	15	15	3	12	
Valve Goizper	0	10	10	0	10	
Collar seal/Goizper	0	20	20	0	20	
Lance filter/Goizper	0	20	20	0	20	
Lance tube/Goizper	0	10	10	2	08	
Pressure regulator/Goizper	0	25	25	10	15	
Pumps Goizper/ spare parts kit	0	10	10	0	10	
Handle/Goizper	0	7	7	0	7	
Filter Goizper pump	0	100	100	0	100	
Barrel (100l)	85	0	85	0	85	
Barrel (150L)	87	0	87	0	87	
Water tank (1200L)	11	0	11	0	11	
Water tank (3000L)	04	0	4	0	4	

TABLE 24: RAINY DAYS DURING THE 2013 IRS CAMPAIGN

		Boukoubé	Cobly	Kérou	Kouandé	Matéri	Natitingou	Péhunco	Tanguiéta	Toucountouna
5/23/2013	Day					1h30		2h		
	Night			1h						
5/27/2013	Day								3h12	04h30
	Night									
6/1/2013	Day									
	Night	3h		2h20						
6/5/2013	Day		3h			2h20	03h50			
	Night			3h	2h30					
6/10/2013	Day		2h				2h30			
	Night									
6/13/2013	Day								2h	
	Night									
6/14/2013	Day		3h	2h30	3h	3h40	04h10	3h		05h00
	Night									
6/17/2013	Day			3h				2h		
	Night				2h					
6/18/2013	Day		2h	4h	4h15	1h30	3h	1h		3h00
	Night									
6/19/2013	Day									
	Night			2h	2h45					
6/20/2013	Day	4h							4h	3h30
	Night				04h20					
6/21/2013	Day							01h30		
	Night									
6/22/2013	Day	1h								
	Night									
6/23/2013	Day	1h			1h40					

		Boukoubé	Cobly	Kérou	Kouandé	Matéri	Natitingou	Péhunco	Tanguiéta	Toucountouna
	Night			55mn						
6/24/2013	Day	1h	2h			3h	2h45		04h30	
	Night				03h50					
6/25/2013	Day	1h								
	Night			45mn						
6/26/2013	Day	1h								
	Night									

FIGURE 18: SPRAY COVERAGE BASED ON STRUCTURES FOUND BY SPRAY OPERATORS PER COMMUNE

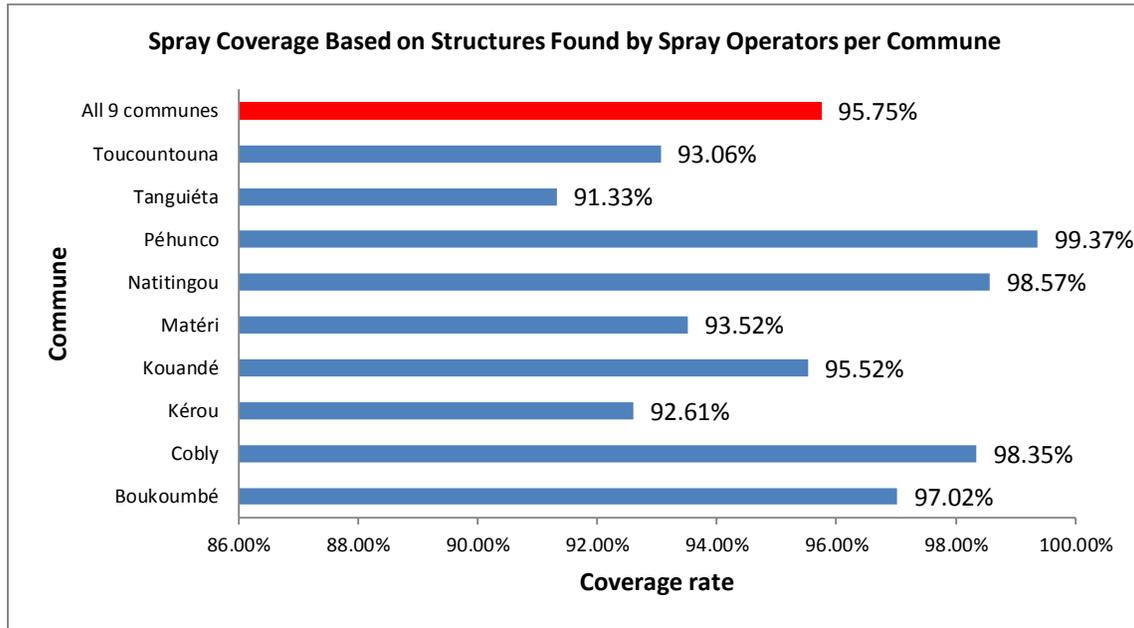


TABLE 25: SUMMARY OF MID-SPRAY ENVIRONMENTAL INSPECTIONS—STORAGE FACILITY AND SOAK PITS

Operation Sites	Are the storekeepers, spray operators and washers wearing appropriate PPE?	Is the current pesticide Material Safety Data Sheet posted?	Are overalls washed daily, and dried over the soak pit?	Do workers have access to end-of-day washing (including soap and water)?	Are spray operators fed before start of spray (before wearing of PPE)?	Is the store well arranged? (height of arranged items, allowing for free movement; proper stacking of items, allowing for ventilation)	Are warning signs correctly displayed? (danger sign, insecticide safety notice)	Are there a fire extinguisher (not expired) and a spill kit?	Is there a thermometer to measure daily temperature in the store? Are lighting and ventilation adequate (can you see your way through the store during the day)?	Is there a well-stocked first aid kit in the store? (eye wash, vitamin E cream)	Is the soak pit used to dispose of all contaminated water?	Is the roof leak-proof and the floor impermeable ?	Does the soak pit absorb all the effluent waste without creating a puddle and/or run-off?	Are the # 2, 4 and 6 drums filled with water?	Are contents of drums 1, 3, 5 and 7 emptied into spray pumps before spray operators depart for field?
Toucountouna	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Natitingou	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Manta	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Natta	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes, but temperature was not recorded.	Yes	Yes	Yes	Yes	Yes	Yes
Matéri	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cobly	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Taiacou	yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Perma	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Guilimaro	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kouandé	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firou	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gnémasson	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Kérou	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dassari	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kaoubagou	Yes	Yes	Yes	Spray operators walked to communities that were sprayed.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Péhunco	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 26: SUMMARY OF MID-SPRAY ENVIRONMENTAL INSPECTIONS—HOMEOWNER PREPARATION

Operation Sites	Have all personal belongings, animals, and sick persons been removed from the house?	Have all items that cannot be removed been properly covered with plastic sheeting?	Are the residents instructed on what to do during and after spraying?
Toucountouna	Yes	Yes	Yes
Natitingou	Yes	Yes	Yes
Manta	Yes	Yes	Yes
Natta	Yes	Yes	Yes
Matéri	Yes	Yes	Yes
Cobly	Yes	Yes	Yes
Taiacou	Yes	Yes	Yes
Perma	Yes	Yes	Yes
Guilimaro	Yes	Yes	Yes
Kouandé	Yes	Yes	Yes
Firou	Yes	Yes	Yes
Gnémasson	Yes	Yes	Yes
Kérou	Yes	Yes	Yes
Dassari	Yes	Yes	Yes
Kaoubagou	Yes	Yes	Yes; however, two residents noted that they were not informed.
Péhunco	Yes	Yes	Yes

TABLE 27: SUMMARY OF MID-SPRAY ENVIRONMENTAL INSPECTIONS—SPRAY OPERATOR PERFORMANCE

Operation sites	Are spray operators in full PPE? (helmet, overalls, boots, gloves, mask)	Is mixing of the insecticide witnessed by any household resident?	Are spray operators spraying only the recommended surfaces?	Do spray operators correctly record household details?	Is any spray operator observed eating/drinking/smoking while at work?	Are the spray operators spraying floors, metal roofs, doors, glass, inside of cupboards, wallpaper, food granaries, curtains, latrines, animal pens?
Toucountouna	Yes	Yes	Yes	Yes	No	No
Natitingou	Yes	Yes	Yes	Yes	No	No
Manta	Yes	Yes	Yes	Yes	No	No
Natta	Yes	Yes	Yes	Yes	No	No
Matéri	Yes	Yes	Yes	Yes	No	No
Cobly	Yes	Yes	Yes	Yes	No	No
Taiacou	Yes	Yes	Yes	Yes	No	No
Perma	Yes	Yes	Yes	N.A.	No	No
Guilimaro	Yes	Yes	Yes	N.A.	No	No
Kouandé	Yes	Yes	Yes	Yes	No	No
Firou	Yes	Yes	Yes	Yes	No	No
Gnésmasson	Yes	Yes	Yes	Yes	No	No
Kérou	Yes	Yes	Yes	N.A.	No	No
Dassari	Yes	Yes	Yes	Yes	No	No
Kaoubagou	Yes	Yes	Yes	Yes	No	No
Péhunco	Yes	Yes	Yes	Yes	No	No

TABLE 28: SUMMARY OF MID-SPRAY ENVIRONMENTAL INSPECTIONS—OBSERVATIONS OF SPRAY OPERATORS AT OPERATION SITES AFTER COMPLETING SPRAYING

Operation Sites	At the end of the shift, are both full and empty sachets returned, counted and recorded in inventory?	Are the empty sachets/ bottles or used masks counted and stored in labeled, sealed containers?	Are #7 barrels placed and arranged on an impermeable ground or plastic sheet (for permeable grounds) along the wash bay?	Do barrels #2, 4, and 6 contain enough water for triple-rinsing?	Do spray operators correctly conduct triple-rinsing whiles wearing PPE?	Have there been any reported accidents?	Have any spray operators complained of irritation (throat, skin, etc.)?	Are spray operators provided with soap to wash and bathe?	Do spray teams bathe after the day's work?	Are the insecticide usage rate and average no. of houses sprayed per spray operator within acceptable limits? (at least 2.5-3 and 10 houses/spray operator/day)*
Touncountouna	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Natitingou	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Manta	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Natta	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Matéri	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Cobly	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Taiacou	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Perma	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Guilimaro	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Kouandé	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Firou	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Gnémasson	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Kérou	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Dassari	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Kaoubagou	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Péhunco	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes

*The insecticide usage rate and average no. of houses sprayed per spray operator within acceptable limits: 2.8 big structures/sachet or bottle; 4.5 small structures/sachet or bottle; 15 structures sprayed/spray operator/day.

TABLE 29: SUMMARY OF POST-SPRAY ENVIRONMENTAL INSPECTIONS

Operation sites	Is this a temporary store?	Have all of the IRS items, insecticides and wastes been taken back to the central store?	Was the store cleaned before being handed over to the owners?	Is the soak pit covered and the gate closed and locked?	Were the soak pit and its surroundings left clean?	Was the working relationship between the IRS team and owners of the store good?	Additional comments
Touncountouna	Yes	Yes	Yes	Yes	Yes	Yes	
Natitingou	Yes	Yes	Yes	Yes	Yes	Yes	The central warehouse is located there .
Dassari	Yes	Yes	Yes	Yes	Yes	Yes	
Natta	Yes	Yes	Yes	Yes; the gate is removed to prevent its theft.	Yes	Yes	
Matéri	Yes	Yes	Yes	Yes; gate removed to prevent its theft.	Yes	Yes	
Cobly	Yes	Yes	Yes	Yes; gate removed to prevent its theft.	Yes	Yes	
Perma	Yes	Yes	Yes	Yes; gate removed to prevent its theft.	Yes	Yes	
Manta	Yes	Yes	Yes	Yes; the gate is removed to prevent its theft.	Yes	Yes	
Guilimaro	Yes	Yes	Yes	Yes	Yes	Yes	
Kouandé	Yes	Yes	Yes	Yes	Yes	Yes	
Firou	Yes	Yes	Yes	Yes; the gate is removed to prevent its theft.	Yes	Yes	The municipal government staff allowed one of their staff members to move into the store room after the IRS campaign.
Gnémasson	Yes	Yes	Yes	Yes	Yes	Yes	
Kérou	Yes	Yes	No	Yes; the gate is removed to prevent its theft.	Yes	Not apparent concern; but the rural development manager wanted to use his store room.	AIRS Benin could not clean because the rural development manager changed locks without letting them know.

Operation sites	Is this a temporary store?	Have all of the IRS items, insecticides and wastes been taken back to the central store?	Was the store cleaned before being handed over to the owners?	Is the soak pit covered and the gate closed and locked?	Were the soak pit and its surroundings left clean?	Was the working relationship between the IRS team and owners of the store good?	Additional comments
Péhunco	Yes	Yes	Yes	Yes	Yes	Yes	Municipal government staff pushed for a quick turn-over of the store room, for other storing needs. Future Memoranda of Understanding should be developed to allow enough time for AIRS to thoroughly complete all close-out activities at each operation site.
Taiacou	Yes	Yes	Yes	Yes; gate removed to prevent its theft.	Yes	Yes	
Kaobagou	Yes	Yes	Yes	Yes; gete removed to prevent its theft.	Yes	Yes	

10.2 OFFICIAL NOTES FROM DISTRICT AND INSECTICIDE SELECTION FOR 2012 IRS CAMPAIGN

Rapport de la séance d'échange entre le PNLN, l'AIRES, le CREC et l'USAID sur les différents scénarii envisagés pour rester dans le budget prévu pour la PID 2013 dans l'Atacora

Le jeudi vingt-neuf novembre 2012 a eu lieu dans la salle de conférence du Programme National de Lutte contre le Paludisme une séance d'échange sur les différents scénarii afin de rester dans le budget prévu pour la PID 2013 dans l'Atacora.

Etaient présents à cette séance, le Professeur AKOGBETO Martin , Directeur du CREC, Dr RAKOTONDRAJAONA Noé, Chef de Mission AIRES, Dr BONGO Emile, Conseiller Technique (PMI) de l'USAID/Bénin, Dr OKE Mariam Coordinatrice du PNLN, Mr DENAKPO Boniface, Point focal PMI, Mr TOKPONNON Filémon , Mr FASSINOU Hector et Mme AKAKPO Evelyne, du Service LAVI/PNLN.

Après les mots de bienvenue, la Coordinatrice National du Programme National de Lutte contre le Paludisme, a fait un rappel de la synthèse de la dernière rencontre selon laquelle le pirimiphos méthyl EC de formulation EC sera utilisé pour la campagne de pulvérisation intra-domiciliaire de 2013 dans sept communes et le reste du bendiocarb dans les deux communes ayant fait l'objet d'un round de PID. Elle a fait également le point des différents scénarii qui lui ont été proposés par Abt Associates.

Le chef de Mission de AIRES prenant la parole a présenté un dernier scénario qui dégage un gap de 300 à 400 mille dollars en pulvérisant 4 communes avec du bendiocarb et 4 communes avec le pirimiphos méthyl EC et en laissant la commune de Tanguéta. Il a fait savoir à l'assistance qu'un stock de bendiocarb a été prêté au Sénégal et sera retiré et 3000 sachets seront achetés au Burkina qui est proche de l'Atacora.

Le Professeur AKOGBETO, prenant la parole, a fait savoir qu'en considérant les contraintes budgétaires on ne saurait abandonner des communes. Il a proposé que certaines communes ayant plus de structures fassent objet de la PID avec du Bendiocarb et les autres communes avec le Pirimiphos méthyle EC.

Les autres acteurs du PNLN prenant la parole ont souhaité que le budget prévisionnel de la PID soit passé en revue et que certaines rubriques fassent objet de réduction et de réaménagement afin de permettre une mise en œuvre sans dépasser le budget prévu.

Prenant la parole, le représentant de l'USAID, Dr Bongo, a fait savoir qu'il n'est pas facile de modifier un pareil budget car le MOP (et le budget détaillé) est déjà validé par le PMI.

Des discussions, l'équipe est parvenue à un consensus selon lequel les communes de Kérou, de Pehunco, de Boukoubé et d'une dernière commune dont l'évaluation entomologique a montré un taux de résistance AceIR faible soit pulvérisée au pirimiphos methyl EC. C'est sur ces mots que le prof AKOGBETO a promis mettre à notre disposition le vendredi matin cette 4ème commune qui va bénéficier de la PID au bendiocarb après avoir consulté le rapport de l'évaluation entomologique des insecticides précédemment réalisée. Ce qui a été fait le lendemain et cette commune est celle de Natitingou. Des discussions du jeudi 29 Novembre et des informations complémentaires reçues du professeur AKOGBETO le vendredi 30 Novembre 2012 ont permis à la Coordinatrice du PNLN de faire la synthèse de la répartition des communes devant faire l'objet de la pulvérisation intradomiciliaire suivant le tableau ci-après :

Communes à pulvériser avec :

Pirimiphos methyle	Bendiocarb
Matéri	Natitingou
Cobly	Boukoubé
Tanguéta	Pehunco
Toucountouna	Kérou
Kouandé	

Le Rapporteur

FASSINOU Hector

10.3 OFFICIAL NOTICE OF SELECTION OF INSECTICIDES FOR USE DURING THE 2013 IRS CAMPAIGN

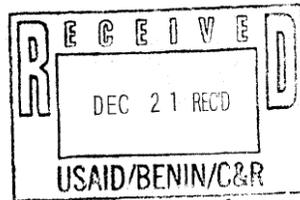


République du Bénin

MINISTÈRE DE LA SANTÉ

Direction Nationale de la Santé Publique

Programme National de Lutte contre le Paludisme



COTONOU, LE 12 DEC 2012

LE MINISTRE DE LA SANTE

2010
N° ___/MS/DC/SGM/DNSP/PNLP/SLAVI/SA

A

**MONSIEUR LE DIRECTEUR DE
L'USAID**

Attention : Chef Equipe Santé

COTONOU

Objet : Choix de l'insecticide pour la Pulvérisation Intradomiciliaire (PID).

Monsieur le Directeur,

Suite au développement de la résistance des vecteurs du paludisme vis-à-vis du Bendiocarb utilisé dans la pulvérisation intradomiciliaire dans le département de l'Atacora, je viens par la présente vous notifier le changement d'insecticide d'après les travaux du groupe technique de travail mis en place à cet effet.

Le **Pirimiphos methyl de formulation EC** sera utilisé en plus du reste du bendiocarb pour la campagne de pulvérisation intradomiciliaire de 2013.

Les évaluations vont se poursuivre en vue d'obtenir de produits de rémanence plus longue pour une utilisation ultérieure.

Veillez recevoir, Monsieur le Directeur, l'expression de mes meilleures salutations.

LE
MINISTRE
Prof. **Docteur** Rothee A. KINDE-GAZARD

BP 01-882 Téléphones : 21 33 12 99/ 21 33 21 63 Fax : 21 33 04 64 Web : www.beninsante.bj

10.4 QUALITY CONTROL TEST RESULTS FOR INSECTICIDE BATCHES SENT TO BENIN



TEST REPORT

Bayer (Pty) Ltd
Attention: Serina Kista
 27 Wrench Road
 Isando
 South Africa

PHARMACEUTICAL CHEMISTRY
 Your ref: PO: 4500524374
 Dated: 2013-05-03
 Our ref: 213864
 Enquiries: Penny Manganyi
 Tel: (012) 428 6373
 Date: 2013-04-30
Report No: 2416/G1053PC
 Page: 1 of 2

FICAM (BENDIOCARB 800g/kg WP) RESULTS OF ANALYSIS

Date received: 2013-04-23

Date commenced: 2013-04-24

Method used	Test performed	Requirement	Batch Number		
SENEGAL BATCHES			30433	30402	30403
CIPAC D (As per WHO Specification 232/NVP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	798 Complies	784 Complies	793 Complies
			30404	30405	30406
CIPAC D (As per WHO Specification 232/NVP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	791 Complies	789 Complies	789 Complies
			30407		
CIPAC D (As per WHO Specification 232/NVP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	789 Complies		
BENIN BATCHES			L333	L327	L329
CIPAC D (As per WHO Specification 232/NVP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	783 Complies	777 Complies	785 Complies

...../2...

1 Dr Lategan Road, Groenkloof, Private Bag X191, Pretoria, 0001.
 Tel +27 12 428 7911. Fax +27 12 344 1568

The test work relating to this report was performed by SABS Commercial SOC Ltd. This report and its test results relate only to the specific sample(s) identified herein. They do not imply SABS approval of the quality and/or performance of the item(s) in question and the test results do not apply to any similar item that has not been tested. This report may not be reproduced except in full. The authenticity of this report and its contents can be confirmed by contacting the person who signed it.

T00002224

124982

TEST REPORT

Report No.: 2416/G1053PC

Date: 2013-04-30

Page 2 of 2

Method used	Test performed	Requirement	Batch Number		
			L331		
CIPAC D (As per WHO Specification 232/WP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	785 complies		
MALI BATCHES			30408	30409	30418
CIPAC D (As per WHO Specification 232/WP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	800 complies	799 complies	793 complies
			30410	30417	
CIPAC D (As per WHO Specification 232/WP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	793 complies	797 complies	


Bongani Mahlangu: Test Officer

 Penny Manganyi: Laboratory Manager

Fax No. +27 (11) 921 5754
E-mail:
thandi.ramugadi@bayer.com
serina.kista@bayer.com
Sherreen_Tolliver@abtassoc.com
Allan_Were@abtassoc.com

TEST REPORT

SABS

PHARMACEUTICAL CHEMISTRY

Your ref: Quotation
 Dated: 2013-03-07
 Our ref: 253724
 Enquiries: Penny Manganyi
 Tel: (012) 428 6373
 Date: 2013-03-12
 Report No: 2416/G1048PC
 Page: 1 of 1

Arysta LifeScience (Pty) Ltd
Attention: Dr Rose Peter
 PO Box 466
 HEIDELBERG
 1438

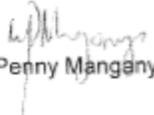
PYRIMIPHOS-METHYL 500G/L EC
RESULTS OF ANALYSIS

Date received: 2013-03-06

Date commenced: 2013-03-11

Method used	Test performed	Requirements	Syngenta Batch Number CHL3B11 -			
			- 06	- 07	- 08	- 09
WHO/SIF/53.R1	Pyrimiphos-methyl Content, g/L	475 to 525	504	504	503	513
	Identification (Retention time)	To comply	Complies	Complies	Complies	Complies
Visual	Appearance	-	Yellow to pale-yellow clear liquid in 100mL transparent glass bottles sealed with white screw caps			
	Condition	-	Room temperature			
Densitometer	Density, g/mL	-	1.0242	1.0235	1.0224	1.0256


 Gerty Pieterse: Technical Signatory


 Penny Manganyi: Manager

E-mail: Allan_Were@abtassoc.com
 cc: Shereen_Tolliver@abtassoc.com
 cc: rose.peter@arysta.com

TABLE 30: NUMBER OF PEOPLE TRAINED BY TYPE OF TRAINING

Categories of Individual Trained	Training of Trainers		Spraying Operations		Data Capture		Logistics Training		Technical Maintenance		Mobilization / IEC Training of Trainers		Mobilization/ IEC Training		Medical Treatment of Intoxication Cases		Washer Activities		Fire Security		Transport Security	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
DDS- (AD / OP)	2										3				1							
SHAB Departmental	1										1											
NMCP National	2										1											
NMCP Departmental	1										1				1							
DDEPN	2																					
DAGRI																						
CREC	1																					
Communes Coordinators	5	4									5	4										
Health Zone Coordinator	3														2							
Commune Chief Doctors/ Other Doctors	7										9				10	1						
Chiefs of Health Post/ Midwife											40	20			25	14						
Hygiene Agents	31	12																				
Spray Operators			603	75																		
Data Clerks					13	7																
Storekeepers							14	2												14	2	
Logistics Assistants							2													2		
Service Technicians									57	8												
IEC Agents													394	84								
Washers																		62				
Drivers																				69		69
Guards																				16		
IEC Assistant		1										1										
TOTAL M/F	55	17	603	75	13	7	16	2	57	8	60	25	394	84	39	15		62	101	2	69	
TOTAL/ training	72		678		20		18		65		85		478		54		62		103		69	

TABLE 31: ENVIRONMENTAL MITIGATION AND MONITORING PLAN OF 2013 IRS CAMPAIGN

Pre-spraying phase			
Impact	Mitigation Measures	Monitoring Indicator	2013 IRS Campaign Results of EMMP Implementation
Accidental spills of insecticides during road transportation to warehouse and spray sites (human health and environmental impacts)	Ensure that the drivers identified to haul the insecticide to the spray sites are well trained on the Food and Agriculture Organization standards and guidelines for the storage, transport and stock control for pesticides.	Number of road accidents and spills reported Records showing drivers training	<i>Zero accident and spill</i> <i>End of Spray Report</i>
	Possible environmental contamination caused by warehouse exposure due to poor siting of warehouses, pilferage, and vermin attack on the stored pesticides before spraying	Ensure the selected warehouse is sited away from a flood plain area, water course, wells, schools, markets. Secure the selected warehouse and apply all the guidelines for Storage and Stock Control Manual by FAO.	Storage facility located outside of floodplain, away from nearby schools, hospitals, water courses Storage facilities secured as per the FAO Storage and Stock Control Manual
Accidental fires and injuries in the warehouses	All warehouses must be equipped with a fire extinguisher, thermometer, exit doors and warning signs, and materials must be stored with proper stacking position and height of stacks, as stipulated in the FAO Storage and Stock Control Manual.	Presence of firefighting equipment, warning signs and at least 3 exits accessible in the warehouse	<i>Compliant</i>
	All the workers handling pesticides or other products and equipment in the storage facilities must all have PPE including goggles, gloves, boots, overall, dust masks, etc.	Availability of PPE to all the workers	<i>Compliant</i>
	All spray operators and store managers must be trained on how to operate the fire extinguishers and what to do in case of fire. Develop an Emergency Response Plan.	Training in fire prevention and fighting Emergency Response Plan	<i>Performed</i> <i>Plan available</i>

Spraying phase potential impacts				
Impact/Issue	Mitigation Measure(s)	Monitoring Indicators	Monitoring frequency	2013 IRS Campaign Results of EMMP Implementation
Fetal exposure could be caused by using expectant female operators in the spraying.	Pregnancy tests to ensure pregnant women are not on the spray teams; prohibition of breastfeeding women on spray teams	Percentage female spray operators who took pregnancy tests	Once before spray operations begin and then every 30 days	100% took pregnancy tests. 2 tests were performed (before and during IRS campaign).
		Percentage female spray operators who indicated they were not breastfeeding		100% of females were not breastfeeding.
	Education of women regarding risk and presentation of consent forms	Percentage of female spray operators who have signed consent forms		There was no consent form instituted. All female spray operators gave verbal consent.
	Reassign women spray operators who become pregnant during the campaign to tasks that minimize occupational exposure to insecticides.	Number of expectant females reassigned to storekeeping work, etc.	Periodic re-assignment as the cases are identified	Three expectant females were reassigned to mobilizer work.
Spray operators', drivers' and storekeepers' exposure due to negligence or lack of PPE, or unintentional exposure caused by accidents	Provide PPE to all the workers, supervisors, team leaders and store managers. Train the team leaders, sprayers, supervisors and store keepers on emergency procedures to take if exposure occurs accidentally, i.e., dermal, eye or ingestion emergencies.	Record indicating training has been conducted Ability to respond as required when exposure incidents are encountered Availability of PPE for all spray teams including storekeepers, drivers	Training to be undertaken once during the overall ToT Daily monitoring of operators by team leaders to ensure full use of PPE	Performed (EOSR) Performed PPE permanently available

	Ensure that each team leader and supervisor effectively monitors the spray operations diligently and takes action to correct any non-compliance issues noted right away.			<i>Performed (during IRS campaign, team leaders and supervisors made sure the spray operators always wore their PPE)</i>
	Procurement of sprayers manufactured according to WHO specifications; procurement and proper use of PPE by spray operators, team leaders and supervisors (cotton overalls, face shield, dust mask, broad-brimmed hat, rubber gloves, gumboots); procurement of PPE for wash persons			<i>Performed</i>
	Prohibition of eating, drinking and smoking during work			<i>No spray operator was eating, drinking or smoking during work.</i>
Residential exposure	IEC Campaign, instruct residents to: clear homes of mats or rugs, furniture, cooking implements and foodstuffs prior to spraying	Households cleared and well prepared before the spraying	Daily basis by the team leaders and supervisors	<i>In general, households followed instructions before and during spraying.</i>
	Move all furniture out of the house and for immovable pieces, take to the center of the house and cover accordingly.	Furniture covered and/or moved to the center of the houses	Cases of residential exposure attributed to lack of or inadequate IEC	<i>Zero cases</i>
	Advise residents to stay outside the home during spraying and for two to four hours after spraying.	Residents stay outside of the hours until the recommended time has elapsed		<i>Measure well followed by residents</i>

	<p>Move and keep all animals outside the home during spraying, and for four hours after spraying. Sweep up any insects killed from the spraying and drop them in latrine pits. Sweep floors free of any residual insecticide that may remain from the spraying.</p>	<p>Animals kept away from the houses until the recommended time after spraying</p>		<p><i>Measure well followed</i></p>
	<p>Advise not to re-plaster or paint over the sprayed walls after spraying, and keep using bed nets for protection against malaria.</p>	<p>Number of houses not plastered or painted after the spraying period</p>		<p><i>No case reported or observed</i></p>
	<p>If skin itches after re-entrance into home, wash with soap and water; for eye irritation, flush eyes with water; for respiratory irritation, leave the home for fresh air; for ingestion, contact program staff or go to nearest health facility.</p>	<p>Cases of reported exposures to the health facilities</p>		<p><i>No exposure case reported</i></p>
<p>Acute effects of pesticide exposure</p>	<p>Ensure treatment medicines for insecticide exposure listed in SEA mitigation section are available at the district level.</p> <p>Ensure first aid kits are available in the storage facilities and the transport vehicles.</p>	<p>Availability of exposure treatment medicine in the hospitals</p> <p>Percentage of treatment medicines available at health facilities</p> <p>Availability of first aid kits in storage facilities and hired vehicles</p>	<p>Once before spraying begins and then periodically to check if the medicines are still in stock in the health centers and if the first aid kits require replacement</p>	<p><i>Medicines available in the hospitals</i></p> <p><i>100% treatment medicines were available at Sanitary Zones and district levels</i></p> <p><i>First kits available in all store rooms and hired vehicles</i></p>

Community exposure, fetal exposure	<p>Prohibition of spraying in homes where sick persons or pregnant women are living who cannot move outside the home <i>and</i> stay outside the home during and 4 hours after spraying</p> <p>Prohibition of spraying in homes where food, utensils and flooring have not been removed from the house, and where furniture has not been removed outside <i>or</i> moved to the middle of the room and covered with a cloth by the spray operator</p>	<p>Residents outside house during spraying (previously mentioned)</p> <p>Residents stay outside for four hours after spraying (previously mentioned)</p> <p>Occurrence of skin/eye/throat irritation (previously mentioned)</p> <p>Food and goods outside house during spraying (previously mentioned)</p>	Daily basis	<p><i>Measure well followed</i></p> <p><i>Not reported or observed</i></p> <p>Compliant</p>
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Post-spraying phase

Impact	Mitigation Measure	Monitoring Indicator	Monitoring Frequency	2013 IRS Campaign Results of EMMP Implementation
Pilferage and community exposure, environmental contamination from any remaining pesticides not used	Keep storage facilities up to standards described in FAO pesticide storage and stock control manual; storage of all insecticides, empty packaging, barrels and tubs in storage facilities	<p>Presence of a dedicated and trained storekeeper</p> <p>Insecticide stored separately from food and medicine (previously mentioned)</p> <p>Stock records up to date</p> <p>Facility double-padlocked and guarded</p> <p>Facility physically secure</p> <p>At the end of the spray round, [stock remaining] = [stock at start] - [no. of sachets distributed].</p> <p>No. sachets distributed should be equal to stock records up-to-date.</p> <p>Cases of theft or pilferage reported</p>	<p>Daily accounting of insecticide and tally of used sachets</p> <p>Periodic monitoring of the warehouse to ensure that it does not have structural problems</p>	<p><i>All storekeepers were well trained before IRS campaign began.</i></p> <p><i>No food was stocked in the store rooms.</i></p> <p><i>Stock records were constantly controlled during supervision visits and were up to date.</i></p> <p><i>All store facilities guarded 24/7 and well secured (double-locked).</i></p> <p><i>No management issue of insecticide or empty sachets/bottles was reported.</i></p> <p><i>No theft or pilferage cases reported.</i></p>

Community exposure from vehicles and secondary warehouses	End-of-program cleaning/decontamination of interior and exterior of vehicles End-of-program cleaning/decontamination of the interior of all secondary warehouses Collection of all the IRS solid wastes at the secondary storage facilities and transferring to central warehouse	Evidence of interiors and exteriors of vehicles cleaned daily Evidence of cleaning of all the secondary warehouses Cases of passenger exposure	Secondary warehouses will be cleaned at the end of spray operations; however, the warehouses will be cleaned daily for reasons of hygiene.	<i>Every day, after spray operation, vehicles were cleaned. Moreover, they were decontaminated in case of pollution by insecticide. No case of passenger exposure was reported. At the end of IRS campaign, all secondary warehouses were decontaminated.</i>
Environmental contamination and resident exposure from IRS spray disposal activities	Sprayer progressive rinse; spray operator bathing; washing of overalls, PPE and cloths used to cover furniture Ensure that a soak pit is constructed for disposing residual water after clean-up. Storage of empty sachets until disposal option selected by the country Procurement and distribution of barrels for progressive rinse, and wash-tubs for personal hygiene; inscription of program barrels and tubs as District Health Office property to deter sale and domestic use in event of pilferage	Reported cases of residential exposure Evidence of progressive rinsing during all post-spray clean-ups Evidence of soak pits in all the return sites for clean-up designed and constructed in the acceptable format Evidence of empty sachets stored in sealed barrels awaiting recapture by manufacturer Availability of wash barrels and tubs with program inscription	Daily	<i>No residential exposure case was reported. (For different evidence, see in the mid-inspection report in this report).</i>
Spray operator exposure due to lack of washing after spraying	Ensure all spray sites have washrooms with adequate water and soap for washing.	Reported cases of operator exposure Soap and clean water available at all times (previously mentioned) Adequate numbers of showers/bathing facilities available for spray operators (designated wash basins at a minimum; previously mentioned)	Daily	<i>No case of operator exposure reported. Every operator was provided with enough soap, and clean water was always available. Every spray site is equipped with at least one shower for men and the same for women.</i>

Residential exposure from contact with secondary warehouses	Decontaminate by cleaning all the 16 secondary warehouses to ensure that exposure incidents are minimized. Collect all the IRS solid waste to the central warehouses for further disposal.	Level of decontamination of warehouses after spray operations end	Decontamination to occur at the end of the spray operations. Daily cleaning and collection of waste to be undertaken.	<p><i>Rinsing area and secondary warehouses were cleaned every day after spray operations.</i></p> <p><i>All secondary warehouses were cleaned with water and soap at the end of spray campaign.</i></p> <p><i>Solid wastes were counted daily and secured in labeled barrels, and afterwards transported to the central warehouse in Natitingou for further disposal.</i></p>
	Sound disposal of solid waste in line with PMI Best Management Practices	<p>Evidence of incinerated solid waste (empty sachets, respiratory used masks, used spray operator bags)</p> <p>Evidence of recycled solid waste (empty plastic bottles)</p> <p>Evidence of buried solid waste (used rubber gloves)</p>	<p>End of spray campaign</p> <p>End of spray campaign</p> <p>End of spray campaign</p>	<p><i>Incineration Certificate</i></p> <p><i>Recycling Certificate</i></p> <p><i>Burying Certificate</i></p>

10.5 BENIN MONITORING AND EVALUATION PLAN INDICATOR MATRIX

BENIN MONITORING AND EVALUATION PLAN INDICATOR MATRIX

UPDATED: January 13, 2014

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Target	Results	Target ⁷	Results	Target	Results

Component 1: Establish cost-effective supply chain mechanisms including procurement, distribution and storage of IRS-related commodities and execute all aspects of logistical plans for IRS-related activities.

1.1 Procurement											
1.1.1 Number and percentage of international insecticide procurement orders delivered in country, at port of entry, at least 30 days prior to the start of spray operations	[<i>Numerator</i> : Number of international insecticide procurements delivered in country, at port of entry, at least 30 days prior to the start of spray operations] [<i>Denominator</i> : Total number of international insecticide procurements] [<i>Calculation</i> : [Numerator ÷ Denominator] x 100]	Y1, Y2, Y3	<i>Data source</i> : Logistics and Procurement Inventory Reports <i>Reporting frequency</i> : Each spray season	By Spray Campaign	AIRS	1; 80%	1; 100%	2; 100%	2; 100%	TBD; 100%	
1.1.2 Number and percentage of international procurement orders for equipment, including	[<i>Numerator</i> : Number of international procurements for equipment, including PPE, at port of entry, 30 days	Y1, Y2, Y3	<i>Data source</i> : Logistics Inventory Report <i>Reporting frequency</i> : Each spray season	By Spray Campaign	AIRS	1; 85%	1; 100%	1; 100%	1; 100%	TBD; 100%	

⁷ The number of districts covered in Y2 has not been finalized, therefore Y2 target indicators may change upon Work Plan approval

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Actuals					
						Year 1		Year 2		Year 3	
						Target	Results	Target ⁷	Results	Target	Results
PPE, received at port of entry, 30 days prior to start of spray operations.	prior to start of spray operations] [Denominator: Total number of international procurements for equipment, including PPE.] Calculation: [Numerator ÷ Denominator] x 100										
1.1.3 Number and percentage of local PPE procurement orders that are delivered to the main warehouse, 14 days before the start of spray operations	[Numerator: Number of local PPE procurements delivered 14 days before the start of spray operations] [Denominator: Total number of local PPE procurements.] Calculation: [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	Data source: Logistics and Procurement Inventory Reports Reporting frequency: Each spray season	By Spray Campaign	AIRS	N.A; 80%	N.A.;	1; 100%	1; 100%	TBD; 100%	
1.1.4 Successfully completed spray operations without an insecticide stock-out	Milestone: (Completed/Not Completed)	Y1, Y2, Y3	Data source: Logistics Inventory Report Reporting frequency: Each spray season	By Spray Campaign	AIRS	Achieved	Achieved	Achieved	Achieved	Achieved	

1.2 In-country Logistics, Warehousing, and Training										
1.2.1 Number and percentage of logistics and warehouse managers trained in IRS supply chain management	<p>[<i>Numerator</i>: Total number of logistics and warehouse managers trained in IRS supply chain management using AIRS Project resources.]</p> <p>[<i>Denominator</i>: Total number of AIRS logistics and warehouse managers.]</p> <p><i>Calculation</i>: [Numerator ÷ Denominator] x 100</p>	Y1, Y2, Y3	<p><i>Data source</i>: Routine training records</p> <p><i>Reporting frequency</i>: Each spray season</p>	<p>By Spray Campaign</p> <p>By Gender</p>	AIRS	15	<p>18</p> <p>M: 16</p> <p>F: 2</p> <p>12.5%</p>	<p>30</p> <p>M: 23</p> <p>F: 7</p> <p>30.5%</p>	<p>18</p> <p>M: 16</p> <p>F: 2</p> <p>11%</p>	TBD
1.2.2 Number and percentage of base stores where physical inventories are verified with up-to-date stock records	<p>[<i>Numerator</i>: Number of base stores where physical inventories are verified by up-to-date stock records]</p> <p>[<i>Denominator</i>: Total number of base stores audited.]</p> <p><i>Calculation</i>: [Numerator ÷ Denominator] x 100</p> <p>(See PIRS for details on sample size for operational audits)</p>	Y2, Y3	<p><i>Data source</i>: Logistics and Environmental compliance reports</p> <p><i>Reporting frequency</i>: Each spray season</p>	By Spray Campaign	AIRS	N.A.	N.A.	15 out of 16; 94%	16 (including central warehouse); 100%	TBD
1.2.3 Submit up-to-date inventory records to AIRS Home Office 30 days after the end of each spray campaign	Milestone: (Completed/Not Completed)	Y2, Y3	<p><i>Data source</i>: Post-Spray Logistics Inventory Report</p> <p><i>Reporting frequency</i>: Each spray season</p>	By Spray Campaign	AIRS	N.A.	N.A.	100%	100% (Completed)	100%

Component 2: Implement safe and high-quality IRS programs and provide operational management support

2.1 Planning and Design of IRS Programs											
2.1.1 Annual IRS country work plan developed and submitted on time	Milestone: (Completed/Not Completed)	Y1, Y2, Y3	<i>Data source:</i> Project records <i>Reporting frequency:</i> Annually		AIRS	Completed	Completed	Completed	Completed	Completed	

2.2 Support of Safety and Health Best Practices and Compliance with USAID and Host Country Environmental Regulations

2.2.1 SEA/letter report submitted on time ⁸	Milestone: (Completed/Not Completed)	Y1, Y2, Y3	Data source: Project records – submitted SEAs/ letter reports Reporting frequency: Each spray campaign	By Spray Campaign	AIRS	Complete	Completed	Complete	Complete	Complete	
2.2.2 Number and percentage of soak pits and warehouses/storerooms inspected and certified by an environmental officer/AIRS Environmental Compliance Officer prior to spraying	[Numerator: Number of soak pits and/or storehouses inspected and certified by AIRS Environmental Compliance Office] [Denominator: Total number of project soak pits and/or storehouses] Calculation: $[Numerator \div Denominator] \times 100$	Y1, Y2, Y3	Data source: Project records – Reports submitted by environmental officers Reporting frequency: Each spray season	By Spray Campaign By soakpits and warehouses / storerooms	AIRS	16 100%	16; 100%	16; 100%	16; 100%	TBD	
2.2.3 Number of government environmental and health officers trained in IRS environmental compliance	Total number of government environmental and health officers trained in IRS environmental compliance using AIRS Project resources	Y1, Y2, Y3	Data source: Training reports from Environmental Compliance Officer Reporting frequency: Semi-annually	By Spray Campaign By Gender	AIRS	5 M: 4 F: 1	5 M: 4 F: 1	72 M: 55 F: 17	71 M: 55 F: 16	TBD	
2.2.4 Number of spray personnel trained in environmental compliance and personal safety standards in IRS implementation	Total number of spray personnel who attend a training in environmental compliance and personal safety standards in IRS implementation using AIRS Project resources, includes all staff who received environmental	Y1, Y2, Y3	Data source: Project records – Training reports Reporting frequency: Each spray season	By Spray Campaign By Gender	AIRS	775	836 M: 703 F: 133	914 M: 777 F: 137	823 ⁹ M: 676 F: 147	TBD	

⁸ In Year 1, SEAs were due 30 days prior to the commencement of spraying and letter reports were to be submitted 14 days prior to the commencement of spraying. In Year 2 and Year 3, due dates agreed upon with Washington-PMI will be noted in each country-specific Monitoring and Evaluation Plan to assess indicator 2.2.1.

⁹ This number includes: spray operators, team leaders, storekeepers, logistic assistants, service technicians, and washers

	compliance training - spray operators, team leaders, washpersons, storekeepers, etc.										
2.2.5 Number of health workers receiving insecticide poisoning case management training	Total number of clinical personnel trained in insecticide poisoning case management using AIRS Project resources	Y2, Y3	Data source: Project records – Training reports Reporting frequency: Each spray season	By Spray Campaign By Gender	AIRS	60	69 M: 46 F: 23	60 M: 46 F: 23	54 M: 39 F: 15	TBD	
2.2.6 Number of adverse reactions to pesticide exposure documented	Total number of incidents of pesticide exposure reported that resulted in a referral for medical care	Y1, Y2, Y3	Data source: Incident report forms that are required for each incidence of pesticide exposure Reporting frequency: Each spray season	By Spray Campaign By residential/occupational exposure	AIRS	0	0	0	0 ¹⁰	0	
2.2.7. Number of vehicular accidents reported	Total number of vehicular accidents reported	Y1, Y2, Y3	Data source: Vehicular incident report forms that are required for each accident Reporting frequency: Each spray season	By Spray Campaign	AIRS	0	0	0	0 ¹¹	0	
2.3 Support Entomological Monitoring Activities and Insecticide Resistance Strategies											
2.3.1 Number of sentinel sites supported by the AIRS project	Total number of entomological sentinel sites supported by the AIRS project	Y1, Y2, Y3	Data source: Entomological reports Reporting frequency: Annually	By Spray Campaign	AIRS	6	6	5	5	5	

¹⁰ No case of adverse reaction observed or reported

¹¹ No accident took place

2.3.2 Number and percentage of entomological monitoring sentinel sites measuring all five primary PMI entomological indicators	[<i>Numerator</i> : Number of entomological monitoring sites measuring all five primary PMI entomological indicators] [<i>Denominator</i> : Number of entomological monitoring sentinel sites] <i>Calculation</i> : [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	<i>Data source</i> : Entomological reports <i>Reporting frequency</i> : Annually	By Spray Campaign	AIRS	5 out of 6 83.3%	5 out of 6 83.3%	2 out of 5 40%	2 out of 5 40%.	TBD	
2.3.3 Number and percentage of entomological monitoring sites measuring at least one secondary PMI indicator	[<i>Numerator</i> : Number of entomological monitoring sites measuring at least one secondary PMI indicator] [<i>Denominator</i> : Number of entomological monitoring sites] <i>Calculation</i> : [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	<i>Data source</i> : Entomological reports <i>Reporting frequency</i> : Annually	By Spray Campaign	AIRS	N.A.	6 out of 6 100%	5 out of 5; 100%	5 out of 5 100% reports.	TBD	
2.3.4 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	[<i>Numerator</i> : Number of insecticide resistance testing sites that tested at least one insecticide from each of the four classes of insecticides recommended for malaria vector control.] [<i>Denominator</i> : Number of insecticide resistance testing sites]	Y1, Y2, Y3	<i>Data source</i> : Entomological reports <i>Reporting frequency</i> : Annually	By Spray Campaign By Type of Insecticide	AIRS	2	2 ¹² : 100%	2 ⁶ ; 100%	0 ¹³ ; 0%	TBD	

¹² Organochlorine class : 0 sites 0% (DDT was tested only in 2010 just before the IRS campaign by CREC. The results showed a high resistance of *An. gambiae* s.l to DDT. Besides, the mortality rate was only 13% in Tanguiéta and 18% in Toucountouna); Organophosphates class : 5 sentinel sites; 100%; Pyrethroids class : 4 sentinel sites, 80%; Carbamates class: 5 sentinel sites, 100%

¹³ Only two insecticide classes were tested - Organophosphates class : 3 sentinel sites; 60%; and Carbamates class: 3 sentinel sites, 60%

	<i>Calculation:</i> [Numerator ÷ Denominator] x 100										
2.3.5 Number of wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS	Total number of wall bioassay studies conducted in established sentinel sites to evaluate quality of IRS spraying activities	Y1, Y2, Y3	Data source: Entomological reports Reporting frequency: Per spray campaign	By Spray Campaign	PMI	1 test on 8 treatment structures and 2 control structure (10 tests total)	1 test on 8 treatment structures and 2 control structure (10 tests total)	1 test on 8 treatment structures and 2 control structure (10 tests total)	1 test on 8 treatment structures and 2 control structure (10 tests total)	1 test on 8 treatment structures and 2 control structure (10 tests total)	
2.3.6 Number of wall bioassays conducted after the completion of spraying at monthly intervals to evaluate insecticide decay	Total number of wall bioassay studies conducted at monthly intervals in established sentinel sites to evaluate the rate of insecticide decay on sprayed surfaces	Y1, Y2, Y3	Data source: Entomological reports Reporting frequency: Per spray campaign	By Spray Campaign	PMI	5 tests on 8 treatment structures and 2 control structure (50 tests total)	5 tests on 8 treatment structures and 2 control structure (50 tests total)	5 tests on 8 treatment structures and 2 control structure (50 tests total)	4 tests on 8 treatment structures and 2 control structure (40 tests total)	5 tests on 8 treatment structures and 2 control structure (50 tests total)	
2.3.7 Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites	Total number of vector susceptibility tests conducted to gauge the effectiveness of individual insecticides proposed for use in spray operations	Y1, Y2, Y3	Data source: Entomological reports Reporting frequency: Per spray campaign	By Spray Campaign By Type of Insecticide	PMI	1	1 ¹⁴	2 ⁶	1	TBD	
2.4 Conduct Communications Activities and Community Mobilization											
2.4.1 Number of radio spots and talk shows aired	Total number of radio spots and talk shows aired in target spray districts to stress the safety and benefits of IRS, ensure successful spray coverage, timely vacating of premises and	Y1, Y2, Y3	Data source: Project records Reporting frequency: Semi-annually	By Spray Campaign	AIRS	2,503	2,503	1,668	5,876	TBD	

¹⁴ Deltamethin, 4 sentinel sites; Bendiocarb, 5 sentinel sites; Pirimithos methyl, 5 sentinel sites; Fenitrothion, 4 sentinel sites

	adherence to IRS safety precautions by community members										
2.4.2 Number of IRS print materials disseminated	Total number of IRS educational materials developed, printed and distributed to community members in target spray districts using AIRS Project resources	Y1, Y2, Y3	Data source: Project records Reporting frequency: Semi-annually	By Spray Campaign By Type of printed material and message(s)	AIRS	121,180	114,110	114,310	109,990	TBD	
2.4.3 Number of people reached with IRS messages via door-to-door mobilization	Total number of adults reached with IRS message during pre-spray community, door-to-door mobilization	Y1, Y2, Y3	Data source: Mobilization Data Collection Forms Reporting frequency: Daily per mobilization conducted	By Spray Campaign By Gender	AIRS	N.A	483,013 M: 226,091 F: 256,922	483,013 M: 226,091 F: 256,922	566,226 M: 268,559 F : 297,667	TBD	
2.5 Spray Targeted Structures According to Technical Specifications											
2.5.1 Number of structures targeted for spraying	Total number of structures found in targeted spray districts by Spray Operators	Y1, Y2, Y3	Data source: Daily Spray Operator Forms Reporting frequency: Daily per spray campaign	By Spray Campaign	PMI	200,000	221,937	222,000	239,112	TBD	
2.5.2 Number of structures sprayed with IRS	Total number of structures in targeted spray districts where spraying was conducted	Y1, Y2, Y3	Data source: Daily Spray Operator Forms Reporting frequency: Daily per spray campaign	By Spray Campaign	PMI	170,000	210,380	188,700	228,951	TBD	
2.5.3 Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	[Numerator: Total number of structures sprayed in targeted districts] [Denominator: Total number of structures in targeted areas found by spray operators] Calculation: [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	Data source: Daily Spray Operator Forms Reporting frequency: Daily per spray campaign	By Spray Campaign	PMI	85%	94.8%	85%	95.8%	85%	

2.5.4 Number of people residing in structures sprayed (Number of people protected by IRS)	Total number of people residing in structures sprayed (Actual numbers are collected during spray operations; population estimates are not used.)	Y1, Y2, Y3	Data source: Daily Spray Operator Forms Reporting frequency: Daily per spray campaign	By Spray Campaign By Number of pregnant women By Number of children <5 years old	PMI	600,000	652,777 ¹⁵	700,000	694,729 M: 349,856 F: 344,873 Pregnant Women: 17,807 Children: 127,133	TBD	
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Component 3: Provide ongoing monitoring and evaluation and quality control measures

3.1 Submit Monitoring and Evaluation Plan (MEP) to PMI-Benin	Milestone: (Completed/Not Completed)	Y1, Y2, Y3	Data source: Project records Reporting frequency: Semi-annual		AIRS	Completed	Completed	Completed	Completed	Completed	
3.2 Submit a post-spray data quality audit report to the AIRS M&E specialist in the home office within 60-180 days of completion of spray operations	Milestone: (Completed/Not Completed)	Y1, Y2, Y3	Data source: Spray Data Quality Report Reporting frequency: Per spray campaign	By Spray Campaign	AIRS	Completed	Completed	N.A.	N/A	TBD	
3.3 Submit a country-specific Eligible Structure Definition Document to local PMI advisors and NMCP	Milestone: (Completed/Not Completed)	Y1	Data source: Project records Reporting frequency: Semi-annually		AIRS	Completed	Completed	N.A.	N.A.	N.A.	N.A.
3.4 Supply chain review conducted by RTT	Milestone: (Completed/Not Completed)	Y1, Y2	Data source: RTT supply chain review reports Reporting frequency: Semi-annually	By Spray Campaign	AIRS	Completed	Completed	N.A.	N/A	TBD	

¹⁵ Children Under Five: 127,133; Pregnant Women: 17,807

**Component 4:
Contribute to Global IRS Policy-Setting and Country-Level Policy Development of Evidence-Based IRS; Disseminate Experiences and Best Practices**

4.1 Number of guidelines/checklists/tools related to IRS operations developed or refined with project support	Total number of implementation guidelines, process checklists and program tools related to IRS operations developed or refined using the technical and/or financial resources of the AIRS Project	Y1, Y2, Y3	Data source: Project records – Activity reports Reporting frequency: Semi-annually	By Guideline/checklist/tool	AIRS	17	17	17	17	TBD	
4.2 Number of articles/best practices documents published	Total number of articles or other best-practice documents that have been published in relevant journals or through PMI/USAID communications vehicles	Y2, Y3	Data source: EOSPR Reporting frequency: Semi-annually	By Spray Campaign By IRS Technical Area	AIRS	N.A.	N.A.	TBD	1 ¹⁶	TBD	
4.3 Number of best practice presentations given at national/regional/international workshops and conferences	Total number of project-related oral and poster presentations delivered in national, regional and/or international meetings related to IRS.	Y2, Y3	Data source: Project records – Activity reports Reporting frequency: Semi-annually	By IRS Technical Area	AIRS	N.A.	N.A.	6	2	TBD	

¹⁶ PMI Annual Report 2013

Component 5 (Cross-cutting): Capacity Building, Knowledge Transfer, Gender Inclusion

5.1 Capacity Building (Gender Inclusion)											
5.1.1	Number of people trained in IRS implementation	Total number of personnel trained in IRS implementation using AIRS Project resources. This figure only includes spray personnel such as spray operators, team leaders, supervisors, clinicians; it excludes data clerks, IEC mobilizers, drivers, washers, porters, pump technicians, security guards, etc.	Y1, Y2, Y3	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Gender Percentage of Women Trained	PMI	760	825 M: 733 F: 92 11%	824 M: 709 F: 115 14%	804 M: 697 F: 107	
5.1.2	Number of people trained to deliver or support IRS in target districts ¹⁷	Total number of people trained using AIRS Project resources to implement/support elements of IRS in target districts. This figure includes all cadre that serve a role in IRS.	Y1, Y2, Y3	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Gender By Role (e.g., spray operator, storekeeper) Percentage of women trained	AIRS	1671	1750 M: 1468 F: 282 16%	1656	1543 M: 12607 F: 276 17.9%	
5.1.3	Number of personnel trained as IRS implementation trainers	Total number of personnel trained in Training of Trainers (TOT) for IRS delivery	Y1, Y2, Y3	Data source: Project records – Training reports Reporting frequency:	By Spray Campaign By Gender	AIRS	75	75	85 M: 62 F: 23	72 M: 55 F: 17	TBD

¹⁷ Please see Annex B for disaggregated training targets and results.

			Semi-annually	Percentage of women trained				27,1%	23.6%		
5.1.4 Number of government environmental and/or health officials trained in IRS oversight	Total number of national and sub-national/district government environmental and/or health officials who are trained in oversight of IRS implementation using AIRS Project resources	Y1, Y2, Y3	Data source: Project records – Training reports Reporting frequency: Semi-annually	By Spray Campaign By Gender Percentage of Women Trained Type of government official (e.g. environmental/health)	AIRS	80 DDHU, NMCP, ABE, DDS	80 M:58 F: 22 27.5% DDHU, NMCP, ABE, DDS	92 M: 64 F: 28 30% DDHU, NMCP, ABE, DDS	71 M: 55 F: 16 22.5%	TBD	
5.1.5 AIRS conducted a capacity assessment	AIRS Benin program conducted an assessment of IRS capacity among national and sub-national/district government health officials	Y1, Y2	Data source: Project records – Capacity assessment reports Reporting frequency: Semi-annually		AIRS	N.A.	N.A.	Completed	Scheduling meeting with the NMCP	Completed	
5.1.6 Number of capacity-building MOUs signed by AIRS, NMCP and partners/ institutions	Total number of Memoranda of Understanding (MOU) on provision of local capacity building finalized and signed between AIRS, the Malaria and Other Parasitic Diseases Division (MOPPD), and other local partners and institutions	Y1, Y2, Y3	Data source: Project records – MOUs Reporting frequency: Semi-annually	By Spray Campaign	AIRS	N.A.	N.A.	N.A.	N/A		

