



PMI | Africa IRS (AIRS) Project

Indoor Residual Spraying (IRS 2) Task Order Four

2012 MALI END-OF-SPRAY REPORT

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2012 MALI END-OF-SPRAY REPORT

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Acronyms

Abt	Abt Associates, Inc.
AIRS	Africa Indoor Residual Spraying Project
ASACO	Community Health Associations (<i>Association de Santé Communautaire</i>)
BMP	Best Management Practices
COP	Chief of Party
DNACPN	National Directorate for Sanitation and Pollution Control (<i>Direction National de l'Assainissement, Contrôle de Pollution et de Nuisances</i>)
DTC	Health Center Technical Director (<i>Directeur Technique de Centre</i>)
ECM	Environmental Compliance Manager
ECO	Environmental Compliance Officer
F&A	Finance and Administration
ICC	Inventory Control Cards
IEC	Information, Education, and Communication
IRS	Indoor Residual Spraying
M&E	Monitoring and Evaluation
MRTC	Malaria Research and Training Center
NMCP	National Malaria Control Program (<i>Programme National de Lutte contre le Paludisme</i>)
PSC	Pyrethrum Spray Catches
PMI	President's Malaria Initiative
PPE	Personal Protective Equipment
RTI	Research Triangle Institute International
RTT	RTT Group, Ltd
SEA	Supplemental Environmental Assessment
STTA	Short-Term Technical Assistance
TOT	Training of Trainers
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

Under its Indoor Residual Spraying 2 Task Order Four contract with the United States Agency for International Development (USAID), Abt Associates has assumed the role of lead implementing agent for the President's Malaria Initiative (PMI) supported Indoor Residual Spraying (IRS) project in Mali, and 13 other sub-Saharan countries. In November, 2011, Abt established its project office in Bamako and began the implementation of IRS programming under the project name, the Africa Indoor Residual Spraying Project (AIRS) Mali. The key objective of AIRS Mali in 2012 is to reduce malaria-associated morbidity and mortality in Baroueli, Bla, and Koulikoro districts by completing IRS for an estimated 215,000 eligible structures, and thereby protecting as many individuals as possible.

Due to concerns about the political situation in Mali, following the change of government in March, USAID Mali instructed the AIRS project to cease field activities starting in April. A reinstatement letter from USAID was presented to Abt Associates in June, and allowed for AIRS Mali to move forward with organizing and planning the 2012 IRS campaign. AIRS Mali moved forward rapidly, and prepared for the 2012 IRS campaign in four weeks.

However, USAID and United States Government (USG) policy limited AIRS Mali from working with the Malian government or organizations funded by the Malian government to implement the 2012 IRS campaign. This meant AIRS Mali needed to find solutions to increase supervision, complete entomological monitoring, and organize the IRS campaign at the community-level.

AIRS Mali quickly engaged Community Health Associations (ASACO) throughout the spray districts, and began working with the community-funded Technical Directors of local health centers. Through this direct engagement of communities, AIRS Mali gained instant buy-in from the IRS campaign's beneficiaries, which led to a rapid organization and set-up of operation sites and IRS campaign logistics. AIRS also successfully leveraged its technical staff in Mali, and at its headquarters to develop cost-effective solutions to plan and implement entomological monitoring for the IRS campaign. This included the construction of an in-office insectary.

AIRS Mali achieved the following results during the 2012 IRS campaign, which was implemented for 45 days, between July 23 and Sept 6, 2012:

- Trained 2,371 individuals (87 percent men, 13 percent women), including 778 agents who followed the training of Spray Operators (96.9 percent men; 3.2 percent women).
- 206,295 eligible structures were sprayed, which accounted for 98.1 percent spray coverage.
- 210,217 eligible structures were found in the three districts.
- 762,146 people were protected by the IRS Campaign, which includes 18,561 pregnant women and 145,953 children under five years of age.

As noted above AIRS Mali completed entomological monitoring for the 2012 IRS campaign in place of the Malaria Research and Training Center (MRTC) (MRTC is affiliated with the University of Mali and is funded by the Malian government). Overall AIRS Mali has noted that the residual life of the carbamate-class insecticide used in 2012, Bendiocarb, has fallen below the WHO threshold for effectiveness (80% or higher mortality rate of mosquitoes that come into contact with the sprayed wall) two months after spraying. However, AIRS Mali has also noted the continued effectiveness of carbamate to reduce mosquito density. This result has complicated decisions about recommending carbamates for the 2013 IRS campaign, and will need further review of upcoming entomological data.

Key lessons learned from the 2012 IRS campaign include:

- Communities are interested in and in many areas have the capability to become more involved in IRS, and assist with the planning, organization, and implementation of the spray campaign;
- Beginning an IRS campaign during the start of the rainy season requires more significant planning and flexibility;
- Two data entry centers led to quick turn-around in the collection, data quality testing, and communicating of IRS campaign progress; and
- Optimization of transport and operation sites is important, given the significant costs of renting vehicles, and the need to hire larger staff to manage operations sites.

Résumé (en français)

Sous son contrat "Task Order Four contract" avec l'Agence Internationale de Développement des Etats Unis, (USAID), Abt Associates a assumé le rôle de principal agent d'exécution pour l'Initiative contre le paludisme (PMI) a appuyé le Projet de pulvérisation Intradomiciliaire au Mali, et dans 13 autres pays d'Afrique subsaharienne. En Novembre 2011, Abt a installé son nouveau projet à Bamako et a débuté la planification de la mise en œuvre de la pulvérisation Intra domiciliaire sous le nom de projet, "African Indoor Residual Spraying (AIRS)" ou Programme Africain de Pulvérisation Intra Domiciliaire au Mali. L'objectif clé de la PID en 2012 au Mali est de réduire la morbidité et la mortalité dues au paludisme dans les trois districts: Koulikoro, Bla et Baroueli par la PID couvrant ainsi environ 211 000 structures éligibles et protéger ainsi autant de personnes que possible dans ces trois districts.

En raison de la situation politique préoccupante au Mali, à la suite du changement de gouvernement en Mars, l'USAID Mali a instruit le projet AIRS Mali de cesser ses activités sur le terrain, à partir du mois d'Avril 2012. Une lettre de l'USAID autorisant AIRS à reprendre ses activités a été adressée à Abt Associates en Juin 2012, et AIRS Mali a immédiatement procédé, en quatre semaines, à l'organisation et à la planification de la campagne PID de 2012. Cependant, la politique de l'USAID a instruit AIRS Mali de ne pas travailler avec le gouvernement malien, ou les organismes financés par le gouvernement malien au cours de la mise en œuvre de la campagne PID 2012. Cela signifiait que AIRS - Mali devait trouver des solutions pour accroître la supervision, compléter la surveillance entomologique, et organiser la campagne PID au niveau communautaire.

AIRS-Mali a rapidement engagé les Associations de Santé Communautaires (ASACO) dans les districts couverts, et a commencé à travailler avec les Directeurs Techniques des Centres de Santé financés par la Communauté. Grâce à cette participation directe des communautés, AIRS-Mali a eu une adhésion de bénéficiaires à la campagne IRS, ce qui a conduit à une réparation rapide des sites et une mise en place de la logistique pour la campagne. AIRS a également misé avec succès sur son personnel technique au Mali et sur son siège pour développer des solutions rentables pour planifier et mettre en œuvre la surveillance entomologique pour la campagne PID, y compris la construction d'un insectarium au niveau du bureau.

AIRS Mali a obtenu les résultats suivants au cours de la campagne PID 2012, qui a été effectuée pendant 45 jours, entre le 23 juillet et le 6 septembre 2012:

- Formation de 2,371 personnes (87 pour cent d'hommes, 13 pour cent de femmes), dont 778 personnes qui ont suivi la formation des agents pulvérisateurs (96.9 pour cent d'hommes, 3.2 pour cent de femmes).
- 206,295 structures ont été pulvérisées, ce qui représente 98.1 pour cent de la couverture de pulvérisation
- 210, 217 structures éligibles ont été trouvées.
- 762,146 personnes ont été protégées par la Campagne PID, qui comprend 18,561 femmes enceintes et 145,953 enfants de moins de cinq ans.

Comme indiqué ci-dessus, AIRS-Mali s'est engagé dans la surveillance entomologique pour la campagne PID 2012 à la place de (MRTC) (MRTC est affilié à l'Université du Mali et est financé par le gouvernement du Mali). Dans l'ensemble, AIRS Mali a noté que la durée de vie résiduelle du Bendiocarb, un insecticide de la classe des Carbamates, est tombée en dessous du seuil de l'OMS pour l'efficacité (80% ou un taux plus élevé de mortalité des moustiques qui entre en contact avec la paroi pulvérisée) deux mois après la pulvérisation. Cependant, AIRS Mali a également noté l'efficacité continue du carbamate dans la

réduction de la densité des moustiques. Ce résultat a rendu difficile la prise de décision sur le fait de recommander des carbamates pour la campagne PID 2013, et il faudra une révision plus approfondie des données entomologiques futures.

Les leçons tirées de la campagne PID 2012:

- Les communautés sont intéressées dans la PID et dans de nombreux cas elles ont la capacité de s'impliquer davantage dans la PID, et aider à la planification, l'organisation et la mise en œuvre de la campagne de pulvérisation;
- Débuter la campagne PID pendant la saison des pluies nécessite une planification et une flexibilité assez importante.
- Deux centres de saisie ont conduit à une collecte rapide, un contrôle qualité des données et une communication des progrès réalisés au cours de la campagne.
- L'Optimisation du transport et des sites d'opérations est importante, étant donné que les coûts de location de véhicules sont élevés, ainsi que la nécessité d'embaucher plus de personnel pour gérer tous les sites d'exploitation.

1. Introduction

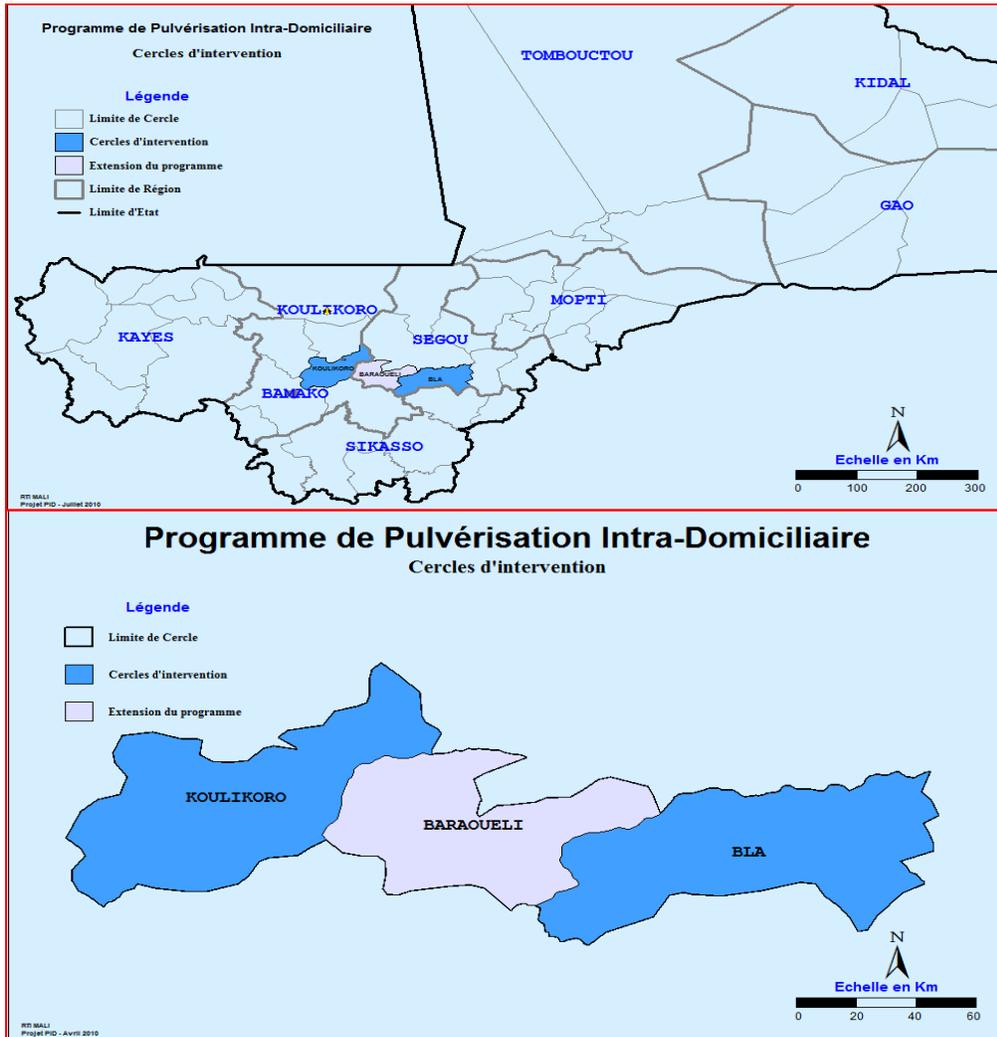
Under its Task Order Four contract with the United States Agency for International Development (USAID), Abt Associates has assumed the role of lead implementing agent for the President's Malaria Initiative (PMI) supported Indoor Residual Spraying (IRS) project in Mali, and 13 other sub-Saharan countries. In November, 2011, Abt established its project office in Bamako and began the implementation of IRS programming under the project name, the Africa Indoor Residual Spray (AIRS) Mali. The key objective of AIRS Mali in 2012 is to reduce malaria-associated morbidity and mortality in Baroueli, Bla, and Koulikoro districts by completing IRS for an estimated 215,000 eligible structures, and thereby protecting as many individuals as possible.

2. Country Background

PMI has supported IRS in Mali since 2008, initially with IRS programs in Bla and Koulikoro districts. In 2011, PMI added support to IRS programming in Baroueli District, thus making the IRS supported area geographically continuous.

Because of the short residual life of the carbamate class insecticide used during the 2011 IRS campaign (Bendiocarb) in some areas (particularly southern Baroueli district), PMI-Mali and the National Malaria Control Program (NMCP) agreed to delay the start of IRS campaign in 2012. The spray campaign had previously been completed June through July. In 2012, the IRS campaign would start in July and end in late-August/early-September to assure that the sprayed walls retain their efficacy through the peak malaria transmission season in September and October. AIRS Mali did note to PMI and the NMCP that the start of the 2012 IRS campaign would coincide with the start of the rainy season, and in some areas transport and spraying would experience delays, due to difficult roads, however the timeline for completing the IRS campaign was feasible.

Figure 1: Location of Baroueli, Bla, and Koulikoro Districts



2.1. Political Situation in Mali

In March 2012, the government of Mali experienced instability, with the deposition of the president and the military taking control of government affairs. Following USAID and United States Government (USG) policy, USAID Mali suspended activities for its development programming in Mali, starting in April. Thus the AIRS program was instructed to cease programming outside of its office in Bamako, until further notice.

April through June are important periods for project set-up in the field, however AIRS Mali abided by the USAID Mali's directions, and focused on extensive planning and developing training materials. Abt Associates received a letter of authorization to re-start all AIRS Mali program activities on June 21, 2012, and move forward with the 2012 IRS campaign. However the authorization letter noted that AIRS Mali cannot work with the Malian government or Malian government supported organizations, until further notice.

AIRS Mali made the appropriate adjustments, including devising methods to work with the Malian health system via community health associations, complete supervision, and implement entomological monitoring. The IRS program was launched on July 23, and finished spraying on September 6th, 2012.

2.2. Objectives for 2012 IRS Campaign

As stated in the 2012 AIRS Mali Work Plan, the four objectives for AIRS Mali in 2012 are:

- 1) Cover at least 85% of targeted and eligible structures found in all 3 districts (Baroueli, Bla, and Koulikoro);
- 2) Promote a participatory implementation (at all levels) of the IRS operations in the three health districts of Baroueli, Koulikoro and Bla;
- 3) Continue efforts to develop national and local capacity in organizing, planning, implementation, and evaluating IRS campaigns, with the goal of identifying a plan for sustainability;
- 4) Participate in the development of a national IRS strategy document, and provide further support towards:
 - a. A national-level IRS training manual; and
 - b. Supporting workshops and various training activities to disseminate the national IRS strategy.

Overall, AIRS Mali aimed to cover an estimated 215,000 structures in Baroueli, Bla, and Koulikoro during the 2012 IRS Campaign, and protect as many of the estimated 762,146 that live within these three districts.

2.2.1. Adjustments to Achieve 2012 Work Plan Objectives

As noted above, due to the USG regulations stemming from the political situation in Mali, and thereby the inability of AIRS Mali to work directly with the Malian government, AIRS Mali was unable to work towards completing objectives three and four. AIRS Mali is hopeful, that the program can complete activities towards these objectives in 2013.

For objectives one and two, AIRS Mali adjusted its programming, and worked directly with the ASACOs or Community Health Organizations throughout the spray districts. Fortunately, the health system in Mali is reliant on the community to guide health center services and activities. Working directly with the ASACO allowed AIRS Mali to gain access to health centers (as the ASACOs acted as a go-between for AIRS Mali and the health center staff, and were able to assure access for AIRS Mali). The health centers in Mali are important for IRS, as many storerooms and soak pits were built within health centers.

Additionally, AIRS Mali engaged the Technical Director of Health Centers (DTC, Directeur Technique de Centre) throughout the spray districts. The DTCs are trained health professionals (doctors, nurses, or midwives) and a member of the district or sub-district health center staff. The DTC are responsible for the technical programming and community outreach of health centers. However the DTC are under authority of the ASACO, not the health center staff or the Malian government. Therefore, AIRS Mali worked closely with DTCs to ensure access to storerooms and soak pits at health centers, complete IRS campaign supervision (in place of district health staff), participate in and lead trainings, and to help with communication efforts to hire Spray Operators and Information, Education, and Communication (IEC) mobilizers.

3. Preparation for IRS Campaign

3.1. IRS Campaign Planning

Listed below are the activities that were undertaken to plan and organize the 2012 IRS campaign:

- Development and Completion of 2012 AIRS Mali Workplan (November 2011-March 2012). The work plan was completed by the newly hired AIRS Mali staff and the AIRS core team. Guidance on the work plan was provided by PMI-Mali and PMI-Washington, leading to the final approved work plan in March 2012.
- Internal IRS Campaign Planning (January-July): Beginning in January, the AIRS Mali team began the detailed planning for all activities to be completed within the IRS campaign. AIRS Mali staff met regularly between January and July, to review its organization and planning for the IRS campaign. These meetings included revising training programs and materials, and setting-up standard for the IRS campaign. The internal IRS campaign planning included taking inventory of IRS equipment and commodities left-over from 2011, and making the appropriate procurements in-country and internationally to gain the right inventory for implementing the 2012 IRS campaign.
- Meeting with IRS Steering Committee (February): AIRS Mali introduced itself to the NMCP, National Directorate for Sanitation and Pollution Control (DNACPN), Ministry of Agriculture, and other government and non-government organization stakeholders, and asked for their support in future IRS activities.
- Meeting with Community Leaders in Bla and Baroueli (March): The meetings with community leaders were completed to discuss the new dates for the IRS campaign (given that the NMCP and PMI supported starting spraying in July, instead of June). The meetings also introduced the new AIRS Mali program and staff to community leaders, and held discussions on which community health workers could be available to work as seasonal staff on the IRS campaign. The AIRS Mali team also went over the importance of communicating to all community members not to plaster, paint, or cover sprayed walls for several months after spraying. In 2011, AIRS Mali and PMI-Mali had theorized that re-plastering of houses in Baroueli district, right after the spray campaign, led to immediate declines in the residual life of carbamates. AIRS Mali intended to do a study on this issue in 2012, however the study was cancelled due to the political situation, and the inability of the AIRS Mali team to use the experimental huts owned by the University of Mali. It is important to note that AIRS Mali was scheduled to meet with community leaders in Koulikoro, on March 26, the same day as the most significant political activities in Mali that led to the change in government. This meeting was subsequently cancelled.
- Meetings with ASACO and DTC (June and July): Rapid meetings were undertaken with ASACO members and DTCs throughout the spray districts in June and July; right after Abt received the USAID letter to officially re-start programming. These meeting were completed to assure communities that the IRS campaign would happen in 2012, and to go over the delayed schedule for beginning and implementing the IRS campaign. The meetings also established the roles and commitments of the ASACO and DTC in implementing the IRS campaign.

3.2. Pre-Spray Environmental Assessment

3.2.1. Geographic Reconnaissance

A very brief geographical reconnaissance was completed by AIRS Mali's Environmental Compliance Officer (ECO) in June. The activity identified areas with difficult geography given the start of the rainy season in July, and would need additional planning for the transport of IRS commodities, Spray Operators and seasonal staff, and the transport of spray campaign data to data-entry sites. Noted below are the difficult areas identified by the reconnaissance activity:

- Swampy areas following the start of the rainy season: Tiénabougou, Bogoni, Kanzangasso (Bla District); Gouendo, Ndjila, Banido, Tesséréla (Baraouéli District); Niamina, Kamani, Tougouni, Tombougou, Tienfala (Koulikoro District).
- Flood-prone areas: Central Bla, Maréla (Bla District); NDjila, Gouendo, N'Gassola, (Baraouéli District).
- Areas where roads are not passable after heavy rainfall: Ngolokouna, Samabogo, Tiénabougou (Bla District); Tombougou, Koula, Tougouni, Niamina, Tamani, Sirakorobougou (Koulikoro District); NGassola, Moabougou, Tesséréla, MPembougou, Gouendo (Baraouéli District).

Overall, the geographical reconnaissance better informed the AIRS Mali team for its scheduling of the 2012 IRS campaign, and for gaining local knowledge of the terrain covered by the IRS campaign.

3.2.2. Pre-Spray Environmental Inspection

Given that AIRS Mali received the authorization to move forward with field work in late June, AIRS Mali completed a rapid pre-campaign environmental inspection in late-June/early-July. During previous years, staff from the NMCP and DNACPN was involved in the environmental compliance inspection; however in 2012 the pre-campaign environmental inspection was completed by the AIRS Mali ECO, Operations Manager, Monitoring and Evaluation (M&E) Manager, and Logistics and Procurement Coordinator.

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

- To examine the location and physical state of store-rooms for storing insecticides and other materials used during the IRS operations;
- To observe the operational condition of the soak pits and rinsing areas;
- To identify areas of environmental non-compliance, and propose a plans for rectifying these issues; and
- Collect data for the completion of the Letter Report.

Since a Letter Report was due on July 2, and the AIRS Mali team did not have enough time to visit all 68 operation sites, the AIRS Mali team inspected 12 operation sites that were used as a representative sample for the other operation sites. The 12 sites that were visited represented the geography of the various operation sites, and the various sizes of operation sites, ranging from small operation sites that support one spray team, to larger operation sites based out of district health centers, where multiple spray teams are based. The Letter Report was approved and the most recent Supplemental Environmental Assessment (SEA) was amended for Koulikoro, Bla, and Baroueli for the following insecticides: pyrethroids, carbamates, and organophates.

The inspections resulted in refurbishing of storerooms, rinsing areas, soak pits, and showers/toilets at the operations sites. Refurbishments were also completed at the three AIRS Mali District Warehouses in Baroueli, Bla, and Koulikoro. Refurbishments for the operation sites were completed by July 20.

Additionally, during the pre-spray environmental inspection, several wash areas were found to be too small to adequately contain all seven barrels needed for progressing rinsing. Working with an AIRS Core staff member who was in Mali assisting with pre-spray campaign set-up, additional plastic sheeting was bought and placed over the wash area slabs and several meters beyond the slab. Thereby, further barrels could be placed in the area to complete progressive rinsing, without worry that wastewater would be spilled on unprotected ground. Additionally the plastic sheeting could be placed over the soak pit draining area, and carefully rinsed. Although this is a good temporary solution, it is clear that the wash area slabs at these operations sites need to be expanded in 2013.

Following the pre-spray environmental assessment, AIRS Mali noticed that most of the fencing used to surround the soakpits during the 2011 IRS campaign was removed and could not be found. The materials used for fencing, straw thatch, are often stolen following the IRS campaign, since the thatch can be used as roofing material. In 2012, the AIRS Mali team installed iron fencing at many operation sites, hoping to prevent theft, and better protect the soak pit areas.

Figure 2: Refurbishments of Operations Site at Kolebougou, Koulikoro District (note the new iron fencing)



Table 1 notes the location of each operation site (where soak pits, wash areas, and storeroom were located) for the 2012 IRS campaign, and if the operation site received storeroom, soak pit, or fencing refurbishments.

Table 1: Refurbishments of Operation Sites for the 2012 IRS Campaign

District	Operation Site Location	Storeroom Refurbished (Yes or No)	Soak pit Refurbished	Fencing Refurbished
Baraoueli	BANIDO	NO	YES	YES
	BARAOUELI TOWN	YES	YES	YES
	BOIDIE	YES	YES	YES
	DOTEMBOU GOU	YES	YES	YES
	DIOFORONGO	YES	NO	NO
	DOUGOUFE	YES	YES	YES
	GARNA	YES	YES	YES
	GOUENDO	YES	YES	YES
	KALAKE	YES	NO	NO
	KONOBOUGOU	NO	YES	YES
	MOABOUGOU	YES	YES	YES
	M'PEBOUGOU	NO	YES	YES
	N'DJILLA	YES	YES	YES
	N'GASSOLA	YES	NO	NO
	NIANZANA	YES	YES	YES
	SANANDO	YES	YES	YES
	SEGUELA	NO	YES	YES
	SOMO	NO	YES	YES
	TAMANI	NO	YES	YES
	TESSERELA	YES	YES	YES
TIGUI	YES	YES	YES	
YERBOUGOU	YES	YES	YES	

District	Operation Site Location	Storeroom Refurbished (Yes or No)	Soak pit Refurbished	Fencing Refurbished
	WONDOBOUGOU	YES	YES	YES
Bla	BENGUENE	YES	YES	YES
	BLA TOWN	YES	YES	YES
	BOGONI	YES	YES	YES
	DIARAMANA	YES	YES	YES
	DIEDALA	YES	YES	YES
	DIENA	YES	YES	YES
	DOUGOULO	NO	YES	YES
	FALO	YES	YES	YES
	KAZANGASSO	YES	YES	YES
	KEMENI	YES	YES	YES
	KOULANDOUNGOU	NO	YES	YES
	KOUTIENSO	NO	YES	YES
	MARELA	YES	NO	NO
	NAMPASSO	YES	YES	YES
	NIALA	YES	YES	YES
	NIAMANA	YES	YES	YES
	PENESSO	YES	YES	YES
	SAMABOGO	YES	YES	YES
	SAMBALA	YES	YES	YES
	TIENABOUGOU	YES	YES	YES
	TONTO	YES	YES	YES

District	Operation Site Location	Storeroom Refurbished (Yes or No)	Soak pit Refurbished	Fencing Refurbished
	SOMASSO	YES	YES	YES
	TOUNA	NO	YES	YES
	YANGASSO	YES	NO	NO
	BOUGOURA	YES	YES	YES
	FANI	YES	NO	NO
	TALO	YES	YES	YES
Koulikoro	CHOLA	NO	YES	YES
	DOUMBA	YES	YES	YES
	GOUNI	YES	YES	YES
	KAMANI	YES	YES	YES
	KENENKOUN	YES	YES	YES
	KOLEBOUGOU	NO	YES	YES
	KOULA	YES	YES	YES
	KOULIKOROBA	NO	YES	YES
	MONZOMBALA	YES	YES	YES
	NYAMINA	YES	YES	YES
	SIRAKOROLA	YES	YES	YES
	SIRAKOROBO UGOU	YES	YES	YES
	SIZANI	YES	YES	YES
TAMANI	YES	YES	YES	

3.2.2. Testing of Mobile Incinerator

The ECO and the Logistics Manager visited the mobile incinerator in Noumoubougou (Koulikoro District) in late June and carried out tests to ensure it was able to reach a high enough temperature to properly incinerate and dispose solid wastes from the IRS campaign. AIRS Mali has been authorized to use this incinerator as it was purchased and procured by PMI, and although it currently sits in a government

facility, it has not been formally handed-over to the government of Mali. The incinerator test was performed with the assistance of a mechanical engineer.

The test showed that the required incineration temperature could not be reached, due to the poor condition of a blower, and leakage within the chimney seal. Thereafter AIRS Mali, upon the advice of the engineer, ordered and procured the following parts: 2 burners, and a 6 meter silicon lanyard (to be used as the seal for the chimney). The parts arrived in October, and were promptly installed on the mobile incinerator.

A follow-up test of the incinerator was completed on November 2, with the engineer and AIRS Mali staff noting that the incinerator is able to reach optimal temperature for solid waste incineration. Therefore the incineration of solid waste began November 7, 2012 and ended on December 1, 2012.

Figure 3: Inspecting the Mobile Incinerator



3.3. Insecticide Selection and Procurement

Carbamate was selected as the insecticide class for the 2012 IRS campaign, based on entomological testing and insecticide resistance monitoring performed by the Malaria Research and Training Center (MRTC) on behalf of the IRS program in 2011. AIRS Mali based their calculations on the information that MRTC provided, however, AIRS Mali was unable to see the susceptibility results done by MRTC in 2011. According to MRTC, in 2011 despite the relative low densities at some sites, MRTC was able to conduct a limited number of WHO bioassays using different insecticides. Results showed full susceptibility to bendiocarb in both Binko and Gomitogo (100% mortality 24 hours after exposure) whereas they showed resistance to pyrethroids and DDT which were tested in Binko only. Pirimiphos-methyl, an organophosphate, was also tested in Binko and results showed 100% mortality (MRTC Annual Progress Report, November 2010-October 2011). The IRS steering committee (directed by the NMCP) formally decided to use carbamates for the 2012 IRS campaign, and the decision was approved by the Ministry of Health, Ministry of Agriculture, DNACPN, PMI-Mali, and the MRTC.

Thereby, AIRS Mali calculated that around 78,000 sachets of carbamate were needed to cover an estimated 215,000 structures in the three spray districts.

After a competitive bidding process, undertaken by the AIRS Core staff, Bendiocarb, manufactured by Bayer, was selected as the carbamate-class insecticide to use for the 2012 IRS campaign.

Since 15,524 sachets of carbamate (Bendiocarb) were already in stock, and could be used for the 2012 IRS campaign, the AIRS project procured an additional 63,000 sachets of Bendiocarb internationally. The shipment of Bendiocarb arrived in Mali on April 1, and after clearing customs was transported to the AIRS Mali district warehouses in Bla, Baroueli, and Koulikoro.

The Bendiocarb was tested for quality control by the South Africa Bureau of Standards. All batches sent to Mali were found to be of good quality. See Annex 10.3. listing the quality control testing results.

During the IRS campaign, AIRS Mali provided 9,600 sachets of Bendiocarb to AIRS Senegal, since the AIRS Senegal team found additional structures during their IRS campaign and needed additional sachets of Bendiocarb to prevent a stock-out. On August 22, AIRS Mali received 9,637 sachets from Bayer, that were ordered by AIRS core staff (and charged to the AIRS Senegal project), as replacement for the sachets provided to the AIRS Senegal project.

3.4. Logistics Planning and Procurement

3.4.2. Personal Protection Equipment Inventory and Procurement

Following the transfer of commodities from Research Triangle International (RTI) (the incumbent for IRS programming in Mali), AIRS Mali completed a full inventory count in all of its district warehouses in January. The AIRS Mali team found most of the inventory, especially the Personal Protection Equipment (PPE), received from RTI was in good shape and of significant quantity for use during the 2012 IRS campaign. Most notably, there was significant quantities of helmets, coveralls, face shields, and face shield brackets, that did not need (or needed very limited) procurement internationally. However, stocks of gloves and face masks were found to be too low, and required procurements. Although the gloves were procured internationally, AIRS Mali decided to procure the face masks locally, noting that face masks were found in high quantities in Mali, and could be purchased for a significantly

cheaper price. Additionally, a large amount of consumables (soap, spray operator cards, IEC materials, etc.) were also procured locally for the IRS campaign.

Overall, procurements were made locally and internationally using an open tender process and collecting bids/quotes on commodities to be purchased. A full list of all commodities that were procured for the 2012 IRS campaign is found in tables 18, 19, and 20 in the annex.

3.4.3. Establishing Logistical Needs for 2012 IRS Campaign

During its internal planning meetings, the AIRS Mali team planned the logistics and transportation for implementing the 2012 IRS campaign. In June, following the geographic reconnaissance and the visits to the operation sites by the Operations Manager, Logistics and Procurement Coordinator, Technical Manager, and ECO, the AIRS Mali team finalized its plans for moving IRS commodities to each operation site. Thereafter on July 22, all IRS commodities were moved from the three district warehouses to the operation sites.

Tables 2, 3, and 4, below denotes the distribution of selected IRS commodities to each operation site per district.

Table 2: Distribution of Selected IRS Commodities to Operation Sites in Koulikoro District

Operations Site	Number of Spray Teams using the Operation Site	Coverall	Boots/pair	Helmet	Spray Pump	Gloves	Face Mask
CHOLA	1	17	09	06	06	13	170
DOUMBA	1	17	09	07	04	18	333
GOUNI	2	29	15	15	10	33	517
KAMANI	2	21	11	10	07	32	325
KENENKOUN	3	39	20	20	14	38	610
MONZOMBALA	2	27	14	10	09	23	331
KOULA	2	27	15	13	09	15	473
KOULIKOROBA	3	37	19	16	11	33	917
KOLEBOUGOU	3	41	20	19	12	55	1125
MASSALA	1	17	09	07	04	20	394
NYAMINA	4	51	26	21	18	43	630
SIRAKOROLA	3	37	19	15	13	32	746
SIRAKOROBOUGOU	2	21	11	10	07	24	291
SIZANI	1	17	12	07	04	22	225
TAMANI	3	35	17	13	12	47	370
TIENFALA	2	21	11	09	05	13	301
TOMBOUGOU	2	21	11	10	07	14	335
TOUGOUNI	2	29	15	15	08	22	363
TOTAL	39	504	263	223	160	497	8456

Table 3: Distribution of Selected IRS Commodities to Operation Sites in Baroueli District

Operations Site	Number of Spray Teams using the Operation Site	Coveralls	Boots/pair	Helmet /complete	Spray Pump	Gloves	Face Mask
BANIDO	2	18	10	08	06	22	360
BAROUELI CENTRAL	6	62	34	31	27	78	1020
BOIDIE	4	39	21	18	14	42	640
DOTEMBOUGOU	2	18	10	09	06	22	200
DIOFORONGO	1	10	06	04	03	12	220
DOUGOUFE	2	23	13	10	08	26	400
GOUENDO	3	29	16	13	10	32	600
KALAKE	3	29	16	14	11	32	600
KONOBOUGOU	6	67	36	31	28	72	1280
MOABOUGOU	2	25	14	11	09	40	300
MPEBOUGOU	1	15	07	05	04	16	220
NDJILLA	1	15	08	07	05	18	240
NGASSOLA	2	18	10	08	06	22	200
NIANZANA	2	20	11	11	07	24	360
SANANDO	3	35	19	16	13	38	500
SEQUELA	2	18	10	09	06	22	400
SOMO	2	25	14	11	09	40	620
GARNA	2	23	12	12	08	26	300
TAMANI	3	31	17	15	11	36	500
TESSERELA	2	20	11	09	07	24	360
TIGUI	1	15	08	06	05	18	320
YERBOUGOU	1	15	08	07	05	18	160
WONDOBOUGOU	2	18	10	08	06	24	360
Totals	55	588	321	273	214	704	10160

Table 4: Distribution of Selected IRS Commodities to Operation Sites in Bla District

Operations Site	Number of Spray Teams using the Operation Site	Coveralls	Boots/pair	Helmet /complete	Spray Pump	Gloves	Face Mask
BENGUENE	2	24	13	10	08	28	480
BLA CENTRAL	6	68	37	30	27	88	2,028
BOGONI	2	19	10	08	07	22	330
DIARAMANA	3	34	18	14	12	38	860
DIEDALA	1	15	08	06	05	18	315
DIENA	3	33	17	14	12	36	700
DOUGOUOLO	2	24	13	10	08	28	420
FALO	4	46	25	20	18	52	1,280
FANI	2	26	14	10	03	30	540
KAZANGASSO	2	21	11	09	07	24	500
KEMENI	3	30	16	13	10	34	885

Operations Site	Number of Spray Teams using the Operation Site	Coveralls	Boots/ pair	Helmet /complete	Spray Pump	Gloves	Face Mask
KOULANDOUNGOU	2	19	10	08	06	22	330
KOUTIENSO	2	21	11	03	07	24	435
MARELA	2	26	14	11	09	30	676
NAMPASSO	3	34	18	14	13	38	630
NIALA	2	26	14	11	10	44	600
NIAMANA	3	34	18	15	12	38	570
PENESSO	1	15	08	06	05	18	238
SAMABOGO	2	13	10	08	06	22	430
SAMBALA	2	19	10	08	06	22	530
SOMASSO	2	26	15	11	10	30	750
TIENABOUGOU	2	24	13	09	08	28	504
TONTO	3	36	19	16	14	40	910
TOUNA	5	54	27	24	20	60	1,068
YANGASSO	3	32	17	14	12	36	840
TALLO	1	15	08	06	05	18	324
BOUGOURA	1	10	06	04	03	14	252
TOTAL	66	744	400	312	263	882	17425

3.5. Human Resources

AIRS Mali hired 2,248 seasonal staff to implement the 2012 IRS campaign. This included 1,853 men and 395 women. Table 5 below provides a full breakdown of the number of men and women hired for each seasonal staff position.

Table 5: 2012 IRS Campaign Seasonal Staff

Position	Men	Women	Total
District Coordinators	3	0	3
District Logisticians	3	0	3
Data Clerks	9	12	21
Pump Mechanics	6	0	6
District Warehouse Managers	3	0	3
Finance Assistants	2	1	3
Transporters for IRS Data	9	0	9
Spray Operators	540	10	550
Supervisors	66	2	68
Team Leaders	148	12	160
Storekeepers	65	3	68
IEC Mobilizers	999	241	1240
Washers	0	114	114

Position	Men	Women	Total
Total	1853	395	2248

AIRS Mali placed job advertisements for some of the seasonal staff in Malian newspapers in June. However, priority was given to hire seasonal staff from previous IRS campaigns that had performed well.

Overall, Spray Operators, Team Leaders, pump mechanics, and washers were recruited in each spray area by the head of the ASACO and the DTC, based on criteria developed by the AIRS Mali technical staff. This criteria included: all Spray Operators were required to be able to read and write, and carry spray pumps for several hours per day, as well as to have a certified note from a doctor stating that they are in good health (and for women noting that they are not pregnant). Additionally, all Spray Operators were required to be individuals respected within their communities, and have had experience working on community health activities.

3.6. Trainings

AIRS Mali implemented eight training sessions for its seasonal staff. The objective of the training was to ensure all seasonal staff was aware of their roles and understood how the IRS campaign would function (particularly with regards to supervision, and the lack of government involvement in the IRS campaign). Additionally the training sessions covered the precautions that should be undertaken and what to do in case of emergency situations (such as poisoning from insecticide). The trainings also reinforced to all seasonal staff the value of their work in preventing malaria transmission.

Although the trainings were originally intended to include government staff (as trainers and trainees), due to the USG restrictions, all training sessions were led by AIRS Mali staff, with support from the DTCs. All trainings took place between July 5 and July 19.

Listed below are descriptions of the trainings that took place in 2012:

Training of Trainers in IEC: Three trainings took place (one per spray district), between July 5 and July 7. The trainings covered key messages for the IEC mobilizers to communicate before, during and after the IRS campaign to prepare households for the IRS campaign, provide information on malaria prevention, and gain information to answer household member questions. The DTC participated in many of these trainings, and were available to speak about correct malaria outreach programming that the health centers provide.

Training of IEC Mobilizers: A one-day training session was organized in the 68 health areas by the DTCs for all IEC mobilizers. In total, 1,240 Mobilizers and 68 IEC Supervisors were trained on the following issues:

- General information about malaria transmission, treatment and prevention;
- Schedule and details of IRS campaign activities; and
- Best practices and strategies for informing household members about the IRS campaign.

Training of Trainers for IRS Spray Campaign Operations: Since the AIRS Mali program hired most of the same District Coordinators from the 2011 IRS campaign; this training was more of a refresher course, to make sure the District Coordinators remained cognizant of the key issues to discuss during the spray operator training. The training was held in Segou, on July 12 and 13. The training was also attended by DTCs.

Training of Spray Operators: Spray Operator training was completed July 17-19, at five different training sites in each district. The training covered spray technique and rinsing spray pumps, scheduling and the methods for completing the 2012 IRS campaign without Malian government staff, and the correct ways for working with households, before, during, and after spraying. Over 778 persons participated in the training; many of these individuals had worked on past IRS campaigns. A post-test was provided at the end of the training, with the individuals that scored highest on the test becoming IRS campaign supervisors, and Team Leaders. All participants received spray operations training, but only 550 participants became Spray Operators, the other 228 participants were selected for other positions within the spray campaign.

Figure 4: Spray Operator Practicing Spraying a Wall during Training



Orientation of the Supervisors, Team Leaders, and Storekeepers: An orientation session was organized in each district for the supervisors, Team Leaders, and storekeepers selected after the Spray operator training. The session was led by the AIRS Mali team, and went over supervision tasks and strategies, and the responsibilities and tasks of the storekeepers.

Training of Data Clerks: 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. Overall, 21 data clerks were trained and assigned to two database entry centers (one in Bamako and one in Segou).

Training of Drives: Drivers hired to transport IRS commodities and spray teams learned correct methods to secure and safely handle insecticides. Participants also learned how to manage an insecticide spill, and safely clean vehicles after each day of the IRS campaign.

Training in Management of Insecticide Intoxications Cases: An orientation session was organized in each district for the DTCs. The training went over the correct protocol and methods to be followed to

treat Spray Operators should any be injured or fall sick from the IRS campaign. In turn, the DTCs were asked to present this information to the District Health Staff, on AIRS Mali's behalf.

Training of Entomological Technicians: Since AIRS Mali completed entomological monitoring for the 2012 IRS campaign, the entomological technicians (who supported the AIRS Mali Entomologist) were trained in mosquito field collection practices, insectary maintenance, identifying mosquito breeding sites, larval and pupae collection, identification of *Anopheles* larvae from *Culiciene*, and managing human landing catches.

Table 6 below, provides a breakdown of the number of people trained before the 2012 IRS campaign.

Table 6: Participants in 2012 IRS Campaign Trainings

Categories of Persons Trained	Training on IRS Delivery						Other Trainings											
	Training of Trainers		Spraying Operations		Data Capture		Logistics Training		Structure Enumeration/ IEC TOT		Structure Enumeration/ IEC Training		Medical Treatment of Intoxication Cases		Transport/ Security		Entomological monitoring	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Technical Directors of Community Health Center	28	2							62	8			52	9				
District Coordinators	3																	
Spray Operators			540	10														
Data clerks					9	12												
Supervisors			66	2														
Team Leaders			148	12														
Storekeepers							65	3										
Mobilizer agents											999	241						
Entomologist Technicians																	6	4
Drivers															90			
TOTAL M/F	31	2	754	24	9	12	65	3	62	8	999	241	52	9	90	0	6	4
TOTAL/ training	33		778		21		68		70		1240		61		90		10	

4. Communications

The AIRS Mali staff developed the communication activities for 2012 based on the cumulative lessons learned and experiences gained by the IRS team from the 2008–2011 spray rounds. Immediately following the authorization to re-start the IRS campaign field activities, AIRS Mali began working with ASACO members and DTC to make initial contacts with community leaders (traditional village chiefs, religious leaders, and other community organizations and associations (especially women's associations)) to brief people that the 2012 IRS Campaign would start at the end of July. Community

meetings were also arranged between AIRS Mali staff and community leaders to begin the IRS campaign sensitization process, and to ask community leaders to begin discussing with community members how to prepare their structures for the IRS campaign.

AIRS Mali had originally intended to complete numerous communication activities before the IRS campaign. This included, enumeration, to gain a better understanding of the exact location of eligible spray structures in the spray districts, and organizing theater groups and puppet shows concerning malaria messaging. Regrettably, due to the short time period to prepare for the IRS campaign, these activities were cut.

Communication activities that were completed in 2012 include:

Newspaper Articles: Several articles were published in Le Républicain, L'Indépendant and Les Echos newspapers during the first week of the IRS campaign, providing the schedule for the IRS program, and the benefits of the IRS program. Following-up articles were published in October, listing the results of the IRS campaign, and interviewing beneficiaries about what their structures are like after the IRS program. All articles noted that appreciation for USAID and PMI for funding the IRS program.

Door-to-Door Mobilization: Following the training of IEC mobilizers in early July, the IEC mobilizers visited communities throughout the spray districts that would be covered by the 2012 IRS campaign. The IEC mobilizers spoke with as many individuals that used the eligible structures, and made sure to discuss:

- The benefits of IRS with regards to malaria prevention;
- How to prepare a structure for the spray campaign and to wait two hours after spraying to re-enter the structure;
- To not allow animals near the structure during and after the spraying;
- To sweep up and dispose any insects that were killed by the spraying;
- Importance of continuing to use mosquito nets; and
- When to expect the Spray Operator in their area.

Additionally, given that there was concern after the 2011 IRS campaign of individuals painting over and applying new plaster, to sprayed walls, right after the IRS campaign, IEC mobilizers informed all beneficiaries to wait until January 2013 before applying any paint, plaster, etc. to the walls that were sprayed in their structure.

One day before the launch of spraying, IEC mobilizers re-visited communities throughout the spray districts, and notified individuals of the spray campaign schedule, and reminded people to properly prepare their structures for the sprayers over the next few weeks.

Throughout, the door-to-door mobilization efforts, IEC mobilizers gave away 8,500 IRS promotion t-shirts, and 2,000 caps. Also 237,870 flyers and leaflets were given-out by IEC mobilizers, promoting the IRS program, and providing instructions for how structures should be prepared for the IRS campaign.

Table 7 denotes the results of the door-to-door mobilization efforts.

Table 7: Results of Door-to-Door Mobilization

District	# of Adults Sensitized by door-to-door mobilization			Most common reason individuals not sensitized
	Male	Female	Total	
Baraouéli	24,940	32,410	57,350	Absence, individuals work in the fields
Bla	62,285	73,940	136,225	Refusal, family members unwilling to let stranger into household
Koulikoro	15,904	19,512	35,416	Refusal, family members unwilling to let stranger into household
Total	103,129	125,862	228,991	

Overall, door-to-door mobilization sensitized 228,991 adults in the three spray districts. AIRS Mali noted

- IEC activities started later than usual. In July when the rains begin, many adults work in their fields most of the day, and were absent from their communities to receive the door-to-door mobilization. AIR Mali notes that next year the door-to-door mobilization will definitely start earlier in May/June.
 - In some cases with the heads of households out in the fields, family members refused IEC mobilizers. In these communities it is traditionally unacceptable to let a stranger into a household, unless the head of the household is present, or the stranger is accompanied by the village chief.
- Additionally, since the door-to-door mobilization coincided with the rainy season, in some areas roads became difficult or impassable and often delayed the ability of IEC mobilizers to reach all communities.

Radio Broadcasts: Since radios are widely used and listened to throughout the spray districts, AIRS Mali made sure to use radio broadcasts to ensure wider dissemination of IRS spray campaign information, particularly the schedules of which communities would be covered by the IRS campaign. Therefore AIRS Mali signed several agreements with local radio stations, to broadcast a variety of programs in French and Bambara to further promote IRS campaign messaging.

The radio programs that were produced for the IRS campaign included:

- Radio announcers visiting communities covered by the IRS campaign and recording interviews with Spray Operators, washers, Team Leaders, and District Coordinators about how their work was progressing. Interviews were also completed with DTCs, ASACO members, AIRS Mali staff, and Village Chiefs to discuss what they had observed during the IRS campaign.
- Radio stations also produced small concerts in various communities, where griots and other musicians played songs about malaria and IRS. The concerts were played live over the air. Additionally the radio station staff worked with AIRS Mali to include messaging about the 2012 IRS campaign. The audiences at the concerts were quizzed about the IRS campaign, with individuals answering questions correctly receiving an IRS campaign t-shirt or cap.

Table 8 below provides a quick list of the total number of radio programs broadcasted during the IRS campaign.

Table 8: Radio Broadcasts during the IRS Campaign

Activity	Number of Broadcasts
Radio Programs	65
Interactive Shows	6

5. Implementation of IRS Activities

The 2012 IRS campaign started on July 23. AIRS Mali decided not to complete an opening ceremony in 2012, given the short time to prepare for the IRS campaigns, and the inability to include the government of Mali in the IRS campaign.

On July 23, AIRS Mali had all contracted radio stations in the three spray districts make a general announcement that IRS spray campaign had started.

5.1. Spraying Operations

The 2012 IRS campaign lasted for almost seven weeks, and ended on September 6. 160 spray teams were deployed for the 2012 IRS spray campaign. The distribution of spray teams was determined by the number of eligible structures per district, and the geography/terrain that the spray teams would cover.

Table 9 below notes the distribution of spray teams per district.

Table 9: Distribution of Spray Teams by District

District	No. of Spray Teams	No. of Eligible Structures per District
Bla	66	87,145
Baroueli	55	69,668
Koulikoro	39	53,404
TOTAL	160	210,217

Considering the importance of supervision in IRS, spray teams were kept as small as possible. Spray Operators were assigned to spray teams consisting of four or five Spray Operators and one team leader. Additionally, field supervisors were deployed to monitor four spray teams each. The supervisors in-turn were supervised by the District Coordinator, and informally by the DTC. Table 10 provides a summary of supervision completed during the IRS campaign.

Table 10: Supervision during the 2012 IRS Campaign

IRS Campaign Staff Member	Supervision Activities
AIRS Mali Chief of Party	Directed all aspects of the 2012 IRS Campaign, and ensured IRS campaign met its goals and objectives. Directly supervised AIRS Mali Technical, Operations, and Finance and Administration (F&A) Managers.
AIRS Mali Technical Manager	<p>Supervised: Entomologist, ECO, M&E Manager</p> <p>Tasks: The Technical Manager coordinated the entomological and environmental compliance monitoring of the IRS campaign. Additionally the Technical Manager supervised the Monitoring and Evaluation (M&E) activities, and data entry and reporting. The Technical Manager worked closely with the Operations Manager to monitor the quality of the IRS activities.</p>
AIRS Mali Operations Manager	<p>Supervised: Logistics and Procurement Coordinator, District Coordinators, and DTCs.</p> <p>Tasks: The Operations Manager coordinated all IRS implementation activities, ranging from supplying storerooms with IRS commodities to ensuring transport for the Spray Operators. The Operations Manager ensured that all activities are carried out in accordance with the IRS campaign's schedule</p>
AIRS Mali ECO	<p>Supervised: N/A</p> <p>Tasks: The ECO ensured environmental compliance for all IRS activities. The ECO led the pre-, mid-, and post-spray environmental inspections, and made sure soak pits and rinsing areas were functional.</p>
AIRS Mali M&E Manager	<p>Supervised: Database Manager and Data Clerks</p> <p>Tasks: Assured the daily entry of spray operations data into the database. Provided quality controls, including random spot checks in the field to assure the data collected and entered into the database is accurate.</p>

IRS Campaign Staff Member	Supervision Activities
AIRS Mali Entomologist	<p>Supervised: Entomological Technicians</p> <p>Tasks: Completed all entomological monitoring activities, including the testing for spray quality during the first week of the IRS campaign. Helped establish the AIRS Mali insectary.</p>
AIRS Mali Logistics and Procurement Coordinator	<p>Supervised: District Warehouse Managers and District Logisticians</p> <p>Tasks: Kept track of all inventory for the 2012 IRS campaign, and organized logistics for moving inventory to operation sites, to prevent stock-outs.</p>
Warehouse Manager	<p>Supervised: N/A</p> <p>Tasks: Recorded all issues and reception of IRS commodities at the district health stores. Works closely with Logistics and Procurement Coordinator to organize transport for sending IRS commodities to operation sites.</p>
District Coordinator	<p>Supervised: Warehouse Manager, District Logistician, Supervisors, Spray Team Leaders, Spray Operators, Washers, etc.</p> <p>Tasks: Provided communicatory and supervisory link between AIRS Mali staff and seasonal spray staff in each district. Ensured the quality of the spray operations and washing/rinsing of equipment. Provided final data quality check, before spray data was transferred to the data-entry centers. Completed problem-solving as needed.</p>
District Logistician	<p>Supervised: Operation Site Storekeepers</p> <p>Tasks: Kept track of inventory at the operation sites to guard against stock-outs, and worked as the main liaison between the warehouse manager and operation site storekeeper.</p>
DTC and ASACO Members	<p>Supervised: N/A</p> <p>Tasks: The DTC and ASACO members served as the bridge between AIRS Mali and district health staff, to coordinate the use of operation sites. Provided direct link to the community, especially for handling community concerns about the IRS campaign. DTC also completed some IRS spray supervision, and reviewed spray campaign data.</p>
Supervisor	<p>Supervised: Spray Team Leaders, Operation Site Staff (Washers, Storekeepers, Guards, etc)</p> <p>Tasks: Supervised and evaluated the work of spray teams in the field, and inspected sprayed structures to ensure the quality of spraying and that all protocols have been fully followed. Facilitated daily meetings with spray teams to review lessons learned, problem</p>

IRS Campaign Staff Member	Supervision Activities
	solve field issues/concerns, and provide an overview of following day's schedule. Also reviewed spray campaign data to ensure accuracy.
Spray Team Leader	<p>Supervised: Spray Operators</p> <p>Tasks: Oversaw the work of Spray Operators to ensure they are following all spray protocol necessary to maintain spray quality. Reviewed data collected to ensure accuracy. Ensured that spray equipment and PPE is properly used, cleaned, and maintained by Spray Operators.</p>

During the spray campaign all operations sites were staffed by storeroom keepers, guards (one for night, and one for the day), washers, supervisors for monitoring the work of the spray teams, and transport vehicles for moving Spray Operators to and from spray sites.

Spray operations began at 6:00am with the spray personnel meeting at their designated operation site to pick up PPE, pumps and insecticide for the day. Once spray equipment and materials were distributed, the supervisor met with the spray Team Leaders, and shared the schedule regarding which communities would be sprayed, and the route to take to reach each community.

The spray teams departed for the communities to carry out spraying and returned to the operation site around noon or 1 pm. On their return, Spray Operators lined up for progressive rinsing of their spray pumps, and then removed coveralls and PPE for washing by the washers. Spray Operators also returned all insecticide sachets (either empty or unused) to the secondary storekeeper. The latter placed empty sachets in a tightly closed drum within the storeroom to await transport for solid waste disposal after the IRS campaign, but also to provide a collection point to count/verify empty sachets against the number of sachets used. The unused sachets were returned to the available stock-on-hand and were distributed the following spray campaign days.

IRS district teams, in close collaboration with the DTC, provided oversight to achieve Abt's goal of providing day-to-day operational management and support for IRS implementation, including all aspects of monitoring and quality assurance for spray operations.

The AIRS Mali staff, most notably the Chief of Party, Operations Manager, Technical Manager, ECO, Logistician, M&E and Database Manager spent considerable time in the field providing spray campaign supervision, and working directly with spray teams to improve the quality of all IRS activities.

Overall, the 2012 IRS campaign did not experience any insecticide poisonings or spills, and no injuries were reported. However, the seasonal staff did find that the face masks purchased locally were of poor quality, and did not provide enough protection. To solve this issue, the operators were asked to use two masks to cover their mouth and nose each day instead of one. In 2013, face masks are likely to be procured internationally.

Overall, AIRS Mali found communities were very receptive to having their structures sprayed.

5.2. Quality Control Testing and Monitoring

During the first week of the 2012 IRS campaign, AIRS Mali's Entomologist completed spray quality testing in several communities throughout the spray districts. The quality testing was completed via World Health Organization (WHO) wall bioassays; 24 hours after a structure's walls were sprayed. Initial spray quality results in Feya (Koulikoro District), and Bouadie (Baroueli District) found mosquito mortality rates around and under the 80 percent efficacy threshold, at 66 percent and 81 percent respectively. Other communities where wall bioassays were completed had mortality rates of 98 percent to 100 percent.

The AIRS Mali team concluded that poor quality spraying had been completed in Feya and Bouadie. The AIRS Mali Technical Manager and District Coordinator organized one-day refresher trainings for the operators that sprayed Feya and Bouadie, and AIRS Mali staff and District Coordinators closely supervised the spray teams work in two nearby communities, N'dentila (Koulikoro District), and Kamba, (Baroueli District). Thereafter the Entomologist performed wall bioassays in N'dentila and Kamba, where the sprayed walls registered 100 percent mosquito mortality.

5.3. Goizper Pump Pilot

Since February, AIRS Core and AIRS Mali staff had been in discussions with Goizper representatives in the United States and Mali about testing the use of Goizper spray pumps during the 2012 IRS campaign.

Goizper pumps are made of plastic, and they are cheaper to buy, repair and replace, and lighter to carry than the standard Hudson spray pumps used in most IRS countries. Additionally, AIRS had noticed that the Goizper pump's jet provided better pressure control, and more even coverage of sprayed surfaces. AIRS Mali received several pumps from Goizper's local representative in June for testing during the IRS campaign.

The AIRS Mali team with help from the AIRS Technical Director, Dereje Dengela, who was in Mali completing short-term technical assistance (STTA), identified three test areas for using the Goizper pumps: Tienfala (Koulikoro District), Fanindo (Baroueli District) and Samabogo (Bla District). AIRS Mali also spoke with District Coordinators and supervisors and identified the best Spray Operators for the pilot. The Spray Operators received an additional training from July 23 to July 26, on the mechanics of the Goizper pump, and how to use the Goizper pump. An engineer from Goizper's offices in the United Kingdom, and the Goizper representative in Mali led several of the training sessions.

AIRS intended for the Spray Operators to use the Goizper pumps throughout the 2012 IRS campaign, and compare the quality of the sprayed walls with Goizper pumps against walls sprayed by standard Hudson pumps, and gain feedback on the use of the Goizper pumps from the Spray Operators. However, after several days of spraying, the pilot was called-off.

The Spray Operators and AIRS Mali staff found the quality of spraying from the Goizper pumps to be satisfactory. However, the mouth of the spray pump tank is narrower than the Hudson spray tank, and required Spray Operators to tear the water soluble insecticide sachets open, in order to pour and mix the insecticide with the water in the spray pump tank. Some Spray Operators tried to physically force the insecticide sachets into the spray pump, but found that this risked the sachet bursting open. Overall this is contrary to the best management practices for IRS, as dropping water soluble bags into the spray

tank, limits the possibility of spilling insecticide when one tears/cuts open a sachet. Also the best management practices require the Spray Operators to avoid direct contact with the insecticide, or with the inner soluble sachets.

Additionally the Goizper pumps have a capacity of eight liters, and the insecticide sachets that are procured for IRS are meant for mixing within a 10 liter spray tank. Therefore the continued use of Goizper spray pumps required careful measuring of insecticide to ensure the right amount was deposited in the Goizper spray pump tank, and several left-over open sachets would need to be disposed as wastage at the end of each spray day. Although the Goizper pump has a flow (pressure) regulator that ensures that eight liters of liquid can spray 250 square meters of wall surface, it was not clear what the effect of the difference in insecticide solution concentration would have on the quality of spraying.

AIRS Core and Mali staff submitted a report regarding the Goizper pump trial to PMI and Goizper, and also discussed with Goizper the limitations in using its spray pump. AIRS Mali and Goizper plan to keep-in-touch, in-case a re-developed spray pump becomes available that meets the specifications of the IRS program.

5.4. Spray Campaign Supervision from AIRS Core Staff

As mentioned above, the AIRS Project's Technical Director, Dereje Dengela, was in Mali for the beginning of the spray campaign. Dereje Dengela helped the AIRS Mali team establish its insectary, develop the project's entomological monitoring plan (and assist with entomological baseline data collection and initial wall bioassay testing), and organize the Goizper spray pump pilot. Additionally, Dereje Dengela helped the AIRS Mali team identify areas that needed further strengthening during the IRS campaign. This included:

- Providing more plastic sheeting to extend wash areas, and ensure all barrels for progressive rinsing can fit in the wash area;
- Pushing for IEC mobilizers to continue door-to-door mobilization during the IRS campaign as IRS messaging was not received by many people within the spray districts during initial door-to-door mobilization efforts;
- Providing minor training and corrective adjustments to spray teams to improve the quality of their work.
- Advising AIRS Mali to increase the number of spray teams at each operation site for future IRS campaigns, as the number of support staff were very cost-inefficient for many operator sites that only supported one spray team.

5.5. Stock Management during the IRS Campaign

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

AIRS Mali used inventory control cards (ICC) for recording each item in the three district warehouses (Baroueli, Bla, and Koulikoro) and operation sites. Storekeepers updated the ICC daily regarding the

movement of stock in or out of the storeroom. Storekeepers were also required to conduct routine physical stock counts daily to ensure that the actual stock in storerooms matched the ICC record.

Every morning during the spray campaign, the Team Leaders with the storekeepers would organize, distribute, and sign-out all PPE to be used for the spray operations. The storekeepers also organized and distributed all PPE to the washers and other IRS staff as needed. At the end of each day, 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 count to ensure that all inventory was returned.

Regarding the sachets of Bendiocarb, at each operations site, storekeepers handed over to the Team Leaders the number of sachets of Bendiocarb that each Spray Operator would use for spraying that day. The Team Leaders signed a special card to acknowledge receipt of the sachets of Bendiocarb. The special cards also noted the codes of the sachets received, for further tracking if needed. The team leader also noted on another card, the number of sachets provided to each Spray Operator, and the codes for the sachets issued to each Spray Operator.

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

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

A mid-campaign inventory was completed by the District Logician for each operation site in their district, and the balance of the inventory counted was reconciled with the inventory balances at each district warehouse. Additionally, the AIRS Mali Logistics and Procurement Coordinator reviewed the inventory balances, and used the mid-campaign inventory as the basis for sending needed IRS commodities to each operation site, during the second-half of the IRS campaign.

Overall, as found in Table 11, AIRS Mali noted the following inventory and usage of Bendiocarb during the IRS campaign.

Table 11: Usage of Insecticide during the 2012 IRS Campaign

Transaction	Balance
Remaining 2011 Bendiocarb stock	15,524
Additional Bendiocarb procured and shipped to Mali	63,000
Total pre-spray campaign Bendiocarb balance	78,524
Stock loaned to Senegal	-9,600
Replacement stock bought with funds from AIRS Senegal	9,637
Bendiocarb sachets used during the 2012 IRS campaign	77,187

Additional stock received after the 2012 IRS Campaign for buffer	6,600
Current Bendiocarb Stock Balance in Mali	7,974

5.6. Mid-Spray Environmental Inspection

The mid-spray environmental inspection was conducted by the ECO in the three spray districts from August 8 through August 16, and August 24 to August 30. The ECO used a checklist for the inspection that was based on PMI's Best Management Practices (BMP) manual. The ECO reported the following issues during the mid-spray inspection:

Areas of Strength:

- Security for the operation sites is adequate with all operation sites guarded day and night, good fencing is found around the soakpits and rinsing areas, and doors for the storerooms are fitted with locks;
- All operation sites were using the progressive rinse method correctly, and washing all PPE and rinsing spray pumps as specified in the BMP;
- The danger signs (skull sign, noting the prohibition of eating/drinking or smoking) are visible near all operation sites, soakpits and rinsing areas;
- During the IRS operations, it was noted that all beneficiaries had removed their objects from their structures, or covered heavy furniture with plastic tarps inside the structure;
- Beneficiaries followed the instructions stated by the Spray Operators and IEC mobilizers, and waited at least 2 hours after spraying, before entering their structures;
- All the washers wore PPE while completing their work or when they were in the rinsing area;
- All the women involved in the spraying operations took the pregnancy test on a monthly basis, and the spray campaign did not find any pregnant or breastfeeding women working in the spray locations, soak pits, storerooms, and rinsing areas during the IRS campaign;
- At wash areas that needed extended plastic sheets, the plastic sheets were correctly washed and rinsed above the soak pit drainage area at the end of each spray day;
- The pressure of the spray pumps used by the Spray Operators was found to be at the correct levels during spraying; and
- The empty insecticide sachets were counted accurately at the operation sites at the end of each spray day, and were thereafter collected in plastic bags, while awaiting their transportation to waste containers in the district;

Areas in Need of Improvement:

- An insufficient amount of spill management kits was found at many operation sites. In Bla and Koulikoro districts, it was common to find only one spill kit. The spill kits were often provided to the transport vehicles, in case of an insecticide spill on the transport vehicle, or to provide the kit to Spray Operators, in-case of a spill at a structure. This often left the operation site storerooms without a spill kit for the day. In 2013, more spill kits will need to be purchased and provided to operation sites, spray teams, and transport.
- The AIRS Mali ECO noticed several spray campaign staff eating and drinking within storerooms. The ECO immediately spoke with the spray campaign staff and explained the importance of having face masks on when they are in the storerooms, and they should not eat or drink near the insecticide.

- The soak pits in Gouni, Kourla, and Sirakorola were found to be too close to agricultural fields. In 2013, new soak pits sites may need to be established in these communities.
- The wash areas for several larger operation sites (Bla, Touna, and Baraouéli) were overcrowded at the end of the spray day. This required the storekeeper, Team Leaders, and supervisors to devise specific schedules of when each spray team could return to the operation site, and rinse their pumps and wash their PPE.
- The IEC communication to pen fowl and domestic animals during the spraying of structures was not heeded. Wherever this was observed, the ECO, worked with Spray Operators and beneficiaries to pen all animals. This information was noted and communicated with all spray operation teams that spraying cannot begin until all animals are penned. It was also communicated that Spray Operators who did not follow this directive could be punished.

5.7. Results of Logistics and Supply Chain Analysis by RTT Group, Limited

AIRS subcontracted RTT, Group Limited (RTT) to complete an analysis of the logistics and supply chain systems that support the Mali IRS campaign, and provide recommendations to improve logistics and supply chain operations for future IRS campaigns. Overall RTT found that the AIRS Mali team is knowledgeable of the logistics and supply chain needs of the IRS campaign, and that most of the operation sites were secure. Further, the quantity of PPE and insecticide procured and used for the IRS Campaign are sufficient, and hazardous materials, such as insecticides were handled properly by all IRS Campaign personnel.

The key findings from the supply chain and logistics assessment by RTT include:

- Standardization of IRS programming seems to be strong as the IRS campaign in Mali mirrored programs in Benin and Senegal in spray operations, and understanding of IRS campaign roles and responsibilities, and health and environmental concerns;
- Population in spray areas really appreciate IRS, and offered “special meals” to the RTT team since they were associated with the IRS campaign;
- The AIRS Mali team is very responsive to storage and supply chain needs. For example, the AIRS Mali team replaced locks at several operation site locations, after RTT noted that the previous locks were beginning to rust;
- The spare part kits sent to AIRS Mali do not provide enough pistons, which were continually in short supply;
- The district warehouse in Baroueli is small, and can barely hold all of the IRS items needed for the district;
- There is a need to complete further stock card trainings, as storekeepers at operation sites made mistakes on stock cards, and entered information in wrong columns;
- A tanker was needed to provide fuel in Baroueli district for IRS program vehicles, due to shortages. This is good, but it can be costly;
- Transport vehicles were often crowded, as transporting 12 Spray Operators in some vehicles, meant very little space for the Spray Operators and their equipment;
- AIRS Mali would benefit from developing a better system for storekeepers at operation sites to communicate their PPE and insecticide needs to the district warehouses. The current lack of a communication system means some operation sites were close to stock-outs before they decided to speak with Logistics staff for securing more commodities.

- In turn, the communication system should lead to developing a more frequent commodity replacement system;
- At many operation sites, the amount of IRS commodities in the storeroom was static, and not replenished during the IRS campaign;
- The quantity and quality of face masks were insufficient;
- Boots need to be washed more often;
- Forecasting is static and only occurs once a year; and
- AIRS Mali should consider purchasing more items locally, versus waiting for international shipments for products that can be bought in Mali.

RTT recommended the following ideas for improving logistics and supply chain management:

- Improving shelving at the Bla district warehouse will make a big difference in organization and storage of smaller PPE items;
- AIRS Mali should consider consolidating the Bla and Baroueli district warehouses, and in turn rent a larger, better organized warehouse in Segou. Segou has better warehouse facilities available, better access to communication, and is a larger city that is centrally-located to both districts;
- There are currently 68 operation sites. AIRS Mali should look into consolidating and reducing the number of operation sites in future years, to attain better cost and operations efficiency;
- The Logistics and Procurement Coordinator and the District Logisticians should be provided minutes for their cellphones, as they need to increase their communication with operation site storekeepers;
- In 2013, AIRS Mali should consult its Spray Operators about the size of gloves and boots they wear, and purchase more large boots and gloves;
- Inventory lists and stock cards should be checked more often by the AIRS Mali staff during supervision;
- Forecasting needs to take into account historical trends and data of past commodities procured for the IRS program;
- It would be good to put a rack on-top of the mini-buses that transport Spray Operators. The rack would allow for spray equipment to be stored above the vehicle, and provide more space for the Spray Operators;
- AIRS Mali should consider hiring more seasonal staff (especially Spray Operators) and shorten the spray campaign;
- AIRS Mali may want to see if it can work with other USAID projects that complete programming in Baroueli, Bla, and Koulikoro, and co-transport goods to the spray areas;
- Bonuses should be devised for rewarding good performance by seasonal spray staff; and
- There is very high acceptance of IRS in the spray districts, an expansion of the program to adjacent districts, could be successful.

6. Monitoring and Evaluation of 2012 IRS Campaign

Monitoring and Evaluation for the 2012 IRS campaign closely followed the processes outlined in the 2012 AIRS Mali Work Plan and the M&E Concept Paper developed by the AIRS core team. M&E activities, under the supervision of the Chief of Party, were led by the AIRS Mali M&E Manager and the Database Manager. A secure and reliable Access database that was used in previous spray campaigns was updated by the Database Manager to reflect minor changes to the 2012 AIRS M&E system and

deployed to the data entry centers in Bamako and Segou. Nine data clerks staffed the Bamako data center that received and processed data from Koulikoro District; twelve data clerks staffed the data center in Segou, which received data from Baroueli and Bla Districts.

6.1. Key Objectives

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

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

6.2. Data Management

The AIRS Mali team made revisions to the data collection tools to accommodate the few updates to the AIRS M&E system for the 2012 spray campaigns. As noted above, all updates were incorporated into the Access database to ensure accuracy and consistency of data entry and reporting.

Data clerks entered spray data into the database and transmitted results to the AIRS Mali office in Bamako within 24-48 hours of spray for quality control purposes and the timely generation of weekly client reports that tracked the progress of the 2012 IRS campaign. Once entered, paper forms were filed and temporarily archived at the data centers. Eventually, all data collections forms were transferred to the AIRS Mali office in Bamako for long-term storage. A daily electronic back-up of data was saved to the AIRS Mali server and to an external hard drive for data safety.

Figure 5: Data Clerks Entering Spray Campaign Data at the Segou Data Center



6.3. Data Quality Assurance and Quality Control

Data quality assurance was carried out daily during the IRS campaign by a variety of AIRS staff (i.e. Spray Operators, Team Leaders, District Coordinators, M&E Manager, Database Manager, etc.) Specific activities conducted to ensure data quality included:

Physical Data Verification:

- Spray Operator Level: 100% of spray data collected on spray operator forms were reviewed, arithmetically verified, and signed off by the team leader and the supervisor.
- District Level: District Coordinators, received the paper forms from the supervisors and checked the accuracy of the spray data. Afterward, the spray operator forms were transmitted to the data centers by motorbike messengers (one from each district) each evening.
- Data Entry Level: Data clerks reviewed each form for typos and transcription error and verified the arithmetic calculations on the spray forms before entering the data into the database.

Database Quality Control:

The Access database was developed to contain a series of rules (i.e. user locks and display error messages) that minimized the number of data entry errors. Data clerks also performed double-data entry, whereby they entered the totals line of each spray operator form for “real-time” or immediate reporting of spray progress and spray coverage. Thereafter, data clerks entered detailed data from the spray operator forms line-by-line (i.e. by structure), from which the End of Spray Report and all other official 2012 campaign reports were generated. Discrepancies between totals and detailed data were investigated and reconciled by the M&E or Database Manager whenever errors were found. If discrepancies were found that could not be addressed by the M&E and Database Managers, the District Coordinator was contacted, and interviews with Spray Operators and Team Leaders were completed (if necessary), to examine any data collection issue or problem. Thereafter, the corrected numbers were added to the paper form and entered into the database.

Random Spot Checks

The M&E and Database Managers regularly conducted spot checks of paper forms at both data centers and compared these with data entered into the database to ensure accuracy of data entry by the data clerks. Additionally, the M&E Manager completed random field checks with other AIRS Mali supervisory staff, whereby random structures found by Spray Operators (per data collection forms filed at the data center) were visited and households interviewed about the spray campaign. The M&E Manager compared the data collected from the field visits with data collected by Spray Operators on the paper forms for data quality control and assurance purposes.

6.4. Spray Coverage Results

As noted in table 12, the 2012 AIRS Mali campaign sprayed 206,295 structures for spray coverage of 98.1 percent.

Table 12: Summary of IRS Campaign Coverage

Total # of eligible structures found by Spray Operators	210,217
Total number of structures sprayed	206,295
Spray coverage	98.1 percent

Figure 6 below presents the progress of the 2012 IRS campaign over its 45 operational days. Since enumeration was not conducted in 2012, our denominator for the spray coverage rate was the number of structures found during the 2011 spray campaign.

Figure 6: Daily Spray Progress (23 July–6 September, 2012; 45 Operational Days)

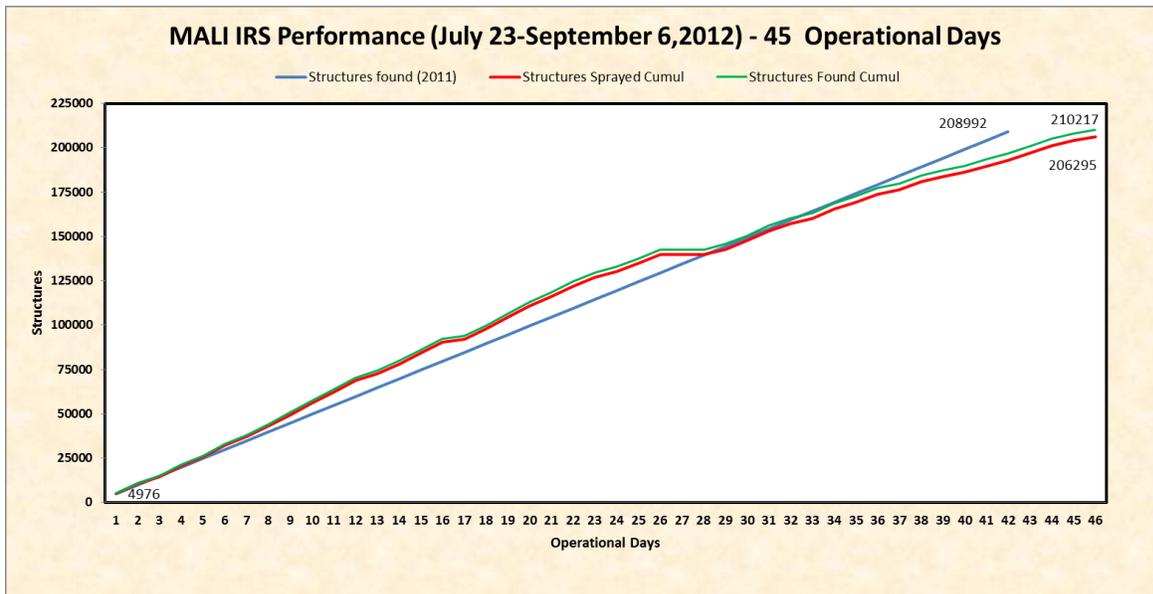
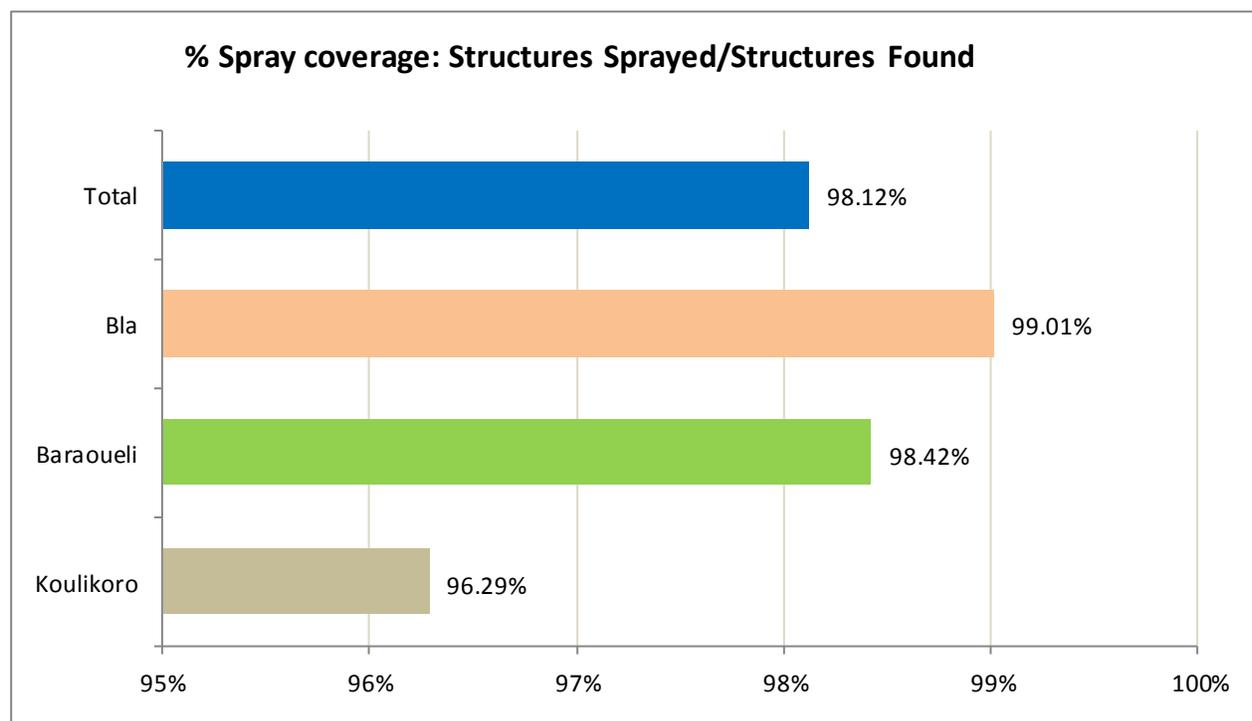


Figure 7 provides a comparison of the percentage of eligible structures sprayed by district. Koulikoro district had the lowest spray coverage, because Spray Operators encountered numerous structures where the owners/head of household were in their fields working, and would not return home until after spray teams had left the area.

Figure 7: Spray Coverage by District (based on eligible structures found by Spray Operators)



6.5. Population Protected

In total, 762,146 people were protected by AIRS Mali during the 2012 spray campaign, including 18,561 pregnant women and 145,953 children under 5 years. Further details, organized per district are found in tables 13 and 14.

Table 13: Spray Coverage and Population Protected

District	Eligible Structures Found	Structures Sprayed	Spray Coverage	Population Protected (total)	Population Protected (percentage)	Children <5 Years Protected	Pregnant Women Protected
Koulikoro	53,404	51,405	96.26%	191,271	96.87%	35,336	5,278
Baroueli	69,668	68,579	98.44%	256,508	99.06%	46,306	5,865
Bla	87,145	86,311	99.04%	314,367	99.26%	64,311	7,418
Total	210,217	206,295	98.1%	762,146	98.58%	145,953	18,561

Table 14: Population Protected, Disaggregated by Sex, and District

District	Total Population Protected		
	Male	Female	Total
Koulikoro	96,696	94,575	191,271
Baroueli	129,290	127,218	256,508
Bla	155,034	159,333	314,367
Total	381,020	381,126	762,146

6.6. Insecticide Usage and Spray Operator Performance

In total, 77,172 sachets of insecticides were used to spray 206,295 structures. On average, 2.7 structures sprayed per sachet of insecticide. Table 15, provides more detail about insecticide usage (by district).

Table 15: Insecticide Usage per District

District	Number of Sachets Used	Number of Structures Sprayed	Number of Structures Sprayed per Sachet	Average Number of Sachets Used per Spray Operator per Day
Koulikoro	20,585	51,405	2.6	11
Baroueli	21,825	68,579	3.1	11
Bla	34,777	86,311	2.5	12
Total	77,187	206,295	2.7	11

7. Entomology

For the previous IRS Campaigns in Mali, the Malaria Research and Training Center (MRTC), a research organization affiliated with the University of Bamako, was contracted by PMI-Mali to complete entomological surveillance.

Due to MRTC's affiliation with the government of Mali (as part of the University of Mali), and USG and USAID policy that did not allow AIRS to work with government-funded organizations in 2012, PMI Mali requested for AIRS Mali to complete entomological surveillance for the IRS campaign.

Since most entomological surveillance results for the 2012 IRS Campaign will be reported in the final entomological report (to be completed in December), this section provides a brief explanation of entomological surveillance that was completed before and during the IRS Campaign.

7.1. Insectary Development

To ensure AIRS Mali's ability to complete entomology monitoring, AIRS Mali established an insectary at its Bamako office. The insectary proved to be inexpensive to build, costing around \$20,000, as AIRS Mali converted a former shipping container into the insectary. The insectary includes 40 feed cages for the mosquitoes, and a humidifier and air-conditioning units to rear adult mosquitoes and sustain mosquito larvae. The insectary also contains the necessary equipment for completing mosquito morphological identification and susceptibility testing.

Figures 8, 9, 10, and 11 are of the AIRS Mali Insectary

Figure 8: Outside of AIRS Mali Insectary



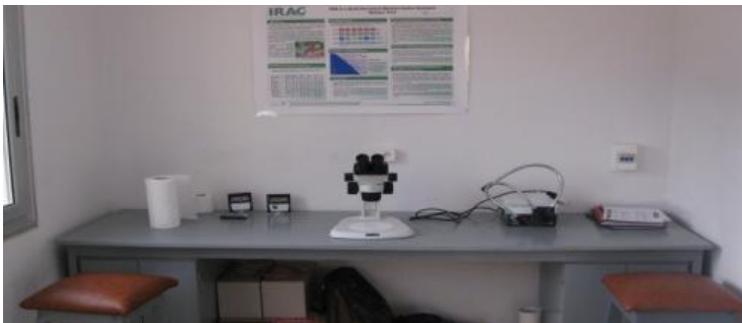
Figure 9: Larval Room



Figure 10: Adult Rearing Room



Figure 11: Species Identification and Test Room



7.2. Lack of Susceptible Mosquito Colony in 2012

Since AIRS Mali did not have access to a susceptible mosquito colony in Mali (given the restrictions from working with MRTC) the AIRS Mali's entomological team collected larvae and pupae from the field, from Baguineda (located in Kati District, a non spray area) and Tienfala (community covered by IRS in Koulikoro District). The larvae and pupae were reared to adults in the newly established Mali AIRS insectary, where the mosquitoes were morphologically identified to species, using the standard mosquito identification key. The susceptibility of *An. gambiae* from Baguineda (non-spray area) to Bendiocarb was determined before their use in wall bioassays during AIRS entomology monitoring.

7.3. Entomological Surveillance Baseline

In July, baseline data was collected by AIRS Mali at two sentinel sites: Tienfala and Baguineda. Since both districts are in Koulikoro Region, their geography, climate, and mosquito composition are comparable. Key results from the baseline data collection include:

- *An. gambiae* were the most prevalent species at the two sentinel sites (71 percent of mosquito composition in Tienfala; 97 percent of mosquito composition in Baguineda)
- The average density of *An. gambiae* per house per night was 30.35 in Tienfala and 77.8 in Baguineda.
- The biting rate of *An. gambiae s.l* per person per night was measured at 90.5 inside, and 103 outside in Tienfala; as compared to 585 inside, and 480.5 outside house in Baguineda.
- The results showed that in Tienfala, the majority of the mosquitoes were exophagic and in Baguineda, the majority was endophagic, although large numbers of mosquitoes were caught

biting both indoors and outdoors in both districts.

- Using mosquitoes reared from the AIRS Mali insectary, susceptibility testing noted, the average mortality rate for mosquitoes exposed to Bendiocarb was 97 percent for mosquitoes from Tienfala, and 96.5 percent at the control-site Baguineda.

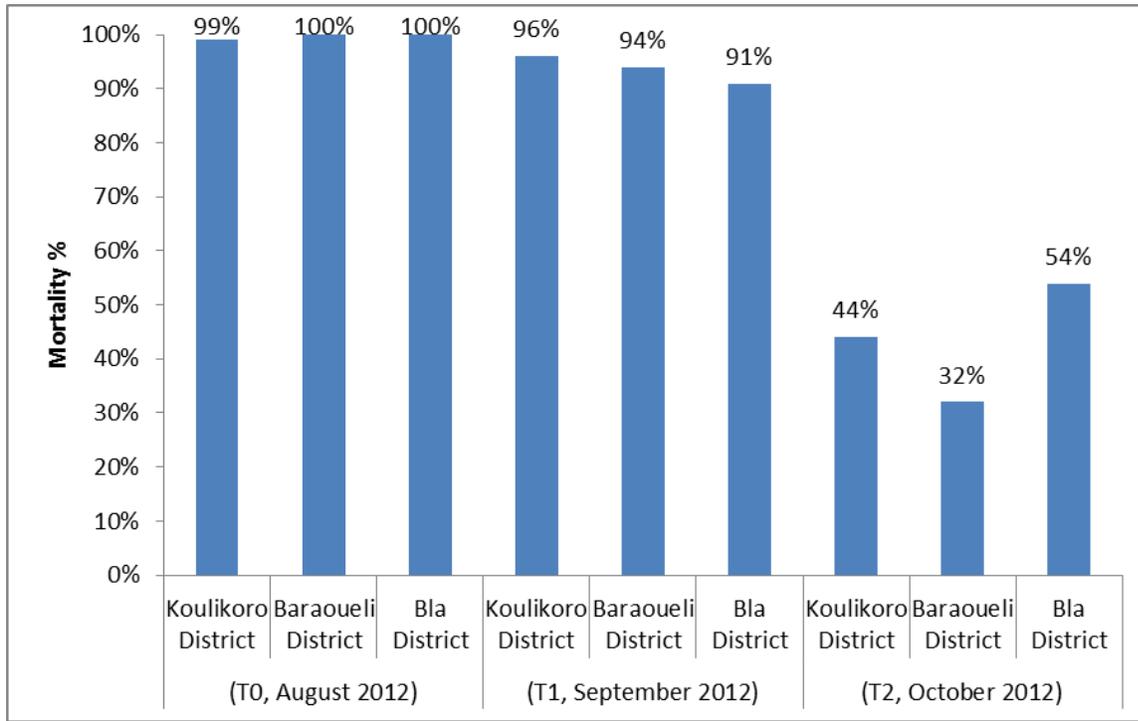
7.4. Entomological Surveillance Monitoring

At the beginning of the IRS campaign, a quality control assessment was carried out at four sentinel sites (Manabougou and N'Dentila in Koulikoro District, Bouadie in Baroueli District, and Niala in Bla District), and at the control sentinel site in Baguineda. The assessment checked the efficacy and homogeneity of insecticide treatment. Mosquitoes reared at the AIRS Mali insectary, were used to assess the quality of spraying and insecticide persistence after spraying as per the WHO recommendation. Thereby, bioassays were performed 24 hours after IRS activities according to the WHO procedures. The first bioassay noted lower than expected mortality rates in Baroueli District at 66% and Koulikoro District at 81%. Noting the low mortality rate in Koulikoro and Baroueli, the AIRS Mali team visited Koulikoro and Baroueli and noted the poor quality of spraying by the spray teams. The spray teams were re-trained during a one-day refresher course and practice. The spray team then sprayed several houses near the sentinel site; a second bioassay was completed, noting good quality of spraying. Since most of the sentinel sites began spraying in August, T0 for the bioassays has been noted as August, 2012.

At T0, AIRS Mali noted mortality rates of 99 percent for Koulikoro District, and 100 percent for Bla and Baroueli districts. Bioassays completed one-month after the IRS campaign started (T1, September, 2012) at the sentinel sites noted mortality rates of 99% in Koulikoro District, 91% in Bla district, and 94% in Baroueli District.

Two months after the IRS campaign (T2, October, 2012) mortality rates were recorded as 44 percent in Koulikoro District, 32 percent in Bla district, and 54 percent in Baroueli District. Although, Although, susceptibility rate to bendicarb of *An gambaie s.l* from Baguineda (use for wall bioassay), the control site was noted as 96 percent. Overall these results definitely question the residual life of Bendiocarb in all IRS districts, as all three districts noted mortality rates lower than the 80 percent threshold. Figure 12, provides a summary of bioassay results from T0 (August, 2012) to T2 (October, 2012).

Figure 12: Percent Mortality of Mosquitoes after 30-minute Exposure to Bendiocarb via WHO Cone Testing, at T0, T1 and T2



7.5. Other Preliminary Entomological Surveillance Findings

Although the residual life of Bendiocarb, two months after spraying has decreased, AIRS Mali has found that the density of mosquitoes remains low in the spray districts after spraying. Pyrethrum Spray Catches (PSC) showed that *An. gambiae* density was reduced by 93% in Tienfala, one month after spraying. One month after the spray of Tienfala the mosquito density was reduced by 93%, while at the same time the density was reduced by only 17% in Baguineda (non-spray area). The difference of density reduction is very high, clearly showing the impact of IRS on mosquito density.

Additionally AIRS Mali found that biting rates at Tienfala decreased minimally from baseline to September, from 90.5 to 87 respectively. Biting rates, however, did decrease more significantly in Baguineda from 585 at baseline to 350.5 in September.

Overall the final results from entomological monitoring in Mali (to be provided in November) will need to be reviewed closely, to determine if carbamates can be used in 2013.

8. Post-Spray Activities

The 2012 IRS campaign was completed on September 6. AIRS Mali decided to forego a closing ceremony due to the political situation in Mali, and the inability to include the NMCP and other government staff in the closing ceremony.

8.1. Post Spray Meetings

District Review Meetings

In September 2012, AIRS Mali staff organized a review meeting in each spray district. The meetings were attended by community leaders (including the DTC, ASACO leaders, village chiefs, representatives from community women's and youth associations, and local NGOs). Additionally, where possible seasonal IRS campaign staffs, including Spray Operators, Spray Team Leaders, District Coordinators, storekeepers, attended the meeting. The meetings provided an opportunity for communities to assess the 2012 spray campaign and provide recommendations for improving IRS programming for the 2013 IRS campaign.

Overall, the communities covered by the spray campaign were appreciative. However, many communities stated that future IRS campaigns should begin their organization with the communities much earlier, to allow more time for planning, and the involvement of more community members.

PMI-Mali IRS Campaign Debrief

AIRS Mali chose to not complete a formal post-spray campaign conference, that are usually completed after IRS campaigns, given the political situation in Mali. Instead, AIRS Mali completed a debrief with PMI-Mali in September. The discussions mostly focused on the spray campaign's performance, lessons learned, and ideas for 2013. PMI-Mali noted that it was impressed by the AIRS Mali insectary. Other discussions included the findings from the USAID environmental audit of the IRS program in Mali.

8.2. Post Spray Environmental Inspection.

The post-spray environmental inspection was performed from October 3 to October 8 in Koulikoro District, October 13 to October 21 in Baroueli District, and October 13 to October 22 in Bla district. The inspection was completed by the AIRS Mali ECO and Logistics and Procurement Coordinator. The inspection's main objective was to make sure all operation sites were properly closed and note any environmental issues that need to be resolved before the 2013 IRS campaign. The findings of the post-spray environment inspection were:

- All IRS commodities had been successfully transported from the operation sites to the three district warehouses;
- Solid wastes from the IRS campaign were also successfully collected from the operation sites and transported to the three district warehouses, where they are stored in secure steel barrels and containers;
- Soak pits and rinsing areas are generally in good shape, although in some areas the inspection team needed to meet with the ASACO and ask for the community to remove weeds and brush that had started to grow in the soak pit drainage area;
- The following storerooms; Sirakorola, Koula, Niazana (in Koulikoro district), Sisanily, NGassola, NDjilla, Wondobougou (in Baroueli District), and Kemeni, Fani, Tuna, and Bogoni (in Bla District) were not thoroughly cleaned. AIRS Mali contacted the storekeepers responsible for these storerooms, and had them sweep, and thoroughly clean the storerooms with soap and water. By the end of October, all storerooms were reported to be clean and ready for shut down.

- In Tienfala, Guni and Sirakorola, village chiefs had removed iron fencing around soak pits and rinsing areas, since they feared the fencing would be stolen. After consulting with PMI-Mali, AIRS Mali met with and requested for the village chiefs to replace the fencing.
- In Somo, the Health Center informed the inspection team that in 2013, the storeroom at the health center could not be used for holding IRS commodities. AIRS Mali is already discussing where to establish a new operations site in the nearby area.
- Yangasso and Guni’s soakpits did not drain quickly and held stagnant water as the rains increased in September. AIRS Mali has decided to close off these soakpits and build new operation sites in the surrounding area.
- The inspection team noted that all materials from the operation sites are well stocked and neatly categorized at the district warehouses. The inspection team found that the remaining products of the campaign are stored separately from other materials.
- However, the ECO also found that some PPE items, particularly boots, were not properly cleaned after the IRS campaign. AIRS Mali re-hired some of the seasonal staff from the campaign, who were available and had them re-clean the boots and other PPE that had not been fully cleaned.

8.3. Solid Waste Incineration

Solid waste incineration began on November 7, and ended on December 1, 2012. The ECO, the Logistics and Procurement Coordinator, and the Technical Director were present to supervise all incineration. Table 16, notes the solid wastes incinerated during that period.

Table 16: Solid Waste from 2012 IRS Campaign Incinerated

Item	Quantity
Sachets	77,187
Masks	31,859
Operator’s bags	167

Other solid waste items, such as glove and flashlights that would release dioxins if they were burned, will be washed thoroughly and either buried or disposed as garbage.

8.4. Post Spray Inventory

Starting in September, all PPE and insecticide were returned to the district warehouses, where the AIRS Mali Logistics and Procurement Coordinator and District Warehouse Managers completed an inventory of all remaining commodities from the 2012 IRS campaign. The results of the inventory are found in tables 18, 19, and 20 in the annex.

8.5. Post Spray Campaign Radio Programs

In September and early October, AIRS Mali funded 12 radio broadcasts in Baroueli, Bla, and Koulikoro districts. The broadcast consisted of short messages and programs that provided the following information:

- The advantages and importance of sleeping in sprayed structures, to prevent malaria transmission;

- The importance of continuing to use insecticide-treated bed nets even after the spraying;
- Noting that beneficiaries cannot apply paint or plaster to sprayed walls until January, to allow for the Bendiocarb to be effective against mosquitoes; and
- General information on malaria transmission, prevention, and treatment.

9. Lessons Learned and Recommendations

9.1. Challenges and Lessons Learned

Administration:

- Beginning the IRS program during the rainy season in July, led to significant delays. This was not only related to difficult to use or impassable roads, which led to transport finding other ways to move Spray Operators and IRS commodities, but also the rains caused many individuals to be unwilling to move their belongings out of their structures and to wait outside while spraying occurred. These delays also led to the IRS campaign finishing a few days later than originally intended.

Figure 13: IRS Vehicle Stuck In Mud during Spraying in August



- The involvement of the ASACO and DTC in the IRS campaign was very positive, and led to not only involving more community members in the IRS campaign, but learning that the communities in the three spray districts are capable of handling more responsibility concerning IRS. AIRS Mali will have to consider ways to further involve the community in future IRS campaigns.
 - The post IRS campaign meetings with the ASACO and community leaders were very beneficial, and allowed for AIRS Mali to gain feedback directly from the IRS campaign's beneficiaries. It was also encouraging to learn that the ASACO and DTCs want to be involved in the 2013 IRS campaign.
- Due to the high cost of renting numerous vehicles in Mali for the spray campaign, and the need to gain PMI approval for the vehicle rentals (as the cost for vehicle rentals is over

\$150,000), the procurement/ bids and selection of vehicles to be rented for the IRS Campaign must be made earlier. In 2013, this process may need to begin in January/February.

- Setting up payments for seasonal staff in the field via Ecobank has proven to be effective, and limits security risks related to AIRS Mali staff transporting large amounts of money to the field. However, the agreement with Ecobank must be signed earlier in the year, and a well-defined payment schedule needs to be developed and approved by AIRS Core Staff and Ecobank.
- AIRS Mali should undertake an assessment of human and logistical needs of the IRS program, as there are cost-savings to potentially be gained from reducing operation sites, and increasing the number of Spray Operators, leading to the possibility of reducing the length of the IRS campaign.

M&E

- Due to the limited amount of time from when AIRS Mali was allowed to begin field work to the beginning of the IRS campaign, AIRS Mali did not have enough time to complete enumeration. This would have been helpful, in order to better identify all eligible/targeted structures. This information was key for helping to plan the IRS program, and providing a second check on the number of structures sprayed.
- Having two data centers allowed for quicker data entry, as spray data in Baroueli and Bla districts had to travel a shorter distance to Segou, for data entry. This allowed for a quick turn-around and loading all data into the central database fast.

IEC

- The use of community radio stations played a key role in informing beneficiaries in the spray districts, about the IRS campaign. This proved to be a cost-effective way to compliment IEC messaging.
- If IEC messaging was not received by a majority of the population (particularly due to absence, as populations are not at home, and are in their fields farming in July), it is best to continue door-to-door mobilization during the IRS campaign, in order to make sure households are sufficiently prepared for the IRS campaign.
- The IEC Mobilizers are an important part of the IRS program, and ensuring the hiring of talented and qualified IEC Mobilizers is important. In future years, AIRS Mali will need to establish a more stringent criterion for the hire of IEC mobilizers.
- During door-to-door mobilization it would be useful for the IEC Mobilizers to find-out if all eligible structures have an IRS card.

Logistics/Storage

- Creating an electronic inventory management system could reduce inventory counting error, and where internet is available, make inventory knowledge as close to “real time” as possible..
- AIRS Mali will need to assess storage facilities thoroughly before the 2013 IRS campaign. Some facilities were too small, or too near agriculture fields. In these areas, storage facilities may need to be relocated.
- 68 store rooms is a very high number, AIRS Mali may consider consolidating and lessening the number of store rooms in future years.

Environment Compliance

- The presence of an ECO on the project team was a good asset, and has allowed for more thorough work in ensuring environmental compliance;

- Operation sites should be thoroughly inspected between November and February, 2013. The inspection should make a note of which storerooms were too small, wash area slabs that were too small for progressive rinsing, and operation sites that need more spill kits.
- In 2013, with the potential involvement of the Malian government in the IRS campaign, inspection teams will be developed with regional, district, and ministerial environment staff to ensure all operation sites are covered during the pre-, mid-, and post- environmental inspections in a timely process.
- The quality of face masks bought in Mali was poor. In 2013, face masks will need to be procured internationally.
- Due to the inability to complete field work between April and June, AIRS Mali did not get to inspect the incinerator until very late. AIRS Mali will plan to complete an incinerator inspection in March/April in 2013, to assure that any repairs for the incinerator can be completed before the IRS campaign.
 - Additionally, AIRS Mali will do a better job to communicate the issues with the incinerator in the future, to assure that the AIRS Core Team and PMI are aware of any potential delays regarding incineration.

Operations/Training Courses

- Further involvement of community members (ASACO and DTC) in trainings is a good way of ensuring better local ownership of the project, and providing the Spray Operators with more familiar faces and an understanding of the importance of their work.

Entomology

- Having an entomologist on staff has helped AIRS Mali complete quick entomological monitoring, and had a good understanding of spray quality issues right after the start of the spray campaign. This allowed for quick action to revisit and improve spray quality for several areas.
- The AIRS Mali team built an insectary quickly and at minimal cost. The insectary has been an asset in completing entomological monitoring. Additionally, the insectary has received praise from PMI, for its usefulness and cost-effectiveness.

9.2. Recommendations

1. Immediately after the approval of the 2013 Work Plan, AIRS should begin all procurements for IRS equipment and commodities internationally and locally. Face masks will be procured internationally, due to the poor quality of face masks that can be procured in Mali.
2. AIRS Mali should continue to work with Goizper or other IRS material manufacturers, and see if any future changes to IRS commodities can save costs and improve IRS campaign efficiency and quality.
3. In February 2013, AIRS should begin its bidding and procurement process for selecting its vehicle hire for the 2013 IRS campaign.
4. An agreement with Ecobank for seasonal staff payments will be developed and approved in April. This agreement will include a potential schedule for when the field payments will be completed.

5. For cost-savings in future years, AIRS Mali should work with the NMCP, and eliminate several operation sites. 68 operation sites is too many, and causes significant project costs ranging from hiring storekeepers and guards for each operation site, to building and refurbishing the operation site each year, and providing transport to and from each operation site. However, AIRS Mali has noted that having operation sites near the spray communities was important in 2012, as it helped to improve access to communities that would have been otherwise managed by district health staff.
 - a. If a high number of operation sites are needed in future years, it may be advisable to increase the number of Spray Operators per operation site. The higher number of Spray Operators would justify the significant investment in numerous operation sites, and having more Spray Operators working simultaneously could lower the number of spray days, and thereby save costs on vehicle rental, spray operator per diem and payments.
6. Considering the strong work of the AIRS Entomologist and the development of an in-office insectary, AIRS Mali should be more involved in entomology work during future IRS campaigns. At the very least AIRS Mali should provide a check to MRTC.
7. AIRS Mali needs to develop a better logistics/supply chain communication system to have a better idea of commodity stock status at each operation site on a daily basis. This information should be used for organizing more frequent IRS commodity re-supplies, and preventing stock-outs.
8. In 2013, AIRS Mali needs to develop a robust environmental compliance inspection team led by the ECO. The team should include environmental staff at the district, regional, and ministerial levels to transfer capacity. The team should also be large enough to supervise and cover all operation sites during pre-, mid-, and post- environmental campaign inspections quickly.
9. In 2013, AIRS Mali should invest significant project funds in upgrading operation sites, as storerooms were found to be too-small and insecure, wash area slabs were too small for progressive rinsing, and more spill kits are needed at each site.
10. IEC Mobilization needs to be completed earlier, and repeated right before the IRS campaign. It is crucial to ensure that households are aware of the IRS campaign, and an adult for the household is at home and ready to receive the spray operator.
11. The effectiveness of carbamate needs to be closely monitored if it is selected as the insecticide for the 2013 IRS campaign. Although it is reducing mosquito populations, and susceptibility remains low, the residual life of carbamate on sprayed walls has decreased dramatically.

10. Annex

10.1. Additional Figures and Tables

Table 17: Vehicles during the IRS Campaign

District	Mini Buses	Pick-Up/4x4
Koulikoro	22	3
Bla	32	3
Baroueli	27	3
Total	81	9

Table 18: Inventory of IRS Commodities at the Koulikoro District Warehouse

Item	Initial Stock Before IRS Campaign	Number of Item Procured	Stock Before Campaign	Used/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2013	Notes
Insecticide (FICAM)	1,546	19,704	21,250	20,585	665	Exp dates: Feb 2016 July 2016
Spray Pumps	226	0	226	48	178	48 in poor condition (not working)
Coveralls	404	131	535	354	535	354 in poor condition, after 5 years of use
Helmet	229	30	259	35	259	2 broken and 33 are the wrong sizes

Item	Initial Stock Before IRS Campaign	Number of Item Procured	Stock Before Campaign	Used/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2013	Notes
Gum Boots	316	0	316	30	316	30 in poor condition after 5 years of use
Red Vests	41	0		0	41	
Green Vests	55	24	79	0	79	
Gloves for Spray operator	1192	432	1624	263	1360	
Gloves for washer	58	0	58	30	28	
Face Masks	3200	14663	17863	8756	5084	
Face Shields	247	0	247	247	0	In poor condition after 5 years of use
Face Shield Brackets	233	0	233	150	83	150 have stretched springs
Spare parts kit Hudson	18	7	25	1	24	
Nozzle Tip Hardened Stainless Steel 8002E	0	270	270	59	211	
Nozzle Tip Hardened Stainless Steel 8001	138	0	138	0	138	
Pump Filter (Strainer)	140	24	164	0	164	
Nozzle flow regulator	0	219	219	1	218	
Nozzle flow regulator assembly	0	219		0	219	
Leather Cup	1	270	271	0	271	
Electronic Thermo-meter	19	0	17	19	0	

Item	Initial Stock Before IRS Campaign	Number of Item Procured	Stock Before Campaign	Used/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2013	Notes
Pregnancy test	0	75	75	20	55	
First aid kit	2	20	22	20	2	
Bucket, 40 Liters	102	40	142	35	107	
Bucket, 15 Liters	45	34	79	0	79	
Bucket, 10 Liters	40	0	40	1	39	
Waste bin Hard plastic	34	0	34	0	34	
Cup plastic. 1 Liter	48	15	63	43	20	
Shovel with short handle	0	49	49	4	45	
Fire extinguisher	3	3	6	3	6	
Operator bag	71	159	230	2	228	
Water Filter	145	101	246	3	243	
Plastic drums, 160 Liters	193	2	195	2	193	
Motorbikes	5	0	5	0	5	

Table 19: Inventory of IRS Commodities at the Bla District Warehouse

Item	Initial Stock Before IRS Campaign	Number of Item Procured	Stock Before Campaign	Used/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2013	Notes
Insecticide (FICAM)	1554	33600	35154	34777	377	Exp date Feb 2016
Spray Pumps	308	0	308	36	272	36 None Functioning
Overalls	660	153	813	150	663	150 in poor condition after 5 years of use

Item	Initial Stock Before IRS Campaign	Number of Item Procured	Stock Before Campaign	Used/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2013	Notes
Helmet	327	40	367	45	322	
Gum Boots	361	61	422	100	322	100 in poor condition after 5 years in use
Red Bright Vests	44	0	44	2	42	
Green Bright vests	86	25	111	1	110	1 missing in Bougora
Gloves for Spray operator	665	444	1109	726	383	
Gloves for washer	396	0	396	144	252	
Face Masks	5270	9380	14650	14128	522	
Face Shield	578	0	578	578	0	Many were in poor condition after the IRS campaign after several years of use
Bracket for Face Shield	329	0	329	25	304	
Spare parts kit Hudson	07	11	18	18	0	
Nozzle Tip Hardened Stainless Steel (8002E)	0	400	400	320	80	
Nozzle Tip Hardened Stainless Steel 8001	44	0	44	44	0	
Pump Filter (Strainer)	502	24	526	0	526	
Nozzle flow regulator	0	485	485	220	265	

Item	Initial Stock Before IRS Campaign	Number of Item Procured	Stock Before Campaign	Used/ Unusable Stock after IRS Campaign	Usable Stock Remaining for 2013	Notes
Nozzle flow regulator assembly	0	502	502	0	502	
Leather Cup	0	361	361	0	361	
Retainer Cup	0	0	0	0	0	
Electronic Thermo-meter	32	0	32	10	22	
Pregnancy test	36	101	147	77	70	Exp Date Apr 2014
First aid kit	0	39	39	35	04	
Plastic Bucket, 40 Liters	115	10	125	50	75	50 were found to be cracked and in bad shape
Metal Bucket, 15 Liters	55	42	97	0	97	
Plastic Bucket, 20 Liters	51	0	51	10	41	
Waste Bin Hard plastic	46	0	46	0	46	
Plastic Cup, 1 Liter	55	10	65	15	50	
Shovel	0	53	53	0	53	
Fire extinguisher	3	3	6	3	3	
Operateur bag	203	210	413	200	213	
Tarpaulin	54	89	143	10	133	10 in poor shape, and need to be disposed
Calculator	43	20	63	25	38	

Table 20: Inventory of IRS Commodities at the Baroueli District Warehouse

Item	Initial Stock Before IRS Campaign	Number of Item Procured	Stock Before Campaign	Consumed / Unusable Stock after IRS Campaign	Usable Stock Remaining for 2013	Notes
Insecticide (FICAM)	2824	19333	22157	21825	332	Exp dates : -Feb and -July 2016
Spray Pumps	239	0	239	10	229	10 extension tube broken for spray pumps
Overalls	494	54	548	1	547	1 unit missing in Koulikoro district
Helmet	276	30	306	1	305	1 unit missing in Koulikoro district
Gum Boots	287	81	368	4	364	4 units missing in Koulikoro district
Red Vests	41	41	41	0	41	
Green Vests	81	25	106	0	106	
Gloves for Spray operator	1696	432	2128	622	1506	
Gloves for washer	80	0	80	74	6	
Respirator mask	10720	9800	20520	11920	8600	
Face Shield	273	0	273	262	11	262 in poor condition after 5 years of use
Supports Face Shield	271	0	271	09	262	9 in poor condition after 5 years of use
Spare parts kits for Spray Pump	12	10	22	0	22	Most of parts in kits have been used.
Nozzle Tip Hardened	0	300	300	189	111	

Item	Initial Stock Before IRS Campaign	Number of Item Procured	Stock Before Campaign	Consumed / Unusable Stock after IRS Campaign	Usable Stock Remaining for 2013	Notes
Stainless Steel 8002E						
Nozzle Tip Hardened Stainless Steel 8001	121	0	121	114	7	
Pump Filter (Strainer)	100	24	124	17	107	
Nozzle flow regulator	0	138	138	0	138	
Nozzle flow regulator	0	200	200	23	177	
Leather Cup	0	250	250	0	250	
Electronic Thermo-meter	24	3	27	02	25	
Pregnancy test	75	75	150	150	0	75 units consumed and 75 expired
First aid kit	28	0	28	23	5	
Bucket Plastic, 40 Liters	84	8	92	1	91	
Bucket metal 15 Liters	66	39	105	0	105	
Waste bin Hard plastic	29	3	32	0	32	
Cup plastic 1 Lite	47	3	50	3	47	3 units missing
Wood seat	23	0	23	0	23	
Scoreboard	24	0	24	0	24	
Support	39	14	53	0	53	

Item	Initial Stock Before IRS Campaign	Number of Item Procured	Stock Before Campaign	Consumed / Unusable Stock after IRS Campaign	Usable Stock Remaining for 2013	Notes
pallet						
Shovel with short handle	0	53	53	0	53	
Fire extinguisher	3	3	6	3	3	3 have to be re-charged
Operator bag	246	70	316	115	201	
Water Filter	128	0	128	70	158	70 are broken
Plastic drums, 160 / 200 Liters	186	0	186	1	185	1 has a hole
Motorbikes	0	5	5	0	5	1 Motorbike needs to be repaired, after a minor accident
Tarpaulin	4	77	81	51	30	51 in poor condition
Calculator	28	3	31	4	27	4 not working

10.2. Results of Bendiocarb Quality Testing

TEST REPORT



Bayer CropScience (Pty) Ltd
Attention: Mr Mark Edwardes
 PO Box 143
 ISANDO
 1600

PHARMACEUTICAL CHEMISTRY
 Your ref: O/N 4500509394
 Dated: 2012-10-01
 Our ref: 213864
 Enquiries: Penny Manganyi
 Tel: (012) 428 6373
 Date: 2012-10-01
Report No: 2416/F1028PC
 Page: 1 of 2

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

Date received: 2012-08-31

Date commenced: 2012-09-26

Method used	Test performed	Requirement	Batch Number		
			L001	L002	L003
CIPAC D (As per WHO Specification 232/WP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	812 Complies	800 Complies	794 Complies
			L004	L005	L006
CIPAC D (As per WHO Specification 232/WP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	811 Complies	808 Complies	798 Complies
			L007	L008	L009
CIPAC D (As per WHO Specification 232/WP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	799 Complies	810 Complies	799 Complies
			L010	L013	L014
CIPAC D (As per WHO Specification 232/WP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	804 Complies	811 Complies	809 Complies

...../2...

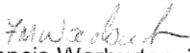
1 Dr Lategan Road, Groenkloof, Private Bag X191, Pretoria, 0001. Tel +27 12 428 7911, Fax +27 12 344 1568

The test work relating to this report was performed by SABS Commercial (Pty) 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. (Refer also to the conditions of test printed on the back of this page.) 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.



T0320

Method used	Test performed	Requirement	Batch Number		
			L015	L016	L017
CIPAC D (As per WHO Specification 232/WP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	801 Complies	811 Complies	802 Complies
			L018	L019	L020
CIPAC D (As per WHO Specification 232/WP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	782 Complies	779 Complies	784 Complies
			L021	L022	L023
CIPAC D (As per WHO Specification 232/WP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	781 Complies	783 Complies	783 Complies
			L024	L025	L026
CIPAC D (As per WHO Specification 232/WP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	781 Complies	779 Complies	784 Complies
			L027	L028	L029
CIPAC D (As per WHO Specification 232/WP)	Bendiocarb Content, g/kg Identification, (retention times)	775 to 825 To comply	778 Complies	795 Complies	807 Complies


Francis Warburton: Technical Signatory


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