PMI | Africa IRS (AIRS) Project

Indoor Residual Spraying (IRS 2) Task Order Four

MADAGASCAR
END-OF-SPRAY REPORT
2012-2013

Recommended Citation: PMI | Africa IRS (AIRS) Project Indoor Residual Spraying (IRS 2) Task Order Four. June 2013. Madagascar End-of-Spray Report2012-2013. Bethesda, MD. PMI | Africa IRS (AIRS) Project Indoor Residual Spraying (IRS 2) Task Order Four, Abt Associates Inc.

Contract No.: GHN-I-00-09-00013-00 Task Order: AID-OAA-TO-11-00039

Submitted to: United States Agency for International Development/PMI

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2012-2013 MADAGASCAR END-OF-SPRAY REPORT

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ACRONYMS

AIRS	Africa Indoor Residual Spraying
BMP	Best Management Practices
CDC	Centers for Disease Control and Prevention
CHL	Central Highlands
COP	Chief of Party
ECO	Environmental Compliance Officer
GHI	Global Health Initiative
IEC	Information, Education, and Communication
IRS	Indoor Residual Spraying
IT	Information Technology
LLIN	Long-Lasting Insecticide Net
M&E	Monitoring and Evaluation
MEP	Monitoring and Evaluation Plan
NMCP	National Malaria Control Program
PMI	President's Malaria Initiative
PPE	Personal Protective Equipment
RBM	Roll Back Malaria
RTT	RTT Group, Limited
SOP	Standard Operating Procedures
STTA	Short Term Technical Assistance
USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization
WHOPES	World Health Organization Pesticide Evaluation Scheme

EXECUTIVE SUMMARY

[In August 2011, Abt Associates, Inc. (Abt) was awarded a three-year Africa-wide Indoor Residual Spraying (IRS) project under IRS 2, Task Order 4, funded by the United States Agency for International Development (USAID) under the President's Malaria Initiative (PMI). The mandate of the project is to limit exposure to malaria and reduce the incidence and prevalence of malaria in up to 17 countries in sub-Saharan Africa through the implementation of IRS. In May 2012, Abt established its project office in Antananarivo and began the implementation of the Africa Indoor Residual Spray (AIRS) project in Madagascar. The key objective of AIRS Madagascar in 2012-2013 was to complete IRS campaigns to reduce malaria-associated morbidity and mortality in the Central Highlands (CHL) and southern Madagascar, targeting an estimated 400,000 eligible structures.

IRS campaigns in Madagascar were implemented in two rounds:

- CHL (November 26, 2012 to December 31, 2012, with mop-up spraying in Ankozobe district occurring from February 6, 2013 to February 10, 2013), using carbamate and pyrethroid class insecticides to cover 41 communes.
- Southern Madagascar (February 4, 2013 to March 16, 2013, with mop-up spraying occurring from April 12, 2013 to April 29, 2013), using carbamate class insecticides to cover seven districts and five communes in Tolagnaro district.

The key results achieved 2012-2013 IRS campaigns are listed in Table 1.

TABLE 1: SUMMARY RESULTS OF 2012-2013 IRS CAMPAIGNS

Result	CHL	Southern Madagascar
Number of districts/communes covered by PMI-supported IRS in 2012-2013	41 communes located in Ambatofinandrahana, Ambohimahasoa, Ambositra, Ankazobe, Anjozorobe, Betafo, and Mandoto districts	103 communes located in Amboasary, Ambovombe, Ampanihy, Bekily, Beloha, Betroka, Tsihombe and Tolagnaro districts
Insecticide	Carbamate and Pyrethroids	Carbamates
Number of structures covered by PMI-supported IRS in 2012-2013	87,081	284,310
Number of structures targeted by PMI-supported IRS in 2012-2013	90,601	289,473
2012-2013 spray coverage	96.1%	98.2%
Population protected by PMI-supported IRS in 2012-2013	522,292 (12,835 Pregnant Women; 83,984 Children Under 5 Years)	1,259,698 (47,311 Pregnant Women; 287,717 Children Under 5 Years)
Number of people trained with United States Government (USG) funds to deliver IRS	3,725	11,105

Key lessons learned from the 2012-2013 IRS campaigns include:

- Thorough planning is needed for the set-up and implementation of the IRS campaigns in the CHL and the south given the short turnaround time between the end of the IRS campaign in the CHL (late December 2012) and the start of the IRS campaign in the south (late January/early February 2013);
- Increased supervision is needed for environmental compliance and inventory management;
- Further consideration needs to be given to the current IRS campaign model given the large number of seasonal staff that needs to be hired and difficulties of supply chain and inventory management given the constant movement of IRS commodities among spray areas;
- Better communication is needed between the AIRS Madagascar project and local authorities/community leaders in the CHL and the south to ensure the community leaders and local authorities have a better understanding of IRS, and to also assure they can provide updates in case of insecurity and unsafe conditions in the spray areas; and
- Better communication is also needed between the AIRS Madagascar project staff and PMI-Madagascar to assure the donor is more aware of the AIRS Madagascar's planning for the upcoming IRS campaign, the results of the IRS campaign, and any issues encountered during the IRS campaign.

1. INTRODUCTION

Malaria prevention and control is a major foreign assistance objective of the United States Government, (USG). In May 2009, President Barack Obama announced the Global Health Initiative (GHI), a multi-year, comprehensive effort to reduce the burden of disease and promote healthy communities and families around the world. Through the GHI, the United States will help partner countries improve health outcomes, with a particular focus on improving the health of women, newborns, and children.

The President's Malaria Initiative (PMI) is a core component of the GHI. PMI was launched in June 2005 as a five-year, $1.2 billion initiative to rapidly scale-up malaria prevention and treatment interventions and reduce malaria-related mortality by 70% in 15 high-burden countries in sub-Saharan Africa. The four malaria prevention and treatment interventions supported by PMI include: insecticide-treated mosquito nets, indoor residual spraying (IRS) with insecticides, intermittent preventive treatment for pregnant women, and prompt use of artemisinin-based combination therapies for those who have been diagnosed with malaria. With passage of the 2008 Lantos-Hyde Act, funding for PMI has been extended through Fiscal Year 2014.

In August 2011, Abt Associates, Inc. (Abt) was awarded a three-year Africa-wide IRS project, funded by the United States Agency for International Development (USAID) under PMI. The objective of the project is to limit the burden of malaria in up to 17 countries in sub-Saharan Africa via the completion of IRS campaigns, building government capacity to complete future IRS campaigns, and complete messaging about malaria prevention during the IRS campaign preparations. Abt is completing this project under the name Africa Indoor Residual Spraying (AIRS). Hereafter in this report, the project's work in Madagascar will be referred to as AIRS Madagascar.

1.1 BACKGROUND OF IRS IN MADAGASCAR

PMI has implemented IRS programming in Madagascar since 2008, with PMI's current support for IRS programming in Madagascar complying with the objectives and parameters of the new 2013-2017 National Malaria Strategy. The National Malaria Strategy aims to implement IRS in 53 districts within the Central Highlands (CHL), "Fringe" Districts[1], and the Southern and Western extension[2] regions of Madagascar.

Through 2011, all IRS programming in Madagascar was categorized as "generalized" spraying or "blanket coverage", providing IRS to as close to 100% of the eligible structures in targeted districts as possible. This IRS strategy has been largely successful through the strong collaboration between PMI and the Global Fund; both donors have provided strong support towards IRS spray programs in all 53 districts targeted for IRS throughout Madagascar.

The Malagasy National Strategic Plan notes that after the completion of four rounds of "blanketed/generalized spraying" in the CHL, IRS campaigns in the CHL should transition to "focalized" spraying in the communes (sub-districts) that are noted for the highest incident rates of malaria (as noted from Malagasy health system data). The remaining communes in a CHL district would not be sprayed, though entomological monitoring would continue in these communes to assure that malaria

[1] The Fringe Districts consist of areas on the border with the CHL, where due to the variation in elevation and climactic zones, malaria transmission (with lower transmission rates at the higher elevations) and malaria seasons vary.
[2] The Western extension region includes districts between the west coast and the Fringe of the CHL. Spraying has occurred in the area since 2010.

transmission and vector density remains low. Per the National Strategic Plan, PMI and the National Malaria Control Program (NMCP) instructed AIRS Madagascar to spray 41 communes with high malaria incident rates across seven districts in the CHL during the 2012 IRS campaign.

PMI also instructed AIRS Madagascar to continue "generalized" spraying across seven districts in southern Madagascar in 2013, and "focalized" spraying in five communes in Tolagnaro (Fort Dauphin).

Additionally, per the guidance of PMI, the IRS campaigns in 2012-2013 marked the first time that the spray campaigns in southern Madagascar and the CHL would not be completed concurrently, with the IRS campaign in southern Madagascar starting in January/February 2013 several weeks after the spray campaign in the CHL ended (late December 2012). By completing the IRS campaign in the south in January/February 2013, it was intended that the effective duration of the insecticide sprayed on a structure's wall during the start of the rainy/peak malaria transmission in the south would be maximized.

For the 2012-2013 IRS campaigns, AIRS Madagascar sprayed in the CHL from November 26, 2012 to December 31, 2012. AIRS Madagascar completed its IRS campaign in the south from February 4, 2013 to March 18, 2013. A mop-up spray campaign was completed in southern Madagascar in mid-April 2013 in all districts that had not reached 85% spray coverage, and for any communes/Fokotany that had not been sprayed due to insecurity, difficult transport, or other reasons. The mop-up spray campaign in southern Madagascar ended on April 29, 2013.

Due to USG regulations, whereby USAID can only contribute towards humanitarian assistance in Madagascar, the AIRS Madagascar project is not allowed to work directly with and/or provide financial and material assistance to the Malagasy government at any level. Thus, the AIRS Madagascar project during the 2012-2013 IRS campaigns described in this report only maintained a relationship with the Malagasy government, specifically the NMCP for purposes of planning the IRS campaigns and communicating results.

1.2 Objectives for AIRS Madagascar during the 2012-2013 IRS Campaigns

Listed below were the approved objectives from the 2012-2013 AIRS Madagascar Work Plan:

1) Cover at least 85% of eligible structures found in all 41 targeted spray communes in the CHL, and seven districts in the south plus five targeted spray communes in Tolagnaro District;
2) Begin work to identify a plan for IRS sustainability in Madagascar;
3) Identify cost and operation-efficiency to streamline the IRS campaign, lower the cost of implementation, and limit stock and supply chain error;
4) Improve monitoring and evaluation (M&E) efforts and increase data quality;
5) Support IRS community mobilization and continue to inform the public about malaria prevention and the benefits of IRS;
6) Perform IRS entomological monitoring;
7) Develop a strategy and standard operating procedures (SOP) for targeted spraying in Madagascar; and

8) Completing entomological "spot checks" in Bekily and Ambovombe districts, to better understand malaria outbreaks epidemics in the south.[3]

Listed below in Table 2 are the selected communes in the CHL and the districts in the south that were covered by the 2012-2013 IRS campaign, and their estimated populations.

TABLE 2: LIST OF COMMUNES AND DISTRICTS COVERED BY 2012-2013 IRS CAMPAIGN

Region	District	Communes Sprayed	Initial Targeted Number of Eligible Structures	Estimated Population
CHL	Ambatofinandrahana	Ambatomifanongoa, Amborompotsy, Mandrosonoro, Mangataboahangy, and Soavina	16,057	87,165
	Ankazobe	Ambolotarakely, Antakavana, Fiadanana, Fihaonana, Kiangara, and Miantso	15,329	62,572
	Mandoto	Ankazomiriotra, Anjoma-Ramartina, Antanambao-Ambary, Betsohana, Mandoto, and Vasiana	15,748	97,912
	Ambositra	Ambinanindrano, Ambositra II, Andina, Antoetra, Fahizay, ImerinaImady, Mahazina-Ambohiperenana, Tsarasaotra, and Vohidahy	16,383	90,396
	Ambohimahasoa	Ambalakindresy, Ankafina, Ankerana, and Morafeno	7,851	52,287
	Betafo	Ambohimanambola, Ambohimasina, Andrembesoa, Antohobe, and Soavina	13,186	74,554
	Anjozorobe	Alakamisy, Ambohimanarina, Androvakely, Antanetibe, Betatao, and Mangamila	11,762	57,406
South	Amboasary	Sprayed 88 communes in these 7 districts[4]	41,510	123,092
	Ambovombe		65,286	306,639
	Ampanihy		69,618	283,942
	Bekily		39,971	153,197
	Beloha		24,471	87,601
	Betroka		38,050	160,715
	Tsihombe		25,472	112,968
	Tolagnaro	Ambatoabo[5], Analapatay, Andranobory, Ankariera, and, Ranopiso[6]	9,312	31,997
		Total	**410,006**	**1,782,443**

[3] Due to a malaria outbreak in Bekily and Ambovombe districts in May 2012, the NMCP with support from the Global Fund organized an emergency spray campaign in these two districts. AIRS contributed towards the entomological surveillance work following the emergency spray campaign. Since this spray campaign was completed by the Global Fund/NMCP and not PMI, the entomological surveillance completed by AIRS Madagascar and the results of the emergency IRS campaign are not described in this report.

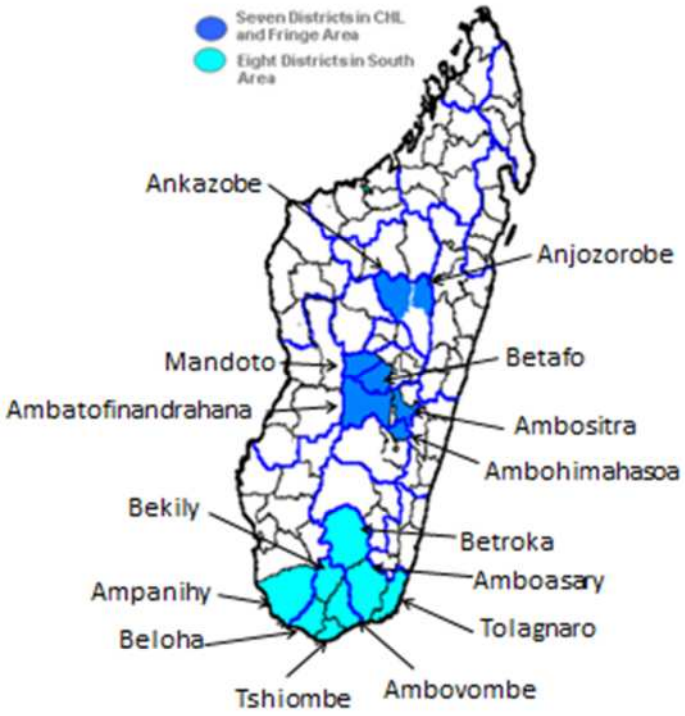
[4] This figure does not include the seven communes in Amboasary district that were not sprayed due to insecurity. This figure does include Ifotaka and Tandava Sud communes which were partially sprayed, as parts of these two communes were secure and safe to spray. See Table 13, in Section 7.3.2., "Insecurity Issues in the South" for more details.

[5] Ambatoabo commune was partially sprayed, as some areas were noted as being insecure and unsafe to spray. See Table 13, in Section 7.3.2., "Insecurity Issues in the South" for more details.

[6] Ranopiso commune was partially sprayed, as some areas were noted as being insecure and unsafe to spray. See Table 13, in Section 7.3.2., "Insecurity Issues in the South" for more details.

Figure 1, notes the location of the spray areas covered during the 2012-2013 IRS campaign.

FIGURE 1: LOCATION OF SPRAY AREAS COVERED BY 2012-2013 IRS CAMPAIGN



The 2012-2013 IRS Campaigns were completed via a model based on locally-selected spray operators spraying their home community and several nearby communities only. AIRS Madagascar asked Chef du Fokotany and local mayors to select community members to work as the spray operators, team leaders, and other season spray staff (including store keepers; guardians; information, education, and communication (IEC) mobilizers; and washers) during the IRS campaigns.

The spray operators worked on average between five to 10 days depending upon the number of structures to spray and the geographic distance/accessibility between structures within their designated spray areas. This also meant there was variation in the number of spray operators hired, as communities/spray areas in more rural areas with less eligible structures had fewer spray operators and spray areas that encompassed district capitals with a higher number of eligible structures had more spray operators.

The 2012-2013 IRS campaigns in the CHL and the south were completed via a "cascading system." Similar to previous IRS campaigns in Madagascar, communities within each commune (in the CHL and the southern Madagascar) began their spray campaign during the first week while other communities waited to begin their spray campaign during subsequent weeks. This was necessary given the high number of spray operators (2,794) and a limited amount of personal protective equipment (PPE). Therefore, the initial communities completed their spray campaigns covering their targeted structures, and subsequently provided the PPE and other IRS commodities to the next group of spray operators that would spray their community/spray area.

Store rooms and soak pits were set up in the central community of each spray area, usually the principle town/village in the spray area. In areas that encompassed a district capital, these capitals were used as the location for the soak pit and store room, but only for the local spray teams covering structures in and around the district capital.

Additionally, some communities that were targeted for spray operations (especially in Ankazobe district in the CHL, and Betroka in the south) that are difficult to access due to lack of roads, difficult river crossings, and mountainous terrain required the building of a secondary soak pit. The secondary soak pits allowed the spray operators to dispose of their liquid wastes after finishing their spraying for the day, and avoid traveling several hours (possibly at night) in a truck back to the primary soak pit with their liquid wastes. In some areas, communities were very remote and required the hiring of porters to help the spray teams hike to the spray areas.

2. PRE-IRS CAMPAIGN ACTIVITIES

2.1 IRS CAMPAIGN PLANNING

Listed below are the activities that were undertaken to plan and organize the 2012-2013 IRS campaigns:

- District Selection and Insecticide Selection for 2012-2013 IRS Campaigns (March 2012) During a meeting in March 2012, the NMCP consulted with the Global Fund and PMI to select which communes and districts would be sprayed by AIRS Madagascar and the Global Fund. During this meeting it was decided which insecticides would be used in each spray area.
- Development and Completion of 2012-2013 AIRS Madagascar Work Plan (May to September 2012) The work plan was completed and prepared by the AIRS Core team and the newly hired AIRS Madagascar staff. Guidance on the work plan was provided by PMI/Madagascar and PMI/Washington, leading to the final approved work plan in September 2012.
- AIRS Madagascar IRS Campaign Planning (mid-October to November 2012) AIRS Madagascar staff completed several internal staff meetings to plan and organize the IRS campaigns in the south and the CHL. The team put together an excel file noting the timetable of when each activity would be completed to set up, implement, and close-out the IRS campaigns.
    - During the internal campaign planning, the AIRS Madagascar team talked extensively about the roles of each staff member during the IRS campaign, and how to communicate amongst each other during the IRS campaign.
- Micro-planning of IRS Campaign (late October 2012 in CHL and January 2013 in the South) Following the initial training of trainers for the IRS campaign, AIRS Madagascar worked with the district coordinators and sector managers to develop the detailed plan of how IRS would be completed in each commune, down to the Fokotany (sub-commune)-level. The micro-planning sessions designated the systems of supervision, and noted the individuals primarily responsible for supervising the IRS campaign in each spray area.

2.1.1 ISSUES WITH IRS CAMPAIGN PLANNING

- Since the IRS campaign in the south began right after the IRS campaign in the CHL, AIRS Madagascar staff did not have sufficient time to review plans for the IRS campaign in the south, as staff were busy closing the IRS campaign in the CHL.
    - Due to the completion of the training of trainers right before the IRS campaign in the south started (in late January 2013), AIRS Madagascar was unable to include the district coordinators and sector managers in the micro-planning sessions for the south.
- AIRS Madagascar did not anticipate nor thoroughly plan for issues in soak pit and store room set-up prior to starting the spray campaigns. AIRS Madagascar staff found numerous soak pits and store rooms, particularly in the south, that were not set up properly. This resulted in AIRS Madagascar and seasonal staff racing to refurbish and rebuild soak pits and store rooms, thereby delaying the start of the IRS campaign.
- More detailed planning for the logistical movement of all PPE and IRS commodities within the spray areas in the CHL and the south was needed.

- Additional planning could have also helped with developing a stronger plan for moving IRS campaign data from the spray teams to the data-entry centers. AIRS Madagascar did not complete detailed planning of how to gain daily spray data from spray areas that are difficult to access. Consequently, this led to slow data entry and difficulties (especially in the south) in estimating spray campaign progress.

2.2 Insecticide Selection

In March 2012, the NMCP, along with the Malagasy Roll Back Malaria (RBM) committee and PMI, reviewed the entomological surveillance data from the 2011 IRS campaign (particularly wall bioassay and residual life data) and selected pyrethroids and carbamates as the insecticide classes to use for the 2012-2013 IRS campaigns. The NMCP decided to use carbamates in most AIRS Madagascar spray areas due to the distribution of pyrethroid-treated long-lasting insecticide nets (LLINs) throughout Madagascar. However, the communes that were sprayed in Ambositra and Ambohimahasoa districts (in the CHL) were selected to use pyrethroid-class insecticides, since these communes were not provided LLINs.

Following the selection of insecticides to be used in each spray area, AIRS completed a competitive procurement process for a carbamate-class insecticide and a pyrethroid-class insecticide. The total amount procured took into consideration the quantities of insecticides in-stock and leftover from the 2011 IRS campaign. The insecticides that were used in each spray area during the 2012-2013 IRS campaigns are presented in Table 3.

TABLE 3: INSECTICIDE USED IN SPRAY AREA

Region	District	Insecticide Class
CHL	Ankazobe, Anjozorobe, Betafo, Mandoto, and Ambatofinandrahana	Carbamate (Bendiocarb)
	Ambositra and Ambohimahasoa	Pyrethroid (Deltamethrin and Fendona)
South	Betroka, Ambovombe, Amboasary, Tshiombe, Beloha, Bekily, Tolagnaro, and Ampanihy	Carbamate (Bendiocarb)

The AIRS Madagascar senior staff also made the decision to use two different pyrethroid class insecticides in Ambositra and Ambohimahasoa, Fendona (leftover from the 2011 IRS campaign) and deltamethrin (shipped to AIRS Madagascar for the 2012 IRS campaign). This decision was made in order to use as much Fendona as possible, since the Fendona was going to expire at the end of 2013. Overall about 6,896 sachets of deltamethrin and 6,575 sachets of Fendona were used to spray Ambositra and Ambohimahasoa districts.

2.3 IRS Campaign Logistics Planning

2.3.1 Logistics Model for 2012-2013 IRS Campaign

All PPE, insecticide, and other IRS commodities were gathered and stored in AIRS Madagascar's three central warehouses (Antananarivo and Ambositra in the CHL, and Ambovombe in the south). From these central warehouses, PPE, insecticide and IRS commodities were sent to the seven district warehouses in the CHL (Ankazobe, Anjozorobe, Betafo, Mandoto, Ambositra, Ambatofinandrahana and Ambohimahasoa), and the six district warehouses[7] in the south (Amboasary[8], Betroka, Bekily, Beloha, Ampanihy, and Tshiombe) before the start of the IRS campaigns.

[7] The central warehouse in Ambovombe also served as the district warehouse for Ambovombe district.

As noted in Section 1.3., "Model of Spray Operations," due to the specific model for the IRS program in Madagascar, secondary store rooms were also set up in each of the spray areas. Therefore when spraying occurred in each spray area, PPE, insecticide, and other IRS commodities were sent to each secondary store, to act as a supply depot for the local spray teams. Most of the secondary store rooms were used for a short period of time, the five to 10 days when the local spray teams were active in completing IRS in the nearby communities. When the local spray teams finished, the secondary store room collected the PPE, remaining insecticide, and commodities and sent them back to the district warehouse for redistribution to other secondary store rooms and spray areas that would begin their IRS campaigns. Overall, AIRS Madagascar used 41 secondary stores in the CHL, and 99 secondary stores in the south (see Table 20, in Section 12.1., "Additional Tables and Figures" for more details regarding the location of the secondary stores).

The central and district warehouses also stored buffer supplies of insecticide, PPE, and other commodities, and were able to issue additional resupplies to secondary stores/spray teams as needed. Overall the logistics system rented over 75 vehicles to help handle the flow of PPE, insecticides, and other IRS commodities between the various store rooms during the IRS campaigns.

2.3.2 PPE, Insecticide, and Commodity Procurement

From May 2012 to August 2012, AIRS Madagascar reviewed its inventory of IRS equipment and commodities at its central warehouses, noting that most of the significant PPE and IRS commodities (e.g., spray pumps, gloves, overalls, helmets) were in acceptable condition and significant quantities that would not need to be replaced for the 2012-2013 IRS campaign. However, AIRS Madagascar noted that some of the PPE in-stock was unusable or at low levels such as socks, face masks, and various spray pump parts, and developed a list of PPE that AIRS Madagascar would procure locally and internationally.

Table 4 notes the amount of selected PPE and IRS commodities that were procured for the 2012-2013 IRS campaigns internationally.

TABLE 4: SELECTED IRS COMMODITIES PROCURED INTERNATIONALLY FOR THE 2012-2013 IRS CAMPAIGN

Item	Quantity in Stock from 2011 IRS Campaign	Quantity Procured and Shipped to Madagascar
Face Masks	16,604	19,040
O-ring gasket	0	2,145
Nozzle tip – 8002 E	2,265	4,290

To ensure enough insecticide stock for the 2012-2013 IRS campaign, AIRS Madagascar procured 108,455 sachets of carbamate, and 11,918 sachets of pyrethroids. The shipment of pyrethroids arrived on September 25, 2012 and the shipment of carbamates arrived on October 26, 2012.

[8] The district warehouse in Amboasary also served as the warehouse for spraying in the five communes of Tolagnaro District.

3. HUMAN RESOURCES

AIRS Madagascar hired 14,818 seasonal staff workers (3,713 seasonal workers in the CHL, and 11,105 seasonal workers in the south) to implement the 2012-2013 IRS campaigns. This included 11,230 men and 3,588 women. Tables 5 and 6 provide a breakdown of the number of seasonal staff workers that were hired for each position by spray area (CHL or south) and gender.

TABLE 5: SEASONAL STAFF WORKERS HIRED, DISAGGREGATED BY SPRAY AREA

Position	Number of Seasonal Workers Hired in CHL	Number of Seasonal Workers Hired in South	Total Number of Seasonal Workers Hired
District Coordinator	4	7	11
District Logistics Assistant	4	7	11
District Financial Assistant	4	7	11
M&E Assistant	1	1	2
Data Entry Clerk	16	27	43
Sector Manager	21	31	52
Store Keeper	42	103	145
Store Room Guard	84	206	290
Team Leader	199	301	500
Spray Operator	1,052	1,742	2,794
Washer	394	602	996
IEC Mobilizer	1,469	7,407	8,876
Carrier/Porter	394	602	996
Spray Pump Technician	29	50	79
Courier		12	12
Total	3,713	11,105	14,818

TABLE 6: SEASONAL STAFF WORKERS HIRED, DISAGGREGATED BY GENDER

Region	Position	Male	Female	Total
CHL	District Coordinator	4		4
	Logistics Assistant	4		4
	Financial Assistant	2	2	4
	M&E Assistant	1		1
	Data Entry Clerk	5	11	16
	Sector Manager	21		21
	Store Keeper	35	7	42
	Store Room Guard	84		84
	Team Leader	177	22	199
	Spray Operator	998	54	1,052
	Washer	1	393	394
	IEC Mobilizer	1,149	320	1,469
	Carrier/Porter	392	2	394
	Spray Pump Technician	29		29
	Total	**2,902**	**811**	**3,713**
South	District coordinator	7		7
	Logistics assistant	7		7
	Financial assistant	3	4	7
	M&E assistant	1		1
	Data Entry Clerk	16	11	27
	Sector Manager	31		31
	Courier	12		12
	Store Keeper	72	31	103
	Store Room Guard	205	1	206
	Team Leader	247	54	301
	Spray Operator	1,559	183	1,742
	Washer		602	602
	IEC Mobilizer	5,516	1,891	7,407
	Carrier/Porter	602		602
	Spray Pump Technician	50		50
	Total	**8,328**	**2,777**	**11,105**
GRAND TOTAL		**11,230**	**3,588**	**14,818**

3.1 Recruitment of Seasonal Staff

AIRS Madagascar advertised in local newspapers to recruit the data entry clerks, district coordinators, district logistics assistants, district finance assistants, and sector managers. For these positions, specific qualifications and abilities were needed (such as knowledge of Microsoft Access databases for data clerks, accounting experience for the finance assistants, or management experience for the district coordinators). Newspaper advertisements for these positions were placed in July 2012 and September 2012. Seasonal staff members were selected after being interviewed by AIRS Madagascar staff and scoring well on short tests on subject matters specific to the seasonal staff position. District coordinators were required to take a test on management and administration; sector managers and district logistics assistants a motorcycle driving test; data clerks a mathematics test and a Microsoft Excel and Microsoft Word familiarity test; and finance assistants a short test on accounting principles.

As noted in Section 1.3., "Model of Spray Operations," other seasonal staff such as the spray operators, team leaders, spray pump technicians, washers, and store managers were recruited in each relevant spray area by the community leaders (Mayor/Chef du Fokotany) based on criteria established by the AIRS Madagascar team. This criteria included the ability to read and write and for the selected members to be in good standing in their communities. It was also noted during recruitment that all spray operators must be in good physical health and capable of holding spray pumps for several hours a day. Thus all spray operators were required to have received a physical examination and a resulting medical certificate noting their good health. Due to other health risks concerning IRS, all women sector managers, team leaders, spray operators, store keepers, and washers were required to complete a pregnancy test, and test negative, before hire.

3.2 Operations Management Assistance from AIRS Benin and AIRS Mali

Since AIRS Madagascar was unable to find a strong candidate to fill the Operations Manager, the project received direct support via two short term technical assistance (STTA) trips by the Operations Managers from the AIRS Benin and AIRS Mali projects. The AIRS Benin Operations Manager completed STTA in Madagascar during the IRS campaign in the CHL from November 18, 2012 to December 21, 2012. The AIRS Mali Operations Manager completed STTA in the south from January 16, 2013 to March 16, 2013.

The overall work for both Operations Managers was very similar, as both used their experience managing IRS campaigns in their respective countries to provide direct supervision and management of the overall IRS campaign implementation and support the logistics/supply chain systems in each spray area. Both Operations Managers spent nearly all of their STTA in the field, traveling to all spray areas and directly monitoring the IRS campaign, and providing crucial problem-solving on a variety of issues ranging from speeding up the delivery of spray operations data to the data entry centers in the south to assuring more efficient use of the district and secondary store rooms in the CHL and correcting various incorrect spray operator practices.

3.3 Supervision of IRS Campaign

Due to the USG regulations in Madagascar that prevent the project from working directly with the Malagasy government, AIRS Madagascar's seasonal and full-time staff completed all supervision for the 2012-2013 IRS campaigns. AIRS Madagascar staff provided daily technical supervision for the IRS campaigns in the CHL and the south to ensure that:

- Appropriate quantities of PPE and insecticide were available at the operation bases for the use of spray teams;
- Stock cards and inventory forms were carefully tracked;
- Environmental best practices for the storage, use, and disposal of PPE and insecticide were followed;

- Seasonal spray staff were paid on time;
- Supervision and staff concerns were addressed and resolved; and
- IRS campaign data were of high quality and entered efficiently.

3.4 District Management Teams

AIRS Madagascar also established seven district offices in the south (the office in Amboasary also supported the spray areas in Tolagnaro), and seven district offices in the CHL.[9] Each office was staffed by a district operations management team consisting of a district coordinator, district logistics assistant, district finance assistant, sector manager(s), and data clerks. The supervisory responsibilities of each district management team were:

- District Coordinator: Provided overall management for the spray programming in each district by assuring all soak pits and store rooms were in good order, reviewing all spray campaign data for accuracy and working with data entry clerks to assure timely updating of the spray campaign database, confirming that spraying in each district aligned with the schedules for when each spray area would be covered, making certain logistics and supply chain systems were in working order, and ensuring that all spray teams had enough PPE, insecticide, and other IRS commodities for completing and spraying. The district coordinators spent considerable time in the field observing the IRS campaign, and providing logistical and programmatic support.
- District Logistics Assistant: Assured that all PPE, insecticides, and IRS commodities readily moved to and from district store rooms to secondary stores and spray teams. Coordinated with the full-time AIRS Madagascar logistical and warehouse staff to gain resupplies of PPE and insecticide. Assured that stock cards and other inventory management systems were in good order and accurate to the physical stock at the district and secondary store-level.
- District Finance Assistant: Managed the payments for all seasonal staff in the district and provided small-scale accounting support for IRS activities within their district.
- Sector Manager: In each district, sector managers were supervised by the district coordinators and given three to five communes (depending on the number of eligible structures to be sprayed, and the terrain that the spray campaigns would cover) to supervise all IRS spray operations. Helped facilitate resupplies for IRS teams and the return of PPE, insecticides, and other IRS commodities for the future use of other spray teams. Directly supervised each spray team's team leader.
- District Data Clerk: Received all spray operator cards (after review by the district coordinator), and completed a final mathematical review of the spray card totals, before completing data entry into the AIRS Madagascar database.

3.5 Other Seasonal Staff

- Couriers were hired in the south to use project motorcycles to retrieve spray operator forms from remote spray areas on a daily basis. This assured the data entry clerks received the spray campaign data daily for entry into the project database.
- Two M&E assistants were hired for the IRS campaigns in the CHL and the south to travel to all data entry sites and help supervise spray campaign data quality checks, and data entry.

[9] The district management team in Ambatofinandrahana closed their office after spraying ended in Ambataofinandrahana district, and opened an office in Ambohimahasoa when this districts started spraying during the second half of the IRS campaign in the CHL. Similarly, the district management team in Ankazobe district closed their office once spraying in this district ended and opened an office Anjozorobe district during the second half of the IRS campaign.

- An environmental compliance assistant was hired to assist the AIRS Madagascar Environmental Compliance Officer (ECO) with visiting the numerous soak pits and store rooms to provide supervision and support, and to also provide supervision of spray operators to ensure spraying adhered to the best management practices (BMP) regarding environmental safety.

3.6 Training of Seasonal Staff

AIRS Madagascar organized and conducted 22 training sessions (11 in the south and 11 in the CHL) for its seasonal staff. The objective of the trainings was to ensure all seasonal staff were aware of their roles and understood how the IRS campaign would function (particularly with regards to supervision). 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 reinforced to all seasonal staff the value of their work in preventing malaria transmission. All training sessions were led by AIRS Madagascar staff, and selected seasonal staff that were trained as trainers. CHL training sessions took place between October 2012 and November 2012; all trainings in the south took place between late January/early February 2013.

AIRS Madagascar trained 14,830 people (3,725 people in the CHL and 11,105 people in the south) to implement the 2012-2013 IRS campaigns. This included 11,235 men and 3,583 women, as noted in Table 19 in Section 12.1., "Additional Tables and Figures."

Table 7 notes the breakdown of training participants in the CHL and the south.

TABLE 7: NUMBER OF PEOPLE TRAINED, DISAGGREGATED BY SPRAY AREA

Training	Number of People Trained in the CHL	Number of People Trained in the South	Total
Training of Trainers	33	52	85
Spray Operator Training	1,251	2,043	3,294
Data Entry Training	17	28	45
Logistics Training	42	103	145
Spray Pump Maintenance	29	50	79
IEC Mobilization/ Enumeration Training	1,469	7,407	8,876
Washer Training	394	602	996
Guardian Training	84	206	290
Transport and Driver Training	394	614	1,008
Total	**3,725**	**11,105**	**14,818**

3.6.1 Brief Description of 2012-2013 IRS Campaign Trainings

Orientation/Supervision Training: AIRS Madagascar staff discussed how the IRS campaign would be implemented with district coordinators and sector managers. Preliminary schedules for the IRS campaigns were provided. Additionally, AIRS Madagascar staff discussed best practices in managing seasonal staff and IRS campaign operations. This training took place in the CHL from September 25, 2013 to October 2, 2012 in Antananarivo and from October 29, 2012 to November 2, 2012 in Fort Dauphin.

Training of Trainers: AIRS Madagascar staff used information from the NMCP-developed IRS campaign training manual to train key seasonal staff management positions (including team leaders, district coordinators, and sector managers) on the importance of IRS in preventing malaria, spray techniques, ensuring environmental compliance during the IRS campaign, completing data collection

forms, completing supervision of spray teams, and providing IEC to notify IRS beneficiaries on how to prepare their structures before the IRS campaign and recommended protocol after the IRS campaign. These individuals in turn trained spray operators in each district capital the week before the spray teams began their IRS campaign work. The training of trainers was held from October 29, 2012 to November 2, 2012 in Antsirabe for the CHL and from January 21, 2013 to January 25, 2013 in Ambovombe for the south.

Training of the Sprayer Operators: The participants in the training of trainers in turn trained all spray operators on the importance of IRS to prevent malaria, correct methods to mix insecticide, best practices in spraying the inside of an eligible structure, the correct use of PPE, how to clean spray pumps and dispose of wastes, how to fill in spray operator forms to record IRS campaign data, and IEC messaging to ensure structures were prepared before spraying and people did not enter a structure until two hours after spraying. The spray operator trainings were held from November 12, 2012 to November 16, 2012 and from December 10, 2012 to December 14, 2012 for the CHL10; and from January 28, 2013 to February 1, 2013 in for the south. For many spray operators in the CHL, the training was review due to most of the spray operators having experience on previous IRS campaigns. In the south, the AIRS Madagascar team noted that 60% of the spray operators were completing IRS for the first time.

Data Clerk Training: Data clerks gained familiarity with the IRS campaign data entry forms and the database used for uploading all IRS campaign data. Data clerk training was completed from October 9, 2012 to October 11, 2012 in Antananarivo for the CHL, and from January 2, 2013 to January 4, 2013 in Fort Dauphin for the south.

Store Keeper Training: The store keepers were trained on inventory management, the value of completing and updating stock cards, and the correct protocol for storing PPE and insecticide. Store keeper training was completed from the end of October 2012 to the first week of November 2012 for the CHL, and during the last week of January 2013 for the south.

Spray Pump Maintenance Training: All spray pump maintenance technicians learned to identify the different components of the spray pumps, and to maintain and repair the spray pumps in case of default. This training took place at the commune level in the CHL from November 6, 2012 to November 10, 2012 and from the end of January 2013 to the first week of February 2013 for the south.

Washer Training: Washers learned techniques to wash PPE correctly. This training took place at the commune level in the CHL and the south, right before spraying began in each spray area.

Transport/Driver Training: Drivers hired for the IRS campaigns learned correct methods to secure and safely handle insecticides, and what to do in the event of intoxication. Participants also learned how to manage an insecticide spill. This training was completed in the CHL in mid-November in Antananarivo, and during the last week of January 2013 in Fort Dauphin in the south.

[10] The spray operator training was completed twice in the CHL, as according to the IRS campaign model in Madagascar, the spray teams in Ambataofinandrahana, Ambositra, Mandoto, and Ankazobe completed their spraying between November 26, 2012 and December 9, 2012. Therefore, the spray operators in these districts were trained before the spray campaign began in mid-November 2012. From December 9, 2012 to December 16, 2012, PPE, insecticide, and other IRS commodities were collected from the spray teams in these districts and provided to the spray teams in Ambohimahasoa, Betafo, and Anjozobe districts who would completed their spraying during the second half of the spray campaign. While the PPE, insecticide, and IRS commodities were being moved, the spray operators in Ambohimahasoa, Betafo, and Anjozorobe received their training.

4. IEC MOBILIZATION

Before and during the IRS campaign, AIRS Madagascar organized advocacy events, worked with mass media channels, produced and distributed various promotional materials, and directly reached out to IRS campaign beneficiaries through door-to-door mobilization to inform the populations in the CHL and the south about IRS.

4.1 IEC ACTIVITIES

The Information, Education and Communication (IEC) Activities completed by AIRS Madagascar included:

- **Community Mobilization:** At least one month before the IRS campaign AIRS Madagascar informed community leaders in the CHL and the south about the upcoming IRS campaign, specifically, the schedule of the IRS campaign and messaging to communicate to their community members. Messaging topics included the benefits of IRS, how to prepare a structure to be sprayed, and the recommended two-hour wait time before entering a sprayed structure. Additionally, AIRS Madagascar worked with community leaders to identify community members to participate as IEC mobilizers during the door-to-door mobilization efforts.

  AIRS Madagascar staff also met with regional heads in Analamanga, Vakinankaratra, Amoron'I Mania, and Haute Matsiatra in the CHL, and Anosy, Androy, and Atsimo Andrefana in the south (as the spray areas for the 2012-2013 IRS campaigns are located in these regions), to discuss the schedule for the IRS campaign and the objectives of the IRS campaigns. In-turn, AIRS Madagascar asked for the regional officials to communicate the schedule of the IRS campaigns and the objectives and benefits of the IRS program to the Chef de district.

- **Door-to Door-Mobilization:** AIRS Madagascar hired 8,876 IEC mobilizers (1,469 IEC mobilizers in the CHL, and 7,407 IEC mobilizers in the south), or about three IEC mobilizers per Fokotany. This was done to assure door-to-door mobilization was completed by community members, since community members would know the most efficient way to reach all people in their communities with IEC messaging and would help with the acceptance of information regarding the IRS campaign.

  Concurrent with the door-to-door mobilization, IEC mobilizers also identified eligible structures in each spray area that would be targeted during the IRS campaign, and noted the number of people who lived in/used each eligible structure. This data helped AIRS Madagascar gain details about the location of each eligible structure. Additionally, the IEC mobilizers left stickers on each eligible structure to help the spray operators identify structures that had been mobilized.

  One-day trainings for the IEC mobilizers were completed over a five-day period from October 10, 2012 to October 15, 2012 in the CHL, and over a four-day period, from January 8, 2013 to January 12, 2013 in the south.

  Door-to-door mobilization took place between October 11, 2012 and October 26, 2012 in the CHL, and between January 9, 2013 and January 19, 2013 in the south.

- **IRS Posters:** IEC mobilizers put up posters in highly visible locations, such as markets, government buildings, and the AIRS Madagascar offices, and distributed leaflets to community members (see annex, Section 12.1., "Additional Tables and Figures" for an example leaflet from the IRS campaign). The posters and leaflets included information on:

- The IRS campaign's schedule;
- The advantages of protecting your household from malaria with IRS;
- How structures should be prepared for the IRS campaign.

- **Radio:** Radio spots were completed in the CHL (41 spots) on five radio stations, and in the south (342 spots) on seven radio stations. Radio spots included information that was identical to the information noted on the flyers. Radio spots were on-air in various areas, the day before the spray area would be covered by the IRS campaign.

4.2 Results of IEC Activities

AIRS Madagascar noted that 99% of the structures in the CHL and the south visited by the IEC mobilizers agreed to accept the IEC messaging and have their structures sprayed during the IRS campaign. However, the most common reasons for rejecting the IEC mobilization were:

- Household occupants were not home when IEC mobilizers visited (usually the household occupants were working in their fields or attending market), and were hesitant to accept a second visit by the IEC mobilizers; and
- Non-family or non-village members were not allowed to enter a household due to personal or cultural practices in various communities.

Table 8 provides the results of the door-to-door mobilization.

TABLE 8: RESULTS OF DOOR-TO-DOOR MOBILIZATION

Region	Districts	Structures Found	Men Sensitized	Women Sensitized	Total population Sensitized	% of Structures Not Sensitized
CHL	Ankazobe	12,933	27,981	28,703	56,684	0.09%
	Anjozorobe	11,289	17,157	19,484	36,641	2.74%
	Betafo	14,155	28,007	29,245	57,252	0.36%
	Mandoto	19,302	28,102	31,156	59,258	2.20%
	Ambositra	17,182	34,335	37,567	71,902	1.13%
	Ambohimahasoa	8,234	14,687	17,695	32,382	1.36%
	Ambatofinandrahana	13,688	23,283	26,806	50,089	0.20%
	Total	**96,783**	**173,552**	**190,656**	**364,208**	**1.15%**
South	Amboasary Sud	39,102	51,734	60,384	112,118	0.92%
	Ambovombe	71,679	400,380	160,948	561,328	1.22%[11]
	Ampanihy	66,820	78,018	92,922	170,940	0.32%
	Bekily	40,853	62,567	68,157	130,724	0.33%
	Beloha	27,070	48,203	52,352	100,555	0.10%
	Betroka	22,572	34,849	36,630	71,479	0.38%
	Tolagnaro	9,968	10,791	12,455	23,246	0.35%

[11] Community leaders in Ambovombe wanted AIRS Madagascar to hire an extensive number of community members as IEC mobilizers (far more than were hired in other districts). When AIRS Madagascar declined to hire the high number of IEC mobilizers, some communities (particularly in Maroalimainty and Tsimananada communes) refused mobilization. After some negotiation with community members, AIRS Madagascar was allowed to complete mobilization in some areas of these communes, although door-to-door mobilization refusals remained slightly higher in Ambovombe than in other districts in the south.

Region	Districts	Structures Found	Men Sensitized	Women Sensitized	Total population Sensitized	% of Structures Not Sensitized
	Tsihombe	24,343	35,572	41,262	76,834	0.25%
	Total	**302,407**	**722,114**	**525,110**	**1,247,224**	**0.59%**
Grand Total		**399,190**	**895,666**	**715,766**	**1,611,432**	**0.73%**

Table 9 notes the quantity of IEC materials that were distributed.

TABLE 9: NUMBER OF IEC MESSAGING DISTRIBUTED

Item	Number Distributed
Radio Spots	383
IRS Campaign Brochures	10,000
Leaflets	141,824
Posters	3,500

4.3 ISSUES WITH IEC MOBILIZATION

- The stickers placed on eligible structures during door-to-door mobilization did not adhere for long, as high winds and the rains between the time of mobilization and the spray campaign often caused the stickers to fall from the eligible structures.
- IEC mobilization training in the south was rushed because AIRS Madagascar staff had to complete a variety of other activities to prepare the districts in the south for the IRS campaign. As a result, IEC mobilizers did not fully understand some of their key activities, including leaving structure identification cards at each eligible structure to provide a receipt or internal record for the IRS beneficiaries that the structure was mobilized and sprayed.
- There was insufficient mobilization supervision in the CHL and the south, as AIRS Madagascar staff were busy working on other activities to prepare the two spray areas to begin their IRS campaigns. The lack of supervision meant IEC mobilizers skipped some communities.
- AIRS Madagascar noted the number of leaflets distributed was not enough, as most beneficiaries in Ambovombe district did not receive a leaflet due to shortages and the distribution of leaflets in other districts.
- In Maroalimainty and Tsimananada communes in Ambovombe district in the south, community leaders were initially upset that AIRS Madagascar did not hire more of their community members as IEC mobilizers (please note that an equal number of community members were hired to work in these two communes, as in the other communes covered by the 2012-2013 IRS campaign). After some further discussions with the AIRS Madagascar Chief of Party (COP) and temporary Operations Manager, the community leaders allowed the IEC mobilizers to complete their work. Mobilization was severely delayed in these two communes.

5. IMPLEMENTATION OF THE IRS CAMPAIGNS

The 2012-2013 IRS campaigns were implemented from November 26, 2012 to December 31, 2012 in the CHL, with a mop-up spray campaign in Ankozobe district from February 6, 2013 to February 10, 2013; and from February 4, 2013 to March 18, 2013 in the south, with a mop-up spray campaign from April 12, 2013 to April 29, 2013.

The spray campaigns in the CHL and the south followed the IRS campaign model noted in Section 1.3., "Model of Spray Operations", completing IRS programming via a cascading start, with various districts and spray areas starting spray first, and then passing along PPE, insecticide, and other IRS commodities to other spray areas and districts after all spraying ended in the initial areas. Overall, spraying in the CHL and the south was completed six days a week. The seventh day provided a day off for spray operators and allowed for the movement of PPE, insecticide, and IRS commodities from sprayed areas to unsprayed areas. The seventh day also allowed for resupplying spray teams, as necessary.

Overall, 2,794 Spray Operators completed spraying during the IRS campaigns in the CHL and the south. Table 10 provides a breakdown of the number of spray teams that completed IRS in the two spray areas.

TABLE 10: BREAKDOWN OF THE NUMBER OF SPRAY TEAMS PER DISTRICT

Region	District	Number of Spray Teams	Number of Spray Operators	Male	Female
CHL	Ambatofinandrahana	34	179	174	5
	Ankazobe	28	151	135	16
	Mandoto	39	219	216	3
	Ambositra	26	127	116	11
	Ambohimahasoa	21	113	101	12
	Betafo	27	137	134	3
	Anjozorobe	24	126	117	9
	Total for CHL	**199**	**1,052**	**993**	**52**
South	Amboasary	43	259	227	32
	Ambovombe	71	395	355	40
	Ampanihy	51	306	263	43
	Bekily	34	197	185	12
	Beloha	20	110	103	7
	Betroka	49	274	253	21
	Tolagnaro	8	50	45	5
	Tshiombe	25	151	128	23
	Total for South	**301**	**1,742**	**1559**	**183**
Grand Total		**500**	**2,794**	**2552**	**242**

5.1 Delays in Starting IRS Campaign in CHL

The IRS Campaign in the CHL was originally intended to begin on November 15, 2012. However, a national mother-child health week was declared by the Ministry of Health, and implemented between November 5, 2012 and November 9, 2012, with the Ministry of Health requiring community health workers and community members (many of whom also worked as various seasonal staff positions with AIRS Madagascar) to participate and help with presentations, immunization campaigns, and other activities. The timing of the mother-child health week meant AIRS Madagascar lacked some of its seasonal staff for trainings and for helping build soak pits and store rooms. Many activities intended for November 5, 2012 to November 9, 2012 had to be delayed until the following week, when seasonal staff members were available again.

Additionally, AIRS Madagascar staff noted during the pre-spray environmental assessment that several soak pits and store rooms were not ready for the IRS campaign. The soak pits and store rooms were not up to the BMP standards, with several soak pit holes that were not dug deep enough, and doors on some store rooms did not have secure locks. It was determined by the AIRS Madagascar staff that these soak pits and store rooms needed to be refurbished before starting the IRS campaign in the CHL, leading to a delay in the start of the IRS campaign until November 26, 2012.

5.2 Delays in Starting IRS Campaign in the South

The IRS Campaign in the south was originally planned to start on January 3, 2013. However, since the AIRS Madagascar staff were busy closing-out the IRS campaign in the CHL (which lasted until December 31, 2012), staff did not have enough time to travel to the south in December 2012 and early January 2013 to organize the building/refurbishment of soak pits and store rooms, the training of seasonal staff, and supervise the movement of PPE, insecticide and IRS commodities from the central warehouse to the district store rooms.

By mid-January 2013, key AIRS Madagascar staff were able to relocate to the south and begin fast-tracking preparations for the IRS campaign. These efforts were further helped by the STTA work of the AIRS Mali Operations Manager, who arrived in Madagascar in mid-January 2013 and immediately relocated to the south. The AIRS Madagascar Operations Manager was able to immediately coordinate soak pit refurbishments, and organize seasonal spray staff in the south. By the first week of February 2013, most spray areas had suitable soak pits and store rooms. The AIRS Mali Operations Manager worked with the AIRS Madagascar ECO, and the seasonal staff environmental compliance assistant, to continue work to ready the remaining soak pits an store rooms, while the initial spray areas began spraying on February 4, 2013.

The IRS campaign in the south was forced to take a pause from February 23, 2013 to February 25, 2013 due to Cyclone Haruna making landfall in southern Madagascar. Following the cyclone, AIRS Madagascar did note that roads became difficult to use in some areas of the south, which further delayed IRS campaign operations.

Overall, AIRS Madagascar did note that IRS operations in the south were completed at a slower pace than expected due to the following issues:

- Around 60% of the community spray operators in the south were new to IRS, and like most new spray operators, they made many errors during their first few days of spraying. This in-turn led to delays in finishing spraying in some areas, which consequently meant other spray areas were delayed in receiving IRS commodities in order to begin spraying their communities.
- Logistics and supply chain systems were not planned as thoroughly as possible and there were delays in resupplying various spray teams or moving IRS commodities from one spray area to the next spray area.

- Some spray teams had skipped various communities during their spraying due to initial refusals and/or tight schedules for completing spraying in their spray area. This meant that spray coverage rates did not meet the PMI-threshold of 85% of all eligible structures sprayed in some areas when the spray campaign was scheduled to end.
- The inability to build all soak pits and refurbish all store rooms in January 2013 meant the spraying of some areas was delayed, while project and seasonal staff assured the spray areas' soak pits and store rooms were ready.
- As AIRS Madagascar began spraying in more remote districts, the project noted that there was a more significant lag-time between when the spray cards were available and ready for delivery to the data entry centers. Unlike in some communes where data from spray teams are delivered daily, in more remote communes, spray data may be sent in once every three to five days. This meant the project had a greater delay in understanding how many structures had been sprayed, and still needed to be sprayed. For these communes, particularly in Betroka and Amboasary, AIRS Madagascar hired couriers (please see Section 3.5., "Other Seasonal Staff" for more details), to travel to remote spray sites daily via motorbike, and return to the data entry centers with spray campaign data.

5.3 Reasons for Mop-Up Campaign in the South

As noted in Section 5.2., the IRS campaign in the south did not move forward as quickly as planned. By mid-March 2013, AIRS Madagascar noted that many spray areas had still not reached the 85% spray coverage objective. The AIRS Core team advised AIRS Madagascar to temporarily stop spraying to 1) allow spray coverage data entry to catch up so that AIRS Madagascar could have a better idea of the actual spray coverage rates in the south, 2) identify problem areas where future IRS campaign efforts could be concentrated, and 3) allow AIRS Madagascar staff to meet with district coordinators and sector managers to determine areas that may have been skipped or had initially refused IRS.

The mop-up campaign in the south was originally scheduled from April 12, 2013 to April 24, 2013. However, a second national mother-child week was implemented by the Ministry of Health from April 21, 2013 to April 26, 2013. Therefore, the final days of the IRS campaign in the south were delayed until April 27, 2013 to April 29, 2013.

5.4 Security Issues in Spray Areas

5.4.1 Security Issues in Androva, CHL

In November 2012, violence-related to ongoing cattle theft occurred in the Androva commune of Ankozobe district. After consulting with the gendarmes for the district, it was determined that AIRS Madagascar would not spray several areas of Androva, particularly Amparihikambana, as the violence had resulted in unsafe conditions for spray operators, and several communities had been burned down with the community members moving away to safer areas. Additionally, AIRS Madagascar had already sprayed more than 85% of all structures in the spray area around Androva, and met its objective for spraying the communes in Ankozobe district.

However, in January 2013, the NMCP reported a malaria outbreak in Androva. AIRS Madagascar and the NMCP determined that the outbreak may have occurred due to people returning to Androva after the cattle thefts had ended to rebuild their houses. Consequently, these structures had not been sprayed.

Per the request of the NMCP and PMI-Madagascar, the AIRS Madagascar Technical Director organized a mop-up spray campaign for Androva during the second week of February 2013. The district coordinator and several sector managers from Ankozobe district were rehired, along with several experienced local spray operators to set up and complete the mop-up IRS campaign in Androva. The Technical Director

and district coordinator traveled to Androva with PPE and insecticide from the Antananarivo central warehouse, and completed a two-day refresher training for the rehired spray operators. After the training was completed, the spray operators were transported to the areas that had not been sprayed and completed a brief mop-up campaign, spraying 545 structures.

5.4.2 INSECURITY ISSUES IN THE SOUTH

Due to insecurity related to cattle theft and violence between cultural groups, AIRS Madagascar was unable to spray several areas in Amboasary district and one commune in Tolagnaro district. AIRS Madagascar made this decision after close consultation with seasonal spray staff familiar with the area, and after receiving an official notice from the Gendarme Brigade Commander of Amboasary district against having any project or seasonal spray staff enter the insecure areas. Table 11 includes the estimated number of eligible structures that were not sprayed due to the insecurity in Amboasary and Tolagnaro districts.

TABLE 11: ESTIMATED NUMBER OF ELIGIBLE STRUCTURES NOT SPRAYED DUE TO INSECURITY IN AMBOASARY AND TOLAGNARO DISTRICTS

District	Commune	Fokotany	Estimated Number of Eligible Structures Not Sprayed	Estimated Population
Amboasary	Ranobe	All Fokotany	984	4,608
	Mahaly	All Fokotany	1,382	5,029
	Esira	All Fokotany	1,333	5,183
	Manevy	All Fokotany	822	4,060
	Ebelo	All Fokotany	2,163	9,714
	Elonty	All Fokotany	2,014	7,381
	Tsivory	All Fokotany	3,412	14,111
	Tandava Sud	Ambaniza	90	3365
		Ampesipolaka	60	
		Maromamdrosa	90	
		Ambolovohitsoa	71	
		Elomako	120	
		Maroaiky I	73	
		Maroaiky II	84	
		Andavaloay	120	
	Ifotaka	Ambenaninato	57	2110
		Andranomainty	134	
		Befantsiolotse	66	
		Mangily	100	
		Mahabo	170	
Tolagnaro	Ranopiso	Midriso	172	933
		Ankilivalo	130	
	Ambatoabo	All Fokotany	1,616	7,085
		Total	**15,263**	**57,171**

5.5 INCIDENTS DURING THE IRS CAMPAIGNS

The IRS campaign in the CHL did not experience any insecticide poisonings or spills, and no injuries were reported. However, the IRS campaign in the south experienced four incidents.

- A spray operator in Amboasary commune (Amboasary district) removed a spray pump cover before depressurizing the spray tank, causing the remaining insecticide in the spray tank to shoot out of the spray tank. Unfortunately the spray operator was not wearing her face shield and was splashed by the insecticide. The spray operator complained of her face stinging and was taken to a nearby health center, where the health staff noted that the spray operator was not injured or suffering from any symptoms of insecticide poisoning or intoxication. The spray operator's face was swollen, but she was not admitted to the health center, and made a full-recovery. Fortunately, the incident took place in a soak pit, and did not lead to any contamination of the surrounding area. AIRS Madagascar staff took this opportunity to retrain seasonal staff in Amboasary district to correctly de-pressurize spray pumps, and more importantly emphasize that PPE is always worn by all seasonal staff when they are in the vicinity of insecticides.
- Also in Amboasary commune, a washer was not wearing her face shield and was splashed in the face by water from a bucket being used to wash overalls. The washer's left eye became inflamed and she noted that her eyes were stinging. The washer was taken to a nearby health center, where the health staff noted that she was not suffering from any symptoms of insecticide poisoning or intoxication. After cleaning her left eye, the washer was released from the health center. Once more AIRS Madagascar staff took the opportunity to retrain all seasonal staff in Amboasary district about the importance of wearing PPE.
- In Andalatonosy commune (Ambovombe district), while monitoring IRS programming, a sector manager was attempting to cross a river on one of the project's motorcycles. Unfortunately the sector manager fell off the motorcycle in the river. The sector manager was able to make his way to a nearby health center, where staff determined that he was not injured outside of several bruises, cuts, and scrapes. The motorcycle was swept away in the river but later recovered by AIRS Madagascar staff. The motorcycle was found by local mechanics to have sustained water damage and needed extensive repairs.
- Three separate animal intoxication incidents occurred in Betroka district. In all three incidents the animals died of intoxication (three cats and four geese). The AIRS Madagascar team and the district coordinator organized another round of IEC messaging to inform people in Betroka district to wait two hours before themselves or any animals entered a spray structure, and to safely dispose of any dead insects swept out of a sprayed structure so they could not be eaten by any animals.
    - In Beampombo II commune, three cats were allowed to enter a structure that had just been sprayed by a spray operator. The cats died of insecticide poisoning and their owner immediately reported the incident to the sector manager.
    - In Ivahona commune, two geese were killed after eating a pile of dead insects that had just been swept out of a sprayed structure. The owner of the geese notified the team leader and sector manager in the area about the incident.
    - A similar situation also occurred in Betroka commune where two geese died after eating a pile of insects recently swept out of a sprayed structure. The owner of the geese informed the sector manager about the incident.

5.6 Missing Insecticide Sachets in Amboasary

On February 10, 2013, AIRS Madagascar staff (and AIRS Core team staff on STTA) visited the Amboasary district warehouse and found its organization, cleanliness, and supervision to be poor. There was limited or no organization of PPE stocks, as gloves were mixed with spray pumps and used face masks were found between helmets, plastic sheeting, and other PPE. Additionally, broken pumps, buckets, and other supplies were found interspersed throughout the warehouse. The warehouse was extremely dirty, and had not been swept in quite some time. The team also noted that the warehouse had not been fenced off properly and community members could easily walk through the area around the district warehouse.

Seeing the condition of the store room, the district coordinator was called over to the warehouse, and physical counts of PPE and most notably insecticide sachets were completed by the store keeper and district coordinator. Most of the items in stock did not match the warehouse's stock cards; most notably, the physical count found 1,400 fewer insecticide sachets than were noted on the stock card. The district coordinator and storekeeper did not have an explanation for the disorganization of the warehouse and difference in physical inventory from the stock cards, only noting that they may not have counted issuances correctly.

Given the disorganization of the Amboasary district warehouse and issues with physical inventory as compared to the stock cards (most notably with regards to insecticide sachets), the AIRS Madagascar ECO and AIRS Mali Operations Manager completed stock audits of all secondary warehouses in Amboasary district during the next week to gain information on all inventory that was sent out and returned to the Amboasary district warehouse. Following these audits, and reviewing all issuance entries at the district warehouse, the AIRS Madagascar team estimated that 44 sachets of Bendiocarb were actually missing from inventory from the Amboasary district warehouse.

After finishing the stock audit for Amboasary district, the AIRS Mali Operations Manager and the AIRS Madagascar ECO visited the other six district warehouses in the south over the next week and a half, to review stock levels. Overall, they found that the other district warehouses (and the AIRS central warehouse) had accurate stock cards and inventory.

Further actions taken by AIRS Madagascar after noting the condition of the store room and the missing insecticide in Amboasary included:

- The Amboasary district warehouse was locked, and the key and stock cards were taken away from the store keeper, district coordinator, and district logistics assistant (who was not available for the recount) until the district stock analysis was completed by the AIRS Madagascar staff.
- The AIRS Mali Operations Manager and the AIRS Madagascar ECO completed further interviews with the district coordinator, store keeper, and district logistics assistant about the incident and the poor condition of the warehouse. However, the store keeper, district coordinator, and district logistics assistant presented different reasons about why the sachets of insecticide were missing and the poor condition of the store room.
- A report was filed with local gendarmes regarding the missing insecticide sachets.
- The AIRS Madagascar COP and the AIRS Mali Operations Manager reinforced among all AIRS staff (full-time and seasonal staff) that all supervision of store rooms should include reviewing stock cards and physical inventory at all store rooms visited.
- After consulting with the project's legal counsel, AIRS Madagascar staff fired the district coordinator, store keeper, and district logistics assistant for poor inventory control, and inability to account for IRS commodities.
- In place of the fired staff in Amboasary district, AIRS Madagascar brought in a strong performing

district coordinator, district logistics assistant, and store keeper from the CHL to work in Amboasary district until the end of the IRS campaign in the south.

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

As noted in the 2012-2013 AIRS Madagascar work plan, AIRS subcontracted RTT Group, Limited (RTT) to complete an analysis of the project's logistics and supply chain systems during the IRS campaign and provide recommendations. RTT completed its evaluation of the logistics and supply chain operations during the IRS campaign in the CHL from December 8, 2012 to December 14, 2012. The RTT evaluation team visited both central warehouses in the CHL, in Antananarivo and Ambositra, and also visited several district and secondary store rooms in Ambositra, Ambohimahasoa, and Betafo districts.

Overall, RTT found that the AIRS Madagascar team completed a reasonable job of managing the logistics and supply chain for supplying the spray teams during the IRS campaign in the CHL. RTT noted the AIRS Benin Operations Manager that was brought to Madagascar to stabilize the spray campaign's operations management had successfully helped to assure good organization of supply chain activities. However, the RTT team did find that some store rooms (particularly at the district level) were superfluous, and communications and supervisions for all logistics and supply chain activities needed improvement. RTT noted that the quantity of PPE and insecticide procured and used for the IRS campaign in the CHL was sufficient and hazardous materials, such as insecticides, were handled properly by all IRS campaign personnel.

Key findings and areas of improvement found by RTT during their evaluation included:

- RTT found the district store rooms to be less relevant and necessary to support the IRS campaign in the CHL. Overall, the district store rooms acted as a transport depot mainly, and more or less only served the function of receiving PPE, insecticide, and IRS commodities from the central warehouses, and then moving the commodities to the secondary store rooms for supplying and supporting the spray teams. During RTT's visits to the district-level store rooms, they found them empty, with store keepers and guardians acknowledging that commodities were only in the district-level store rooms for a few days, but most of the time the district-level store keepers were unused.
- The central warehouse in Ambositra warehouse was noted for its large size, security, and cleanliness, but was also used more or less as a way station for supplying spray areas near Ambositra and the southern part of the CHL. Overall, with the good road network from Antananarivo to the southern part of the CHL, RTT was unsure of the necessity of the central warehouse in Ambositra.
- Overall, the secondary store rooms were found to be in acceptable condition and well-organized. Store keepers were knowledgeable of inventory management systems and kept accurate stock cards. The store keepers were also inventive in completing minor refurbishments (such as lining earth floors with tarpaulin) to safely store insecticides. In some areas, RTT did note that store room areas needed better fencing to keep non-IRS personnel from walking through areas near the store rooms. Some secondary store rooms lacked fire extinguishers and first aid kits, but RTT noted that when this finding was provided to the AIRS Madagascar team, they quickly provided these items to the several secondary store rooms that lacked fire extinguishers and first aid kits.
- RTT noted that there is a need for more supervision of logistics and supply chain systems. The AIRS Madagascar logistics staff and Operations Manager are too small of a team to supervise all supply chain activities. Additionally, although some district coordinators and sector managers completed supervision and engaged in the supply chain management, many were busy with numerous other IRS campaign management issues to complete more supervision of supply chain activities.

RTT recommended the following ideas for improving logistics and supply chain management of the IRS campaign in the CHL:

- AIRS Madagascar should evaluate whether the central warehouse in Ambositra can take on greater responsibilities in organizing, supervising, and monitoring supply chain operations in the southern CHL. Since the roads from Antananarivo to southern CHL are good, and there are not too many structures to be sprayed in the CHL, the Ambositra warehouse could be closed. AIRS Madagascar could look to gain a larger warehouse in Antananarivo to become the main and only central warehouse for the CHL.
- The district-level store rooms should also be reevaluated, as they only serve as a temporary depot, and may not require guards and store rooms for a significant period of time. Instead, AIRS Madagascar may consider sending all IRS campaign commodities directly from the central warehouses to the secondary store rooms, and eliminate the district-level store room. RTT did note that district-level logistics staff could take on a greater role in supply chain supervision if they have limited work to do at their store rooms.
- More training should be provided to all levels of seasonal staff within the supply chain. This will not only help seasonal staff remember key skill sets (such as accurately keeping stock cards), but will also help build capacity in order for the supply chain system to rely less on Warehouse managers at the central-level.
- A reference manual and standard operating procedure should be developed and presented to all store managers and district logistics assistants. Additionally, AIRS Madagascar should make sure that the Material Safety Sheets (especially for insecticides) are translated into French and Malagasy.
- Additional supervision for supply chain activities especially with regards to the secondary stores is needed. RTT noted that AIRS Madagascar is unable to utilize a significant layer of supervision that the other AIRS projects use extensively (i.e., the involvement of government staff to complete supervision), and this has meant that supervision is at a minimal level with regards to supply chain and inventory management systems. RTT also noted that AIRS Madagascar staff and the district coordinators and sector managers often have high workloads and it is challenging for them to provide more time to supervise and monitor supply chain activities, especially for the secondary store rooms. However, the project should make an effort to either reallocate resources or hire more staff to complete more supervision. Most errors at the district and secondary store rooms were minor. Supervision at the very least would allow for some one-on-one training to limit some of these smaller errors. In addition to more supervision, better communication (such as phone calls to store manager cellphones) will help resolve more supply chain issues, such as rectifying shipments from the central warehouse that did not provide the right quantities more quickly.

6. Environmental Compliance

6.1 Pre-Spray Environmental Assessment

An initial pre-spray environment inspection was undertaken by the AIRS Madagascar ECO in September 2012. Details from this pre-spray environmental inspection are found in the Letter Report that AIRS submitted to PMI-Washington, PMI-Madagascar, and USAID-Washington on October 1, 2012. The inspection team used a checklist to complete their review, based on PMI's BMP document.

The initial pre-spray inspection resulted in AIRS Madagascar identifying the location for all soak pits and store rooms to be used during the 2012-2013 IRS campaigns and beginning discussions with community leaders, particularly Chef du Fokotany, to negotiate the precise location for all store rooms and soak pits. The location for all soak pits and store rooms to be used during the 2012-2013 IRS campaign was finalized in October 2012.

One month before the IRS campaigns started (October/November 2012 in the CHL, and January 2013 in the south), the ECO, temporary Operations Manager, and the Environmental Compliance Assistant visited all store rooms and soak pits, to assure they were correctly constructed/refurbished and ready for the IRS campaign. Any store rooms or soak pits that were unready were discussed with the district coordinator and sector manager, who in turn worked to complete the appropriate changes to ensure the store rooms and soak pits were ready.

6.2 Soak Pit Construction

Following the hire of the district coordinators and sector managers for the CHL and the south, the ECO worked with these seasonal staff workers to begin developing soak pits and store rooms at the designated locations. As noted in Section 2.3., "IRS Campaign Logistics Planning," AIRS Madagascar developed over 130 store rooms for the 2012-2013 IRS Campaigns. AIRS Madagascar developed 759 soak pits for the 2012-2013 IRS campaigns. Table 12 includes the number of soak pits built in each district.

TABLE 12: NUMBER OF SOAK PITS BUILT PER DISTRICT

Region	District	Number of Primary Soak Pits	Number of Secondary Soak Pits
CHL	Ankazobe	3	22
	Anjozorobe	6	17
	Betafo	6	18
	Mandoto	7	30
	Ambositra	7	31
	Ambatofinandrahana	9	45
	Ambohimahasoa	4	12
	Total	**42**	**175**
South	Ampanihy	21	80
	Ambovombe	22	64
	Tshiombe	7	25
	Beloha	7	42

Region	District	Number of Primary Soak Pits	Number of Secondary Soak Pits
	Bekily	19	71
	Betroka	20	76
	Amboasary	16	53
	Tolagnaro	5	14
	Total	**117**	**425**
Grand Total for CHL and South		**159**	**600**

Overall, soak pits were built in the same location as most store rooms (in all district capitals and near the secondary stores). The soak pits built by AIRS Madagascar were designed to be non-permanent, given that the areas where IRS will be completed in Madagascar will change as more areas transition to "focalized" spraying in future years. Therefore, the soak pits consisted of a hole filled with the correct layers of sediment for absorbing and safely degrading insecticides (large rocks, small rocks, pebbles, gravel, sand and coal) as noted in the BMP. The area surrounding the soak pit was sloped to assure all runoff from washing and the progressive rinsing of spray tanks would drain into the soak pit. This area was covered with plastic sheeting (tarpaulin) to assure the protection of the earth from any insecticide runoff. The soak pits were enclosed by fence consisting of several posts and tarpaulin. AIRS Madagascar chose to use tarpaulin extensively in its soak pits since the plastic sheeting can be washed and reused in future years, or if damaged, the tarpaulin can be washed thoroughly and either disposed of in a landfill or recycled. AIRS Madagascar also used ropes to devise areas for drying the washed PPE (mainly coveralls). Figure 2 provides an example of a typical soak pit used during the 2012-2013 IRS campaigns.

FIGURE 2: SOAK PIT USED DURING THE 2012 IRS CAMPAIGN IN THE CHL

6.3 Environmental Inspections during the IRS Campaigns

During the IRS campaigns, the ECO and the Environmental Compliance Assistant were in the field continuously, traveling to all spray areas to complete monitoring of the use and condition of soak pits and store rooms and the performance of spray operators with regards to environmental compliance issues. All environmental monitoring during the IRS campaign was completed via a checklist that was developed by the AIRS project based on PMI's BMP.

However, since there were a high number of soak pits and store rooms, other AIRS Madagascar staff, including the COP, Technical Director, and the temporary Operation Managers also visited soak pits and store rooms on the ECO's behalf. During these visits, the ECO and other AIRS staff reviewed the condition of the soak pit, particularly the flow rate and drainage of the soak pit holes and the condition

of the tarpaulin surrounding the soak pit. They also assessed the condition of the store rooms, namely whether the store room's roof remained in acceptable condition, if all insecticides and PPE were organized well and stored safely on pallets, and that stock cards matched the actual physical stock of the insecticide and PPE in the store room.

In addition to reviewing the soak pits and store rooms, the ECO and AIRS staff monitored the environmental compliance of the spray operators while they completed their spraying. They inspected 1) whether insecticide was mixed completely within the spray pumps, 2) that spray pumps were being pressurized between 35-55 psi during spraying and were properly depressurized before being rinsed, 3) that the progressive rinse for all spray pumps was followed, and 4) whether all spray operators, washers, team leaders, and store keepers correctly used their PPE. The findings from the environmental inspections during the IRS Campaign included:

Storage Facilities:

- All storage facilities (district and secondary) were equipped with a double locking keys system.
- Store rooms warehouses were well ventilated and in good order. In some areas where store rooms included an earth floor, the floor was adequately covered with tarpaulin and plastic sheeting.
- The insecticide stocks were stored on pallets not taller than two meters, and solid wastes from the IRS campaign were regularly stored in plastic bins separated from other stock which had not been used yet.
- Aside from the Amboasary district warehouse, stock cards and inventory records in most store rooms were correct during most supervision visits. A few store rooms did have stock cards that needed to be updated, and AIRS Madagascar staff worked with the store keeper to complete a physical count of all items in the store rooms, to assure the stock cards were updated and accurate.

Soak Pits:

- While the tarpaulin-enclosed soak pits worked well in the CHL, strong winds constantly knocked down and/or ripped the tarpaulin enclosures around the soak pits in some spray areas in the south (particularly near the coast). This caused AIRS Madagascar to constantly purchase new tarpaulin to replace the ripped and torn enclosures. The enclosures in some areas needed to be rebuilt several times each week.
- Spraying in Betroka district was delayed in several spray areas during the IRS campaign due to improperly built soak pits. In these areas, AIRS Madagascar would not allow for spraying to start until the soak pit were rebuilt correctly and it was determined that the soak pits could safely drain and dispose of liquid wastes. This often meant spraying in some areas was delayed by one to two days until the soak pits were deemed ready. Due to the high-number of poorly built soak pits, AIRS Madagascar assured that one of its staff members was in Betroka for the second half of the IRS campaign in the south to monitor and assure all soak pits were in an appropriate condition to safely dispose liquid wastes. Additionally, the ECO retrained the Betroka district coordinator, sector managers, and district logistics assistant on how to properly build a soak pit and what to look for when observing the IRS campaign and the condition of soak pits.

Other Environmental Compliance Issues:

- AIRS Madagascar staff noted that seasonal staff in the CHL and the south readily complained about the sizes of PPE, particularly overalls, gloves, and boots. It was noted that a size "medium" was often too large for an average-sized spray operator or washer. Project staff have determined that for the 2013-2014 IRS campaigns, AIRS Madagascar will work to procure more small sizes for overalls, gloves, and boots, and seasonal staff should provide their clothing and boot sizes.
- In several spray areas in the CHL and the south, AIRS staff noted spray operators mixing insecticide

in a bucket and then pouring the insecticide from the bucket into the spray tank. This was clearly observed during the STTA trip by the AIRS Project Director and Technical Coordinator in Tsihombe District in the south. In all areas where this was observed, AIRS Madagascar staff immediately retrained all spray operators and team leaders on the correct method for mixing pyrethroid-class and carbamate-class insecticides. This method includes filling the spray pump with water, dropping the insecticide sachet into the spray tank, and agitating the spray pump. For future IRS campaigns, all spray operators will be trained, instructed, and supervised to ensure that they only mix insecticide in their spray pumps.

- AIRS Madagascar staff noted in the CHL that some spray operators did not wash the scarves that were worn around a spray-operator's neck during spraying. Where this was observed, AIRS Madagascar staff provided refresher trainings in the proper use of PPE and reminded spray operators that all PPE must be washed daily after spraying.
- During the first half of the IRS campaign in the south, AIRS Madagascar found that several pickup trucks (4x4 pickups) that were hired to move spray operators were too small and did not have enough space to fit five spray operators, a team leader, and their equipment. In some situations, spray operators had to walk 5 kilometers at the end of the day due to a lack of space in the truck to reach their soak pit and store room. AIRS Madagascar staff quickly renegotiated the type of vehicles used for transporting spray operators in the south with the rental agencies and found larger vehicles for transporting all spray operators during the second half of the IRS campaign in the south.

6.4 Post-Spray Environmental Inspection

The post-spray environmental inspection was conducted from January 3, 2013 to January 9, 2013 in the CHL and from May 3, 2013 to May 25, 2013 in the south. The ECO primarily completed the post-spray environmental inspection in the CHL with assistance from the Environmental Compliance Assistant. The AIRS Madagascar COP and newly hired Logistics Manager assisted the ECO with the post-spray environmental compliance inspection in the south.

The main objective of the inspection was to ensure that all soak pits and store rooms were properly closed, and to record any environmental issues that need to be resolved before the next IRS campaigns.

Key findings from the post-spray environmental inspection include:

- All store rooms in the CHL and the south were found to be empty (as all PPE, insecticides, and IRS commodities had been moved to the central warehouse) and cleaned. AIRS Madagascar staff assured the store rooms were locked, and collected all stock cards and other inventory records for storage at the central warehouses.
- Most soak pits were closed correctly, via seasonal management staff in each district covering the soak pit with a plastic sheet/tarpaulin after its final use, and then covering the tarpaulin sheet with earth. The ECO noted that most closed soak pits had not been tampered with by nearby communities.
    - In Betroka, Amboasary and Ambovombe districts, AIRS Madagascar staff found several soak pits had been disturbed, as people living around the soak pit had removed the coals and some of the rocks after the soak pit had been closed. Noting the health risks related to this issue, AIRS Madagascar contacted local authorities and community leaders and explained the health risks for using coals and rocks that were found in soak pits, since they had been in contact with insecticide. With the help of the community leaders and authorities, AIRS Madagascar was able to get people to return the coals and rocks to the soak pit, and received some assistance in covering the soak pits with tarpaulin and earth again. AIRS Madagascar also used this opportunity to speak with community members about the health risks of disturbing the soak pits, and why the soak pits need to remain undisturbed in order

to assure the safe degradation of the insecticide wastes that were poured into the soak pit.

6.5 Solid Waste Disposal

All solid wastes from the 2012-2013 IRS campaigns were collected and sent to the AIRS Madagascar central warehouse in Antananarivo for safe storage until their disposal.

Depending on the materials that comprise the solid wastes, they will be incinerated, possibly recycled, or cleaned and disposed in a landfill. Table 13 notes the solid waste remaining from the IRS campaign and the proposed method for its disposal.

TABLE 13: SUMMARY OF SOLID WASTE DISPOSAL

Item	Material Comprising Item	Quantity	Method of Disposal
Empty sachets Bendiocarb	Paper	77,209 sachets	Incineration
Empty sachets Pyrethroids (Deltamethrin)	Paper	6,896 sachets	Incineration
Empty sachets Pyrethroids (Fendona)	Paper	9,291[12] sachets	Incineration
Towels, Overalls, Scarves, Haversacks	Cotton	715 kg	Incineration
Used Face Masks	Cotton	364 kg	Incineration
Empty Insecticide boxes	Paper	642 kg	Incineration
Damaged gumboots and rubber gloves	Polyvinyl chloride (PVC)	1,357 kg	To be Determined
Strainers and Funnels	Metal	83 kg	Decontamination & Recycling
Plastic bags and Tarpaulin	Low density polyethylene (LDPE)	341 kg	Decontamination & Recycling
Barrels, bucket plastic cups	High density polyethylene (HDPE)	458 kg	Decontamination & Recycling
Fendona Expired	Insecticides	361 sachets	To be Determined

6.6 INCINERATION OF SOLID WASTES

Since July 2013, AIRS Madagascar has been arranging for the incineration of the empty insecticide sachets, towels, overalls, scarves, haversacks, used face masks, and empty insecticide boxes at the Adonis Incinerator in Antananarivo. Although the AIRS Madagascar ECO completed an inspection visit of the Adonis Incinerator in May 2013 and learned that the Adonis Incinerator is currently able to reach adequate temperature for incinerating carbamate and pyrethroid class solid wastes safely, the incinerator's owners informed AIRS Madagascar unexpectedly that the incinerator would need repairs in July 2013 and was not available for use. AIRS Madagascar has followed up with the Adonis Incinerator owners several times in July 2013 and August 2013, and although repairs to the incinerator were finished in August 2013, the incinerator is currently undergoing tests to ensure it is able to reach the correct temperatures for waste disposal. When the incinerator is ready for use, AIRS will ensure that the solid waste incineration will be monitored by the AIRS Madagascar ECO and Operations Manager to assure the incineration is completed correctly.

[12] Includes 2,716 empty sachets that were leftover from the NMCP-led emergency IRS campaign in the south (2,716 empty Fendona sachets from the IRS campaign in the south + 6,575 empty Fendona sachets used during the IRS campaign in the CHL= 9,291 empty Fendona sachets).

6.7 Other Disposal Processes for Solid Wastes

AIRS Madagascar has noted that the other solid wastes (e.g., plastic barrels, buckets, cups, and used rubber boots and gloves) cannot be incinerated, since they contain chlorinated hydrocarbons and incineration would release harmful chemicals into the atmosphere. AIRS Madagascar is currently looking to find a recycling agent to handle these materials for possible recycling and safe disposal. AIRS Madagascar is also looking to identify recycling agents for the metal strainers and funnels.

6.8 Expired Fendona

Although the project worked to spray all of the Fendona that would expire in 2013, 361 sachets of Fendona remained in inventory after the IRS campaign ended in the CHL and have since expired. AIRS Madagascar and AIRS Core staff have determined the Adonis Incinerator in Antananarivo does not have the right specifications to reach a sufficiently high temperature to safely dispose of the expired Fendona. Therefore, AIRS is currently contacting the Fendona manufacturer, Avima, to see if they can either take back the expired product for safe disposal or if they can recommend a company that can safely dispose of the expired Fendona.

7. Monitoring and Evaluation of 2012-2013 IRS Campaigns

M&E for the 2012-2013 IRS campaigns closely followed the processes outlined in the 2012-2013 AIRS Madagascar work plan and the M&E Concept Paper developed by the AIRS Core team. AIRS Madagascar also collected data on all relevant indicators listed in the Madagascar Monitoring and Evaluation Plan (MEP) provided to PMI in December 2012. M&E activities were led by the AIRS Madagascar M&E Manager (and the AIRS Madagascar Information Technology (IT) Manager who served as the project's temporary M&E Manager following the M&E Manager's extended medical leave that started during the spray campaign in the south) and the Database Manager.

7.1 Data Management

Spray operators entered IRS campaign data on their spray form at each eligible structure visited by a spray operator. This included noting if an eligible structure was sprayed or not sprayed, including the reason why the structure was not sprayed. The spray operators noted the number of people that sleep in the eligible structure regardless if the structures were sprayed or not sprayed. The spray operators also noted the number of pregnant women and the number of children under five years sleeping in the eligible structure.

Data quality assurance protocols were followed to check the accuracy of all spray operator data collected. Team leaders and thereafter district coordinators were required to check and validate all spray forms before they were sent to data entry centers, located in each of the seven districts where IRS was completed in the CHL and in the eight districts covered by IRS in the south. Furthermore, the M&E Manager, the database manager, and the M&E assistant regularly made supervisory visits to the field to ensure that spray operators were accurately and correctly filling in their spray forms.

In the CHL, the spray forms were picked up by each of the district coordinators as they completed their supervision rounds via motorbike. In the south, due to the greater distances between the spray areas and data entry centers, AIRS Madagascar hired several couriers to travel to each spray area via motorbike and bring the spray cards to the data entry centers daily. This courier system worked well; however, due to the remoteness of some spray areas (especially in Betroka, Ambovombe, and Amboasary districts), daily delivery of spray operator forms remained a challenge.

Additionally, the M&E Manager (and the IT Manager serving as the Temporary M&E Manager later in the spray campaign in the south), the Database Manager, and the M&E assistant regularly checked the accuracy of data entered by data clerks. This was mainly completed via the M&E Manager and Database Manager traveling to all of the data entry sites to supervise data entry, and noting any issues with the database. During the supervision process, spray operator cards were randomly pulled and checked to ensure that the data noted on the spray operator cards matched what was entered in the database. The AIRS Madagascar database also included various logic and controls checks to assure accurate data entry. For example, the database automatically prevented a data clerk from entering a sprayed structure that included a pregnant woman, if the data clerk had already entered that no women lived in the sprayed structure.

7.2 NUMBER OF ELIGIBLE STRUCTURES SPRAYED

As noted in Table 14, the 2012-2013 IRS Campaign sprayed 371,391 eligible structures (87,081 eligible structures in the CHL and 284,310 eligible structures in the south). Total spray coverage was recorded as 97.7%, well above the minimum PMI threshold of 85%. It should be noted that the spray coverage does not include 15,263 structures in the south located in Amboasary, and Tolagnaro districts (see Table 11, in Section 5.4.2., "Insecurity Issues in the South" for more details) that were not visited or targeted due to insecurity in these spray areas.

TABLE 14: SUMMARY OF IRS COVERAGE

Spray Area	District	Total Number of Eligible Structures Found by Spray Operators	Total Number of Eligible Structures Sprayed by Spray Operators	Percentage of Eligible Structures Found that were Sprayed (Spray Coverage
CHL	Ambatofinandrahana	12,755	12,633	99.0%
	Ambohimahasoa	7,783	7,636	98.1%
	Ambositra	16,186	14,912	92.1%
	Anjozorobe	10,977	10,622	96.8%
	Ankazobe	11,863	11,333	95.5%
	Betafo	13,054	12,640	96.8%
	Mandoto	17,983	17,305	96.2%
	TOTAL	**90,601**	**87,081**	**96.1%**
South	Amboasary	27,328	26,587	97.3%
	Ambovombe	61,864	61,068	98.7%
	Ampanihy	68,506	67,830	99.0%
	Bekily	37,834	37,067	98.0%
	Beloha	23,789	23,332	98.1%
	Betroka	35,637	34,393	96.5%
	Tolagnaro	7,503	7,461	99.4%
	Tsihombe	27,012	26,572	98.4%
	TOTAL	**289,473**	**284,310**	**98.2%**
GRAND TOTAL		**380,074**	**371,391**	**97.7%**

Overall, 8,683 structures (3,520 structures in the CHL and 5,163 structures in the south) were identified as eligible were not sprayed during the IRS campaigns. The leading reasons for not spraying these structures included:

- Residents of the eligible structures were not at home and left their structures locked while working in their fields, completing other work, or attending a nearby market. Unfortunately, the structures remained inaccessible during mop-up campaign efforts.
    - AIRS Madagascar has noted that in some of these areas where more locked structures were found, the door-to-door mobilization occurred several weeks before the IRS campaign, and many residents most likely forgot about or were less aware of the IRS campaign schedule.
- Residents were not at home due to funerals and other community-wide festivals/events.
- Higher refusal rates occurred in more urban areas, particularly in Ambositra district. In these areas,

potential beneficiaries did not want to receive IRS due to:

- Unwillingness to show belongings and personal items in front of neighbors;
- Fear of theft of items, while beneficiaries waited two hours outside of their structure; and
- Discomfort with allowing spray operators (strangers) into their structure to view their belongings.

7.3 POPULATION PROTECTED

A total of 1,781,981 peoples were protected during the IRS campaigns in the CHL (522,292) and the south (1,259,689). 371,701 children under five years were protected and 60,146 pregnant women were protected during the 2012-2013 campaign. Table 15 notes the number of people protected during the IRS campaigns and is broken down by spray area and district.

TABLE 15: NUMBER OF PERSONS PROTECTED BY IRS IN THE CHL AND THE SOUTH

Spray Area	District	Total Population Protected	Pregnant Women Protected	Children under 5 years Protected
CHL	Ambatofinandrahana	87,165	2,191	15,995
	Ambohimahasoa	52,287	1,078	8,445
	Ambositra	90,396	1,792	14,551
	Anjozorobe	57,406	1,038	7,305
	Ankazobe	62,572	1,255	10,276
	Betafo	74,554	2,668	11,565
	Mandoto	97,912	2,813	15,847
	TOTAL	**522,292**	**12,835**	**83,984**
South	Amboasary	123,048	5,912	26,126
	Ambovombe	306,052	12,907	71,384
	Ampanihy	283,752	10,964	71,734
	Bekily	153,287	4,906	35,652
	Beloha	87,592	2,613	19,118
	Betroka	160,706	5,310	33,115
	Tolagnaro	32,229	1,170	6,167
	Tsihombe	113,023	3,529	24,421
	TOTAL	**1,259,689**	**47,311**	**287,717**
GRAND TOTAL		**1,781,981**	**60,146**	**371,701**

7.4 USE OF INSECTICIDE AND SPRAY OPERATOR PERFORMANCE

A total of 88,444 insecticide sachets (74,973 sachets of carbamate and 13,471 sachets of pyrethroids) were used to spray 371,391 eligible structures (87,081 in the CHL and 284,310 in the south). Spray operators averaged spraying 11.9 structures per day in the CHL and 29.6 structures in the south. The

average number of structures sprayed daily in the south is higher than the CHL due to the smaller size of structures in the south.

Table 16 provides a breakdown of the average number of structures covered by one sachet, per district.

TABLE 14: INSECTICIDE USED BY DISTRICT AND SPRAYER PERFORMANCE IN CHL AND SOUTH

Spray Area	Districts	Total Number of Eligible Structures Sprayed by Spray Operators	Bags returned empty	Number of Structures Sprayed per Sachet of Bendiocarb/Pyrethroid
CHL	Ambatofinandrahana	12,633	7,000	1.80
	Ambohimahasoa (Pyrethroid)	7,636	4,706	1.62
	Ambositra (Pyrethroid)	14,912	8,888	1.68
	Anjozorobe	10,622	5,532	1.92
	Ankazobe	11,333	6,027	1.88
	Betafo	12,640	7,037	1.80
	Mandoto	17,305	8,457	2.05
	TOTAL	**87,081**	**47,647**	**1.83**
South	Amboasary	26,587	4,815	5.52
	Ambovombe	61,068	8,293	7.36
	Ampanihy	67,830	8,677	7.82
	Bekily	37,067	5,342	6.94
	Beloha	23,332	2,409	9.69
	Betroka	34,393	7,537	4.56
	Tolagnaro	7,461	990	7.54
	Tsihombe	26,572	2,857	9.30
	TOTAL	**284,310**	**40,920**	**6.95**
GRAND TOTAL		**371,391**	**88,567**	**4.77**

It is important to note that a sachet of pyrethroids and carbamates are both formulated to cover 250m2. Therefore, the calculations noted above for the average number of structures sprayed per sachet in the CHL does not need to be separated via insecticide class.

AIRS Madagascar notes that the larger size of structures in the CHL accounts for the significant difference between the average number of structures sprayed per sachet in the CHL versus the south. AIRS Madagascar estimates that the average size of a structure in the CHL is 135.8m2 versus 32.3m2 in the south. Therefore, it takes considerably more insecticide to spray a structure in the CHL as compared to the south.

8. ENTOMOLOGY

Under the supervision of the AIRS Madagascar Technical Director, the project hired four teams of entomologists and entomological technical assistants to complete all entomological surveillance activities. Since AIRS Madagascar has sent in a final entomological report, this section provides a brief explanation of the entomological surveillance results of the past year of the project.

AIRS Madagascar completed entomological surveillance at 15 sentinel sites in 2012-2013. As noted in the work plan, the sentinel sites were selected with the Malagasy NMCP in May 2012 and featured several sites in non-AIRS program spray area where AIRS Madagascar agreed to complete entomological surveillance to help support national malaria control data and entomological data collection.

Additionally, AIRS Madagascar completed entomological surveillance at four sentinel sites in the south, to support the emergency IRS campaign undertaken by the NMCP and Global Fund in July 2012 due to a malaria outbreak. These sentinel sites were only visited during a brief time after the emergency IRS campaign in the south to assure the quality of the spraying.

This section will only focus on the entomological surveillance data gained from the sentinel sites in the AIRS Madagascar spray areas, which were used to monitor the results of the 2012-2013 IRS campaigns to decrease malaria incidents.

Table 17 provides a brief list of all of the sentinel sites where entomological surveillance was carried out in 2012-2013. All of these sentinels were previously listed in the 2012-2013 AIRS Madagascar work plan.

TABLE 15: ENTOMOLOGICAL SURVEILLANCE SITES FOR 2012-2013 IRS CAMPAIGN

District	Sentinel Site	Zone	Notes
Betafo	Inanantonana	CHL	Non spray site, acted as a control
	Soavina		In AIRS Madagascar Spray Area
Ambatofinandrahana	Soavina Ambatofinandrahana	CHL	In AIRS Madagascar Spray Area
	Ambatofinandrahana		Non spray site, acted as a control
Ambositra	Antoetra	CHL	In AIRS Madagascar Spray Area (sprayed with pyrethroids)
Ankazobe	Kiangara	CHL	In AIRS Madagascar Spray Area
Amboasary	Amboasary	South	In AIRS Madagascar Spray Area
Fort Dauphin	Fort Dauphin	South	Non AIRS Madagascar Spray site, surveillance requested by NMCP
Bekily	Bekily	South	Spot check site for emergency IRS Campaign
	Beraketa		
Ambovombe	Ampamanta	South	Spot check site for

	Antanimora		emergency IRS Campaign
Ambilobe	Ambilobe	North	Non AIRS Madagascar Spray site, surveillance requested by NMCP
Brickaville	Anivorano	East	Non AIRS Spray site, surveillance requested by NMCP
Ambilobe	Ambilobe	North	Non AIRS Spray site, surveillance requested by NMCP

8.1 Entomological Surveillance Baseline

Baseline entomological data was collected in the CHL in September 2012, with baseline data collected in the south in November 2012. In both areas, the most prevalent vector species noted during baseline data collection was Anopheles gambiae s.l.

In the CHL, Anopheles gambiae s.l ranged from 33.5% in Soavina-Betafo to 2% in Antoetra. Anopheles mascarensis was the second most prevalent vector species in the CHL ranging from 2.5% in Kiangara to 0.4% in Soavina-Ambatofinandrahana. In Soavina-Betafo, Anopheles funestus was the second most prevalent vector species at 0.6%.

In the south, Anopheles gambiae s.l was noted as 23% of the mosquitoes species found. Unlike the CHL, very small numbers of other vector/Anopheline species were found in the south, comprising under 1% of the mosquitoes collected. Other non-Anopheline species accounted for over 75% of the other mosquitoes collected in the south, which was considerably higher than in the CHL.

8.2 Initial Bioassay Test Results

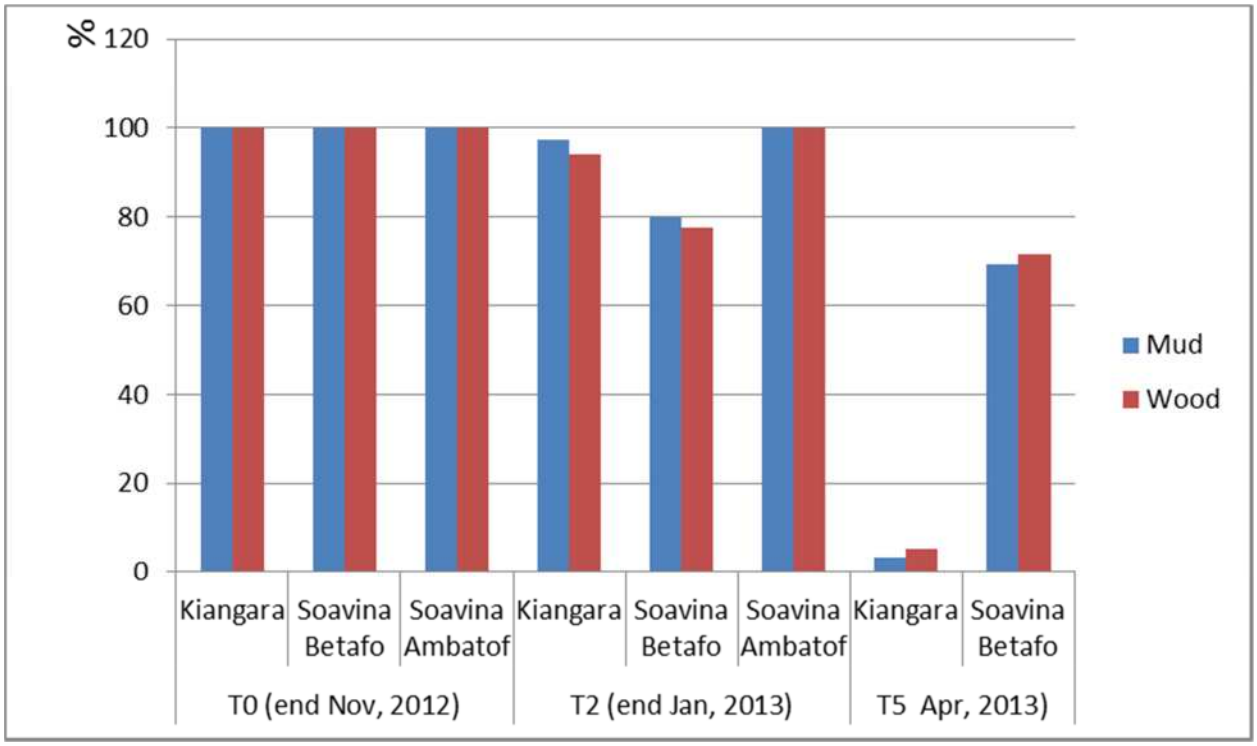
At the beginning of the IRS campaigns, a quality control study was carried out to check the efficacy and homogeneity of insecticide treatment at the four sentinel sites in the AIRS spray areas in the CHL and the one sentinel site in the spray area in the south. The quality control study was completed in the CHL during the week of November 27, 2012 and in the south on February 21, 2013. Since Madagascar lacks a susceptible colony of Kisumu strain mosquitoes, all bioassay tests were completed with local wild mosquitoes that were caught near the sentinel sites and raised from larvae to adults. AIRS Madagascar completed WHO Tube Bioassays and CDC Bottle Bioassays to test the residual life of the insecticides sprayed during the IRS campaigns in the CHL and the south. During the bioassay tests, the knock-down rate for mosquitoes was noted after 30 minutes and 60 minutes. Bendiocarb was used during the bioassays at Kiangara, Soavina-Betafo, and Soavina- Ambatofinandrahana in the CHL. Deltamethrin was used for the bioassays in Antoetra since this sentinel site was located in Ambositra district in the CHL, which was sprayed with pyrethroids. In the south, Bendiocarb was used for the bioassays at the Amboasary sentinel site. Initial bioassay tests completed at the five sentinel sites in the AIRS Madagascar spray areas noted 100% mortality.

8.3 Further Bioassay and Residual Life Results

Residual life was tested at all five sentinel sites in AIRS Madagascar spray areas. The cone bioassay tests used to collect data on residual life were completed on mud and wood, the two primary surfaces for constructing structures in Madagascar.

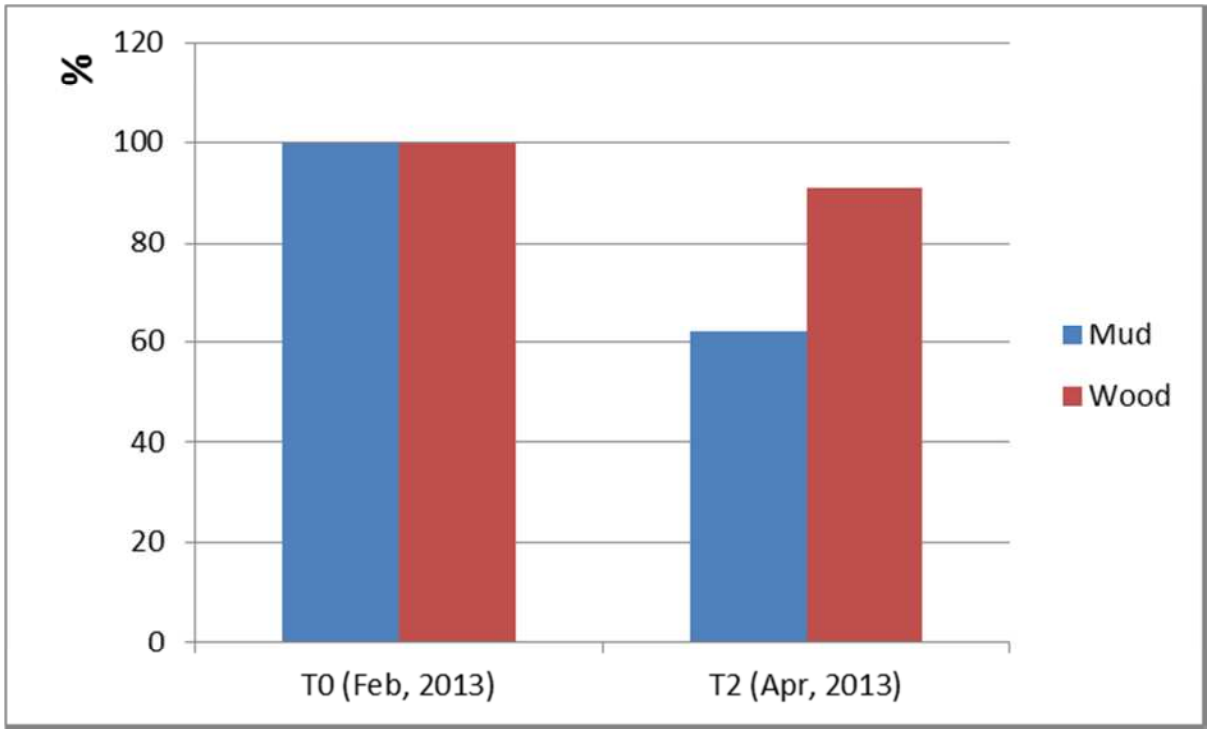
In the CHL, as noted in Figure 3, the residual life for Bendiocarb was noted as two months. Soon thereafter, the residual life of Bendiocarb decreased quickly. There were very minor differences in the residual life between Bendiocarb sprayed on wood versus mud walls.

FIGURE 3: INSECTICIDE DECAY RATE OBSERVED FOR BENDIOCARB IN THE CHL



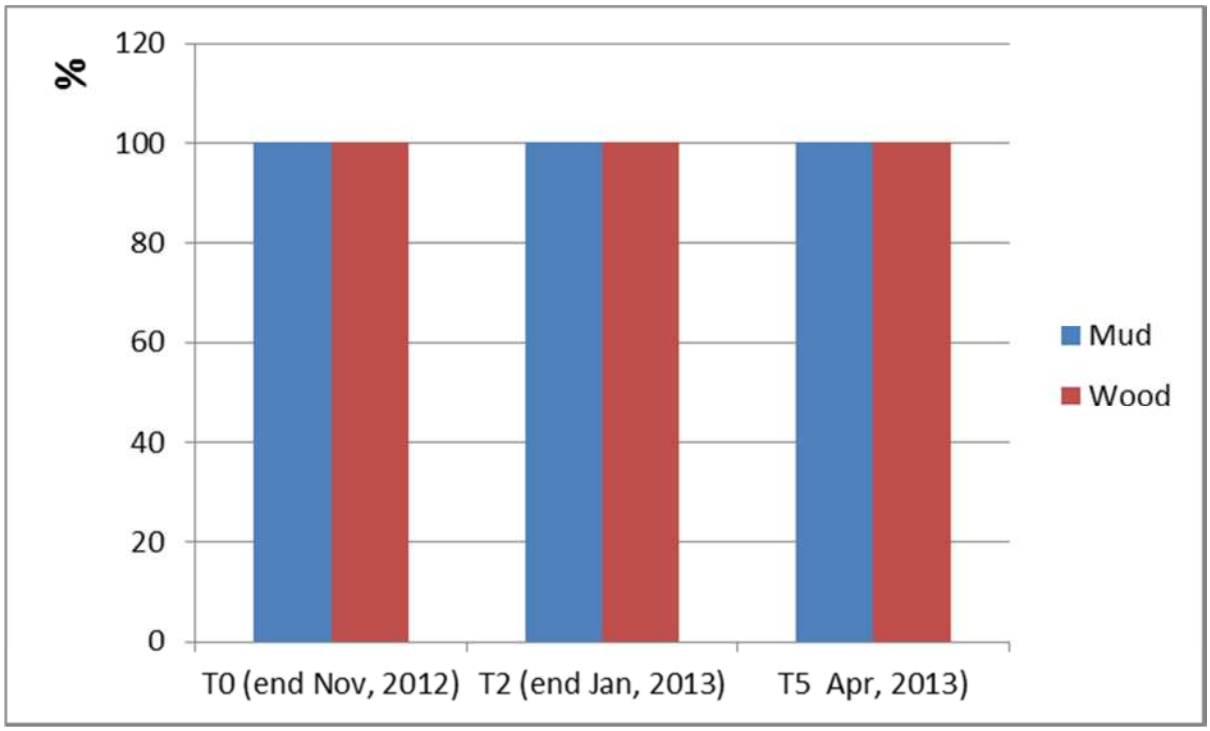
In the south (Amboasary sentinel site), the residual life of Bendiocarb was noted as a two months. The decay rate for Bendiocarb sprayed on wood was much lower than Bendiocarb sprayed on mud surfaces. Figure 4 provides more details on the decay rate of mud and wood for Bendiocarb in the south.

FIGURE 4: INSECTICIDE DECAY RATE OBSERVED FOR BENDIOCARB IN THE SOUTH (AMBOASARY)



However, the residual life for Deltamethrin was excellent, with a residual life noted for over five months at the Antoetra sentinel site without any differences in decay rate between mud and wood walls. Figure 5 provides more details on the decay rate of mud and wood for Deltamethrin in the CHL.

FIGURE 5: INSECTICIDE DECAY RATE OBSERVED FOR DELTAMETHRIN IN THE CHL (ANTOETRA)



8.4 SUSCEPTIBILITY RESULTS

Insecticide susceptibility tests were performed using DDT (organochlorines), Fenitrothion (organophosphates), Bendiocarb (carbamates), Deltamethrin (pyrethroids), Lambda-cyhalothrin (pyrethroids), Permethrin (pyrethroids), and Alphacypermethrin (pyrethroids). Technically, all insecticides approved by WHOPES for IRS use are potentially eligible for selection and use in Madagascar except DDT. All the insecticides tested are performing well against An. gambiae s.l except for DDT, which was noted for having full-resistance in several sentinel sites. The results of the vector susceptibility tests indicate complete susceptibility of local mosquitoes to Bendiocarb, Deltamethrin, and Lambdacyhalothrin. There is also, indication of possible resistance and delay in the knock-down time for some of the pyrethroids in some sentinel sites that needs close monitoring.

Figures 6 and 7 provide the results of susceptibility tests completed via WHO bioassay and CDC bioassay.

FIGURE 6: INSECTICIDE SUSCEPTIBILITY TEST RESULTS VIA WHO BIOASSAY FOR *ANOPHELES GAMBIAE S.L.* AT SENTINEL SITES IN AREAS COVERED BY IRS

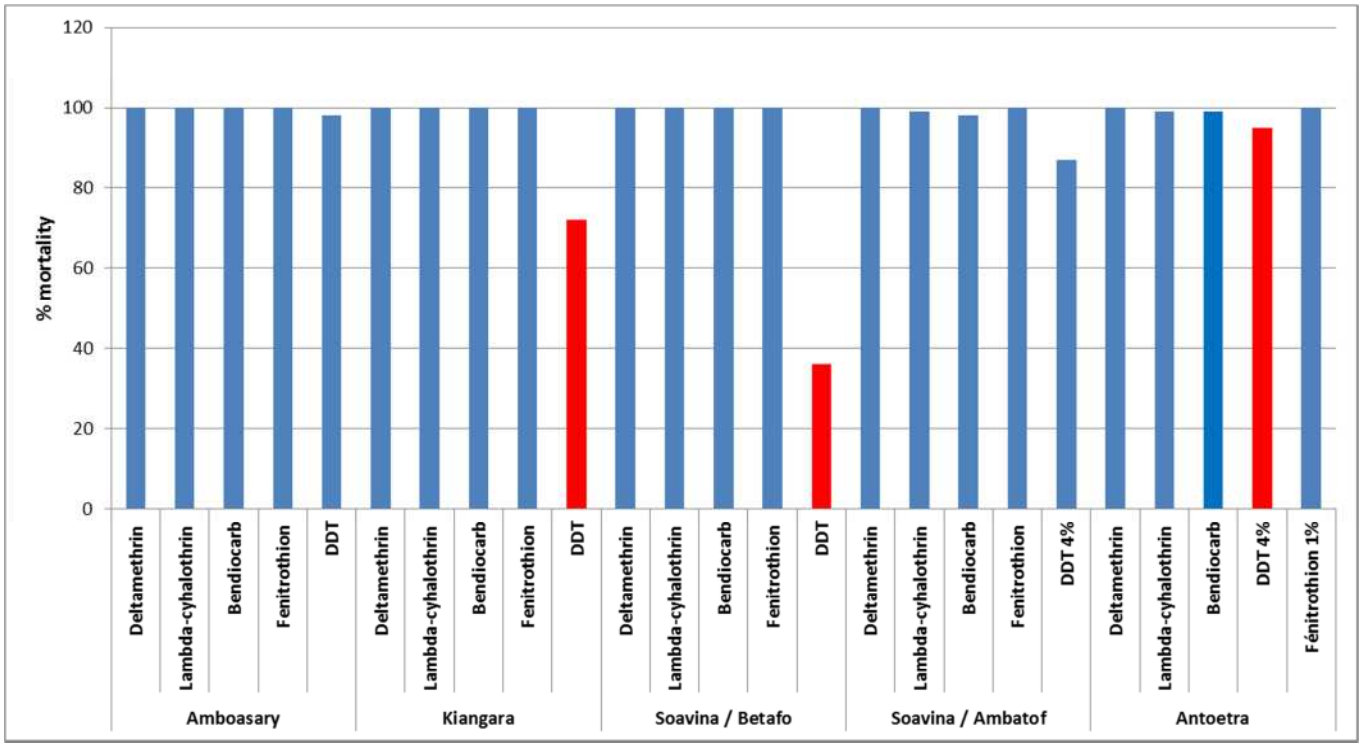
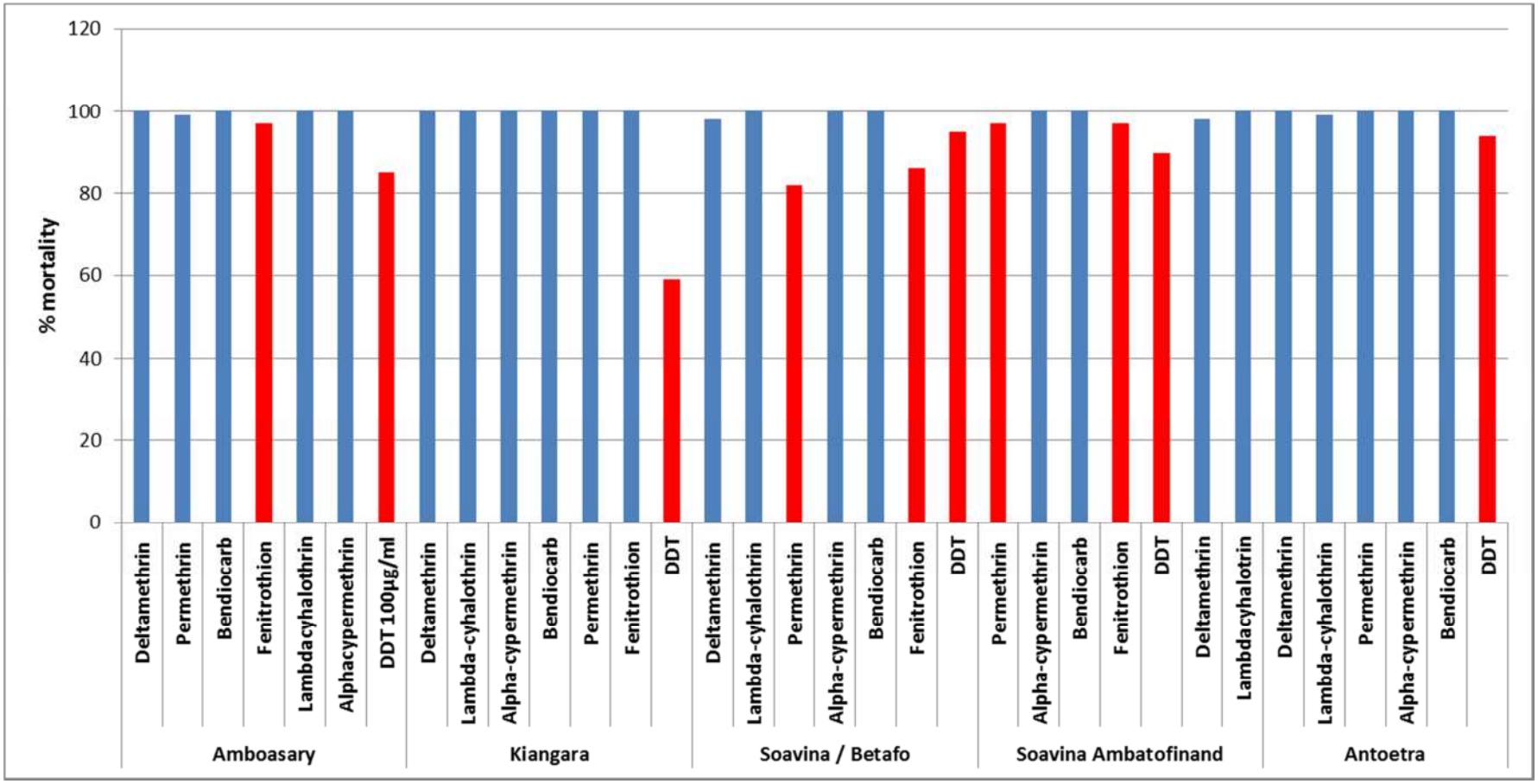


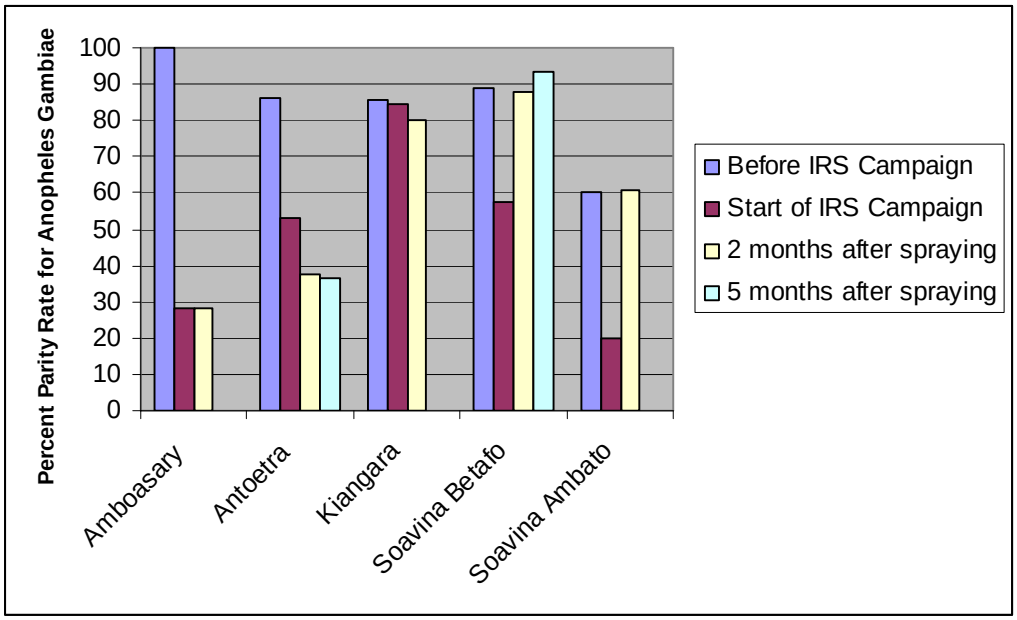
FIGURE 7: INSECTICIDE SUSCEPTIBILITY TEST RESULTS VIA CDC BIOASSAY FOR *ANOPHELES GAMBIAE S.L.* AT SENTINEL SITES IN AREAS COVERED BY IRS



8.5 OTHER ENTOMOLOGICAL SURVEILLANCE FINDINGS

- Man biting rates indoors in most AIRS Madagascar spray areas reduced significantly from baseline through several months after the IRS campaign.
    - In the pyrethroid spray area in the CHL, man biting rates were noted as 0.1 indoors before the IRS campaign, and less than 0.1 indoors five months after spraying.
    - In the carbamate spray area in the CHL, man biting rates indoors at baseline were noted as 2.5 in Kiangara; 0.3 in Soavina-Betafo; and 0.6 in Soavina-Ambatofinandrahana. Man biting rates indoors decreased to 1.8 in Kiangara five months after spraying; 0.1 in Soavina-Betafo five months after spraying, and increased to 1 in Soavina-Ambatofinandrahana two months after spraying.
    - In the south, man biting rates indoors were noted as 1.8 in Amboasary before the IRS campaign, and 0.3 two months after spraying
- Anopheles gambiae s.l. is the main biting vector species at all of the sentinel sites, as it was collected inside and outside at the entire sentinel sites.
- Vectors were noted as biting more outside than inside. It is possible that the high coverage of LLINs following three years of intensive distribution may have contributed to the outdoor biting tendency, especially for Anopheles funestus.
- Vector density was low in all areas, but especially low in areas covered by IRS. In these areas, the indoor resting density (via pyrethrum spray collections) was zero or close to zero following spraying.
- The parity rate for the spray areas was lower than non-spray areas and helps to note the success of the IRS campaign in shortening the life of mosquitoes. Figure 8 denotes the parity rate for the sentinel sites in the spray areas.

FIGURE 8: PARITY RATE FOR *ANOPHELES GAMBIAE S.L* AT SENTINEL SITES IN SPRAY AREAS



9. POST-SPRAY ACTIVITIES

9.1 TRANSPORT OF IRS COMMODITIES BACK TO CENTRAL WAREHOUSES

Following the end of the IRS campaign, the spray operators, washers, team leaders, spray pump technicians, couriers, and district coordinators returned all PPE, insecticide sachets (used and unused), and other IRS commodities to their assigned store rooms. All returned items were inspected (especially PPE to ensure it was cleaned) and noted on the store rooms final stock cards as the stock card's final entry. Thereafter, the district logistics assistants and the AIRS Madagascar logistics assistant traveled to all secondary and district store rooms with trucks and collected all PPE, insecticide, and other IRS commodities and returned these items to the central warehouses. This activity took place in the CHL from January 17, 2013 to January 31, 2013 and in the south from April 28, 2013 to May 6, 2013.

9.2 LOSS OF INVENTORY IN THE SOUTH

As IRS commodities were returned to the central warehouse in Ambovombe, AIRS Madagascar staff noted that various amounts of commodities were missing from inventory. Noting this issue, AIRS Madagascar completed a physical count of all items returned to the central warehouse and examined all issuance and inventory management documents regarding the amount of inventory that was sent to each district in the south.

Several investigative trips were completed by the newly hired Logistics Manager, the Warehouse Manager in the south, and the project's Logistics Assistant to verify that there was missing inventory and to determine the location of the missing items and the possibility of their return. In mid-June 2013, the AIRS Madagascar COP and Logistics Manager traveled to the south and completed another investigation, this time meeting with the former district coordinators and community leaders in the south asking them to complete further investigations on the project's behalf in their communities. Unfortunately, these investigations did not recover any of the missing inventory. Therefore, AIRS Madagascar filed a claim with the gendarmerie in Amboasary on June 21, 2013, noting the missing inventory. The gendarmes have opened an investigation regarding the missing inventory as of June 22, 2013.

Table 18 notes the missing inventory in the south.

TABLE 16: MISSING INVENTORY IN THE SOUTH

Item	Quantity Missing
Gumboots	285
Helmets	60
Overalls	770
Bendiocarb Sachets	244

From their investigations, AIRS Madagascar staff have concluded that most of the inventory that was not returned was most likely kept by the spray operators following the end of the IRS campaign, as gumboots and overalls are useful items for farming and other work. Most of the missing Bendiocarb sachets were likely sold for farming purposes.

AIRS Madagascar noted that the supervision for the return of inventory was inadequate. The project did not have enough staff to adequately supervise the over 120 store rooms returning inventory after the IRS campaign and monitor the logistics and inventory management systems.

The AIRS Madagascar COP reported the loss of inventory to PMI-Madagascar on June 25, 2013 with the AIRS Core team reporting this issue to PMI-Washington on June 27, 2013.

Fortunately, the IRS campaign in the CHL did not experience the same issues, with the correct amount of inventory returned to the central warehouses in reasonable condition.

10. LESSONS LEARNED

Administration and Planning

- Thorough planning needs to be undertaken months ahead of the spray campaign given the very short turnaround between the two IRS campaigns. This also means that AIRS Madagascar staff should be out in the field setting up the IRS campaigns in the CHL and the south months before both IRS campaigns begin and completing micro-plans with district coordinators far in-advance of the IRS campaigns. Once the IRS campaign in the CHL begins, there is limited time for AIRS Madagascar staff to head south and begin preparations for the next IRS campaign.
- AIRS Madagascar management needs to develop a better system (and ensure district coordinators adhere to the system) to gain daily updates from the district coordinators on spray coverage. Although this system will not necessarily match the official data that is collected and entered into the AIRS Madagascar database (which is often a week behind the actual spraying due to the amount of time it takes to complete data entry and clean the data in the database), the daily monitoring system can provide a good estimator/predictor if any areas are struggling and behind in reaching spray coverage targets. This will allow AIRS Madagascar to better manage the IRS campaign and address issues that are preventing high-coverage rates, such as refusals, or disorganization among seasonal staff.
- More administrative planning is needed to create a system that assures that seasonal staff is paid on time and that rental agencies with the best quality vehicles are reviewed and hired for transporting spray teams and IRS equipment.

M&E

- The number of data entry clerks in the CHL was too low during the 2012 IRS campaign. The data clerks often had a high workload with too many spray cards being sent to the data entry centers each day. Consequently, this led to some delays in completing the spray campaign data entry and assuring the database was as up to date as possible.
- Overall, AIRS Madagascar found its data for the spray campaign to be accurate, although the project would like to make certain district coordinators and sector managers take more time to review the data before it is provided to the data clerks. M&E staff was required to complete numerous phone calls to district coordinators and sector managers to check into the accuracy of some spray operator forms.
- The internet connection at some data entry centers in the south (particularly Bekily and Betroka districts) was difficult and handling the large files of the AIRS Madagascar database caused the internet connection to slow down considerably. AIRS Madagascar was able to work around this issue by compressing the database and ensuring the database files were smaller and took up less bandwidth.
- The collection and transport of spray operator forms from the fields in the south (particularly in Ambovombe, Betroka, and Amboasary districts) to the data entry centers were slow and took several days. To remedy this issue, AIRS Madagascar hired several couriers that used project motorcycles to travel to spray areas each morning to collect the spray operator forms. The couriers returned to the district capital in the late afternoon so that the spray operator forms could be reviewed by the district coordinator and entered into the AIRS Madagascar database by the data

entry clerks.

Labor Issues

- Due to the inability to find and hire a qualified candidate for the Operations Manager in Madagascar, the IRS campaigns lacked leadership in planning and organizing the IRS campaigns.
- Given that the AIRS Madagascar team was focusing on closing operations in the CHL in early January 2013, the AIRS Madagascar team was understaffed to concurrently work on setting-up the IRS campaign in the South, which was originally planned to start in early January 2013. Most of the AIRS Madagascar staff was unavailable to help with the IRS campaign startup activities in the south until mid-January 2013. At this point, the team had to work exceptionally fast to set up store rooms and soak pits, train seasonal staff, and complete mobilization before the IRS campaign in the south could begin.
- AIRS Madagascar staff needs to be in the field longer to supervise the pre-IRS campaign set-up and post-IRS campaign closing activities. Due to the high number of soak pits and store rooms, the AIRS Madagascar staff had to rely on seasonal staff to set up soak pits and store rooms in various areas, and to manage the return of inventory to the central warehouses. As noted in other sections of this report, the soak pits and store rooms in some areas were set up poorly and needed to be refurbished or rebuilt right before or after the IRS campaign started. In the south, inventory has gone missing after the IRS campaign ended.
- Although the CHL district coordinators and sector managers proved to have several years of experience working on IRS campaigns, most of the seasonal staff in the south were completing IRS for the first time and were prone to making mistakes, especially with regards to monitoring, supervising, and managing the IRS campaign.

IEC

- The hiring of over 10,000 IEC mobilizers was very difficult to properly manage and supervise.
- Not all of the structures in the south received the household spray card (to be kept in the eligible structure to assure it was sprayed) provided by the IEC mobilizers. In these cases, AIRS Madagascar worked to reprint and provide household spray cards via the spray operators. AIRS Madagascar noted there was originally a shortage of these cards in the south and will need to complete better forecasting to assure enough household spray cards are printed in future years.
- The stickers that IEC mobilizers placed on structures that had received door-to-door mobilization and were marked as eligible structures did not adhere to the door frames where they were originally placed. Unfortunately, the weather conditions in the south and the CHL proved to be difficult. The use of a different marking system may be more appropriate in the future.
- Further IEC messaging needs to be developed to ensure people do not remove coals and rocks from soak pits.

Logistics and Supply Chain Management

- The transfer of PPE and commodities between spray teams during the IRS campaign proved to be cumbersome and took significant time. In some areas, particularly the south, the geographic distances and road networks were difficult and led to delays in transporting PPE and commodities between spray teams. This led to delays in completing the IRS campaign according to the original spray schedule.
    - The cost of transporting and collecting PPE and insecticide from one spray team to another was significant and required the rental of a large number of vehicles in the CHL and the south.

- Given the constant movement of PPE and insecticide between spray areas, it was challenging to have a good inventory tracking system to know where all insecticide sachets and IRS commodities were located at a given time. This opened the project up to significant risks for theft.

- Although transfers of equipment between the CHL and the south during the 2012-2013 IRS campaign proved to be helpful in preventing stock-outs of various items, it did not help with the preparedness of the spray campaign in the south. The south needed to wait for some commodities to be returned from the CHL before the IRS campaign could begin. The transfer of equipment could not be completed until after the IRS campaign in CHL was closed out in mid-January 2013. Given the short time period between the close-out of the IRS campaign in the CHL and the start of the IRS campaign in the south, AIRS Madagascar needs to strive for self-sufficiency in both spray areas regarding insecticide and IRS commodities in the future and limit transfers between the two areas, unless there is an emergency situation.
- There were over 150 store rooms used for the 2012-2013 IRS campaign. Store rooms ranged in size from one room structures to large-scale warehouses at the district-level. However, given that spray operators would only use the store rooms for one or two weeks (especially at the commune-level), it was inefficient to hire and train store keepers and security guards to manage store rooms that were empty for most of the IRS campaign.
    - AIRS Madagascar staff will need to complete more rigorous supervision of store rooms, assure the stock cards match the number of items issued and received, and the physical stock in inventory. As noted in Amboasary, without supervision, store rooms could become disorganized quickly and lead to possible theft of key commodities.
- More project staff supervision is needed during the returning of all inventory to the central warehouses. Current supervision is inadequate and too reliant on seasonal staff. As noted in Section 9.2., "Loss of Inventory in the South," the risk of theft of IRS campaign commodities is considerable, especially in the south.

Environmental Compliance

- During the 2012-2013 IRS campaign, over 200 non-permanent soak pits were built. This was far too many soak pits for the ECO to properly monitor and observe before, during, and after the IRS campaign.
- • The size of the soak pits that were built was often inappropriate, as AIRS Madagascar tended to build large soak pits at the district and secondary level that required significant amounts of resources (around 30 meters or more of plastic sheeting/tarpaulin) and labor (to clear larger areas and place the tarpaulin on the ground and building fences/walls of tarpaulin). However, the soak pits were often used by five spray operators for one week only.
- Numerous soak pits were built in inappropriate areas (such as in the middle of a densely populated area, or at the bottom of a small valley), and therefore during pre-spray environmental monitoring, AIRS Madagascar had to rush to rebuild these soak pits in new appropriate areas before the IRS campaign started. Overall, AIRS Madagascar is likely to provide more funds to soak pits for the next IRS campaign to assure better grading for all wash areas, and that all soak pit holes can be covered with a firm/lockable cover to prevent access to the soak pits after the IRS campaign ends.
- Incident reports need to be completed faster and reported to PMI and the AIRS Core team as soon as possible.

Relationship with NMCP and Local Leaders

- Although AIRS Madagascar cannot work with the NMCP and provincial/district health offices, AIRS Madagascar needs to further engage the NMCP and various health offices to assure that they are aware of the IRS program issues and successes.
- AIRS Madagascar experienced insecurity in several communes in Amboasary, Tolagnaro, and Betroka districts in the south, and Ankazobe district in the CHL. While AIRS Madagascar chose to not spray areas where insecurity would prevent safe implementation of IRS, the project staff will need to develop and maintain good relationships with local authorities (e.g., gendarmes and provincial/district governments). This is necessary not only to inform them about the IRS program and perspective dates of spraying insecure areas, but also for these individuals to warn AIRS Madagascar if there are any safety and insecurity issues to consider.
- Most importantly, AIRS Madagascar should develop good relationships with local/community leaders such as Chef du Fokotany. Schedules for the spray campaign and presentations on the benefits of the IRS should be presented to all Fokotany leaders, as these individuals can play a significant role in assuring support for IRS. Additionally, if there are any thefts, the community leaders can play a leading role in helping AIRS Madagascar recover missing items by speaking with community members.
- Finally, given the reliance on community leaders to pick spray operators and IEC mobilizers, AIRS Madagascar should hold discussions with community leaders about the type of experience, qualities, and skill set that they would like the selected spray operators and IEC mobilizers to possess.

Operations/Trainings

- AIRS Madagascar staff need to complete more supervision during spray operator trainings at the district-level to assure correct information is provided about how to mix insecticides correctly.
- The hiring of over 2,000 spray operators was very difficult to properly manage and supervise. AIRS Madagascar either needs to strengthen its supervision resources by either hiring new staff to help with supervision, and/or reducing the number of spray operators to minimize the number of spray operators to supervise.
- With new spray teams starting each week of the IRS campaign, AIRS Madagascar found that during the initial two to three days of spraying, spray operators made numerous mistakes that were consistently repeated throughout the IRS campaign. This not only required additional time to supervise and retrain spray operators but also led to spray teams falling behind early in the week and then needing to race to finish spraying all of their targeted areas within their allotted one week of employment. AIRS Madagascar found that most spray operators after a few days of experience, made fewer errors and completed better quality work. However, given the model of the IRS program in Madagascar, by the time the spray operators reached the point when they were not making mistakes, their week of spraying/employment was over, and they were required to return their PPE and insecticide in order for a new spray team to begin their work. Unfortunately, the new spray teams that were starting spraying often repeated the same errors as the previous spray teams during their first few days of work.
- Since AIRS Madagascar plans to have a smaller number of spray teams and operation sites, AIRS will work to have more comprehensive supervision and monitoring at all levels of the IRS campaign daily. The various IRS campaign supervisors (team leaders, sector managers, district coordinators, etc.) and AIRS Madagascar staff will lead meetings with spray teams and the spray support staff (washers, couriers, porters, etc.) each day before the spray teams head out into the field. These meetings will allow for the review of key environmental compliance and safety procedures, such as the importance of wearing PPE and the correct procedure to depressurize a spray tank.

Entomology

- Consultants used for entomological work need to be hired as full-time staff. Currently the consultants are hired for close to nine months a year. According to Malagasy labor law any consultant working nine months year is entitled to benefits the equivalent of full-time staff, and their short-term contracts become indefinite labor contracts.
- The AIRS Madagascar team noted that there were too many sentinel sites during the 2012-2013 IRS campaign. Further, since the entomological teams needed to spend around 20 days at each sentinel site, mainly to raise wild mosquitoes for testing, the entomological teams had to alternate between sentinel sites each month. This is not ideal, and led the entomological teams to not collect key data for T3 and T4 in some areas, which was needed to note the exact residual life of insecticide. AIRS believes this issue should be remedied for the 2013-2014 IRS campaigns, as PMI has worked with the NMCP to ensure all AIRS Madagascar sentinel sites are in PMI-supported IRS spray areas, which has helped reduce the number of sentinel sites.
- The entomological teams did a good job of capture and using wild mosquitoes for their entomological surveillance work. However, it would be best if all of the entomological teams had access to a susceptible colony of mosquitoes, to assure better quality data for all entomological surveillance work.
- Currently there is only one sentinel site in the south, and four in the CHL. Given that there are three times more eligible structures in the south than the CHL, and the southern IRS campaign area in Madagascar is extensive and geographically diverse, a second sentinel site in the south would be

useful for collecting more entomological surveillance data. AIRS Madagascar is willing to work with PMI, to advocate for the RBM committee to approve a second sentinel site in the PMI-supported IRS campaign areas in the south.

Other Issues

- The CHL and the south are very different with regards to geography, infrastructure, access to communication and material resources, and the capacity and experience of seasonal staff. Therefore, the planning and implementation of IRS should treat these areas completely separate. Plans and IRS campaign models for the spray areas should do a better job of reflecting the realities of spraying in very different areas.
- The project will need to closely monitor the security situation in the south and the CHL throughout the year to make sure future spray areas are safe for IRS implementation. AIRS Madagascar should also update and inform PMI regularly about any dangerous situations which would prevent AIRS Madagascar from completing IRS.
- AIRS Madagascar staff noted that it started raining in some parts of the south in late January 2013. However, after Cyclone Haruna, all rains stopped until right before the mop-up spray campaign. AIRS Madagascar staff have definitely noticed a change in the timing of the rains in the south over the past two years. It may be advisable for all district coordinators during future IRS campaigns to record when and how much rain is received and help determine if there has been a shift in the timing of rains in the south to better plan when spraying should occur. AIRS Madagascar will explore putting this into the scopes of work for the district coordinators.
- The AIRS Madagascar project possesses a large fleet of motorcycles used by district coordinators, district logistics assistants, and sector managers in both the CHL and south for IRS campaign monitoring. Given the number of motorcycles, their total value, and possibility for damage or vandalization, the project should consider appointing a staff member to keep track of their use, repairs, and maintenance. AIRS Madagascar noted that in south and the CHL, some motorcycles needed repairs during the IRS campaign. Without a staff member responsible for maintaining the motorcycle fleet, repairs took considerable time to be completed and the mobility of district coordinators and sector managers to complete supervision was limited while waiting for repairs.

11. RECOMMENDATIONS

Listed below are several recommendations that the AIRS Madagascar team has developed to improve the efficiency and effectiveness of future IRS campaigns.

- AIRS Madagascar should reconsider its current IRS campaign model. The use of the cascade start model and movement of commodities to and from spray areas led to challenges in supervision as well as high costs in inventory management and transportation. The logistics of constantly moving IRS commodities also proved to be challenging to organize thoroughly. It was also noted that the small time period that spray operators are employed within the current IRS campaign model did not allow them to gain enough experience to improve the quality of their spraying. AIRS Madagascar should consider changing the spray campaign model to a more common model of starting spraying in all districts and communes at once, as this would minimize internal movements of PPE, insecticide, and other IRS commodities during the IRS campaign. It would also reduce the difficulty in understanding which seasonal staff are completing IRS and which seasonal staff are not working or waiting to begin their work on the IRS campaign.
- AIRS Madagascar should hire more staff and make certain seasonal staff positions full-time staff members. Presently, AIRS Madagascar is too short staffed to provide adequate supervision of the IRS campaign in the CHL, and concurrently assure the IRS campaign in the south is set up thoroughly. Additionally, in the south, due to the large geographic distances, difficult to reach spray areas, and high number of seasonal staff hired, more staff is needed to complete more in-depth supervision. AIRS Madagascar should consider opening a new office in the south and staffing this office with several staff members that can focus on setting-up the IRS campaign in the south throughout the year, and allow the staff based out of Antananarivo to focus on monitoring and closing out the IRS campaign in the CHL before traveling to the south to help supervise the larger IRS campaign. Additionally, the staff in the south will provide extra people to help with the supervision of the IRS campaign during implementation.
    - The District Coordinators in the CHL and the south should be hired as full-time staff to assure the project has a presence in all of the spray areas throughout the year in order to begin recruitment of seasonal staff earlier and allow for earlier selections of soak pit and store room sites. A full-time district coordinator can also organize and arrange the development and/or refurbishment of soak pits and store rooms much earlier in the year to avoid a rush to build infrastructure right before the IRS campaign. Most notably, by hiring the district coordinator as full-time staff, the project can work to assure the district coordinators are better trained and have more capacity to manage IRS programming and are held more accountable for their work by the AIRS Madagascar project staff.

- Related to supervision issues, AIRS Madagascar will assure that all project staff completing supervision in the field are trained to assess environmental compliance issues, inventory/supply chain management operations (most notably accuracy of stock cards and physical inventory), data quality control, and general best practices for spray operations (ranging from correctly mixing insecticides to assuring good quality spraying of targeted structures). This measure will help with supervision efficiency as any staff member traveling to a spray area could complete supervision for multiple IRS campaign activities and alert other AIRS Madagascar staff that deal directly with the technical area (such as the ECO regarding soak pit issues) about problems to resolve. The AIRS project has developed multiple tools for completing environmental compliance, M&E, and operations supervision that could be utilized by all AIRS Madagascar staff when they are monitoring IRS campaign activities.
- There is a significant need to shrink the number of spray operators that are hired to work on the IRS campaign, and improve their capacity. As noted in this report, the high number of spray operators that are hired to complete IRS makes it difficult to properly supervise. Although the current model emphasized spray operators spraying their community, the local spray operators are not reducing or limiting refusals. Instead, a smaller number of spray operators should be hired (after a competitive process) and provided more time for training. The spray operators should complete spraying during the entire length of the IRS campaign and move throughout all spray areas. Spray operators that spray for several weeks are more likely to gain critical experience and better capacity in completing IRS, which will limit common errors spray operators are more likely to make if they only spray for a few days. Additionally, the hiring of a small number of spray operators will mean there is less inventory to be provided to the field and the AIRS Madagascar staff will have less seasonal staff to monitor and supervise.
- Given the difficulty in managing and maintaining large numbers of soak pits and store rooms, and most store rooms and soak pits were only used for a short period of time by a small number of spray operators, AIRS Madagascar should look into reducing the number of soak pits and store rooms and assuring the soak pits and store rooms that are built are more centrally located and can be used for the entire length of the IRS campaign. It would be preferable if the project only built a small number of soak pits and store rooms per district instead of relying on community spray operators to walk to local soak pits and store rooms each day. This recommendation will require that the AIRS Madagascar project can rent enough vehicles to guarantee spray operators have access to transport to all spray areas throughout the IRS campaign and can safely return to the more centrally located soak pit and store room each day. Additionally, the reduced number of soak pits and store rooms will allow the AIRS Madagascar team to adequately monitor and supervise the store rooms and soak pits, requiring less time to set up the soak pits and store rooms before the IRS campaign.
    - For more remote spray areas in the CHL and the south where spray teams will not be able to travel to the spray area and back to the operation site in one day, AIRS Madagascar will provide "portable" soak pits to the spray teams. The portable soak pit will be a small soak pit that can be placed in the ground and used for disposing liquid wastes. After the area is sprayed, the portable soak pit can be dug up and transported back to the main operation sites. Thereby, the portable soak pit would be used in place of a spray team building a small soak pit that would be used for only three days and would need to be covered up and monitored closely after the spray season.
    - Given the issues in the south regarding individuals removing coal and rocks from the soak pits, it would be advisable if AIRS Madagascar considers building lockable covers for all soak pits at operation sites. This has been completed in most AIRS countries; ECOs from the AIRS countries can provide a variety of ideas to the AIRS Madagascar team for building a soak pit cover, from simple metal sheeting that can lock into place to heavy pieces of

concrete that cannot be moved.

- AIRS Madagascar needs to reach out and establish relationships with district health offices and local authorities in all spray areas. Although AIRS Madagascar cannot work directly with these individuals during the IRS campaign, the project should establish a relationship in order to assure the district health officials understand the benefits of IRS and can help provide messaging to communities to minimize refusals. Additionally, the local authorities can provide updates on any security issues in the spray areas.
    - AIRS Madagascar should consider completing a short introduction to IRS/IEC messaging training for traditional/non-government community leaders in the CHL and the south. The training should cover the benefits of IRS, and describe how IRS is completed. By ensuring better understanding of IRS, community leaders can become strong advocates for IRS.
    - AIRS Madagascar would like to support more regular/monthly meetings with the RBM committee and use the meetings as a forum for AIRS Madagascar to discuss with the Global Fund best practices and lessons learned for implementing IRS programming in Madagascar. These discussions may help AIRS Madagascar staff develop new ideas for dealing with critical IRS implementation issues and help build consensus among all IRS stakeholders on key issues such as insecticide selection, methodology for determining the location of focalized spraying, and sharing good technical innovation to improve IRS throughout Madagascar.
- AIRS Madagascar should reexamine its training material and improve upon messaging for key environmental compliance issues (particularly for mixing insecticide, as mixing of insecticide outside of the spray tank was noted in both the CHL and the south). AIRS Madagascar should also build a demonstration soak pit during its training of trainers. This will help district coordinators, sector managers, and team leaders gain a greater understanding of what a correct soak pit should look like and why AIRS requires various components of the soak pit to adhere to the BMP. Finally, further messaging will need to be developed emphasizing the responsibilities of beneficiaries after their structures are sprayed, including how to safely dispose of any dead insects inside their structures (burial or disposal in a latrine) to prevent any domestic animals from eating the dead insects.
    - Additionally, AIRS Madagascar should consider further involving M&E staff during spray operator training to ensure the spray operators gain a better understanding of how to properly fill-in spray operator cards and the importance of the data collected by spray operators.
- To prevent the possibility of seasonal staff taking IRS commodities after the spray campaign ends, AIRS Madagascar should aim to synchronize the final payment of seasonal staff when they return all of their IRS campaign equipment at the end of future IRS campaigns. Any seasonal staff member who is unable to return all of their IRS campaign equipment may not receive their pay and may be billed for the missing equipment.

ANNEX

Additional Tables and Figures

TABLE 17: NUMBER OF PEOPLE TRAINED, DISAGGREGATED BY GENDER

Categories of Persons Trained	Training on IRS Delivery										Other Trainings							
	Training of Trainers: Spray Ops		Spray Operations		Data Entry		Logistics		Technical Maintenance		IEC Mobilization/ Enumeration		PPE Washing		Security		Transportation	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Trainings in CHL																		
District Coordinator	4																	
Logistics Assistant	4																	
Financial Assistant	2	2																
M&E Assistant					1													
Data Entry Clerk					11	5												
Sector Manager	21																	
Store Keeper							35	7										
Store Room Guard															84			
Team Leader			177	22														
Spray Operator			998	54														
Washer													1	393				

Categories of Persons Trained	Training on IRS Delivery										Other Trainings							
	Training of Trainers: Spray Ops		Spray Operations		Data Entry		Logistics		Technical Maintenance		IEC Mobilization/ Enumeration		PPE Washing		Security		Transportation	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
IEC Mobilizer											1149	320						
Carrier/Porter																	392	2
Spray Pump Technician									29									
TOTAL M/F	31	2	1175	76	12	5	35	7	29	0	1149	320	1	393	84	0	392	2
TOTAL/ training		33		1251		17		42		29		1469		394		84		394
Grand TOTAL																		**3,713**
Total Number of Women Trained in the CHL																		**805**
Total Number of Men Trained in the CHL																		**2908**
Trainings in the South																		
District Coordinator	7																	
Logistics Assistant	7																	
Financial Assistant	3	4																
M&E Assistant						1												
Data Entry Clerk					16	11												
Sector Manager	31																	
Store Keeper							72	31										
Store Room Guard															205	1		
Team Leader			247	54														

Categories of Persons Trained	Training on IRS Delivery										Other Trainings							
	Training of Trainers: Spray Ops		Spray Operations		Data Entry		Logistics		Technical Maintenance		IEC Mobilization/ Enumeration		PPE Washing		Security		Transportation	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Spray Operator			1559	183														
Washer														602				
IEC Mobilizer											5516	1891						
Carrier/Porter																	602	
Courier																	12	
Spray Pump Technician									50									
TOTAL M/F	48	4	1806	237	16	12	72	31	50	0	5516	1891	0	602	205	1	614	0
TOTAL/ training		52		2043		28		103		50		7407		602		206		614
Grand TOTAL																		11,105
Total Number of Women Trained in the CHL																		2778
Total Number of Men Trained in the CHL																		8327
Total Number of Women Trained in the South and CHL																		3,583
Total Number of Men Trained in the South and CHL																		11,235
Grand Total Number of People Trained in South and CHL																		14,818

FIGURE 9: EXAMPLE OF 2012-2013 IRS CAMPAIGN LEAFLET

TABLE 18: LOCATION OF ALL SECONDARY STORES DURING THE 2012-2013 IRS CAMPAIGNS

Region	District	Location of Secondary Store
CHL	Ambatofinandrahana	Ambatomifanongoa, Amborompotsy, Mandrosonoro, Mangataboahary, and Soavina
	Ankazobe	Miantso, Ambolotarakely, Antakavana, Fiadanana, Fihaonana, and Kiangara
	Mandoto	Mandoto, Vasiana, Betrohana, Antanambao Ambany, Anjoma Mamatsina, and Ankazomiriotra
	Ambositra	Ambinanindrano, Ambositra II, Andina, Andoetra, Mahaizina, Ambohimpierenana, Tsarasaotra, and Vohidahy
	Ambohimahasoa	Ambalakindresy, Ankofina, Ankerana, and Morafeno
	Betafo	Andrembesoa, Ambohimanambola, Antohobe, Ambohimasina, and Soavina
	Anjozorobe	Mangamila, Betatao, Antanetibe, Androvakely, Ambohimarina, and Alakamisy
South	Amboasary	Amboasary Sud, Tanandava Sud, Behara, Ifotaka, Marotsiraka, Sampona, and Tranomaro
	Ambovombe	Imanombo, Ambanisarika,Ambazoa, Ambohimalaza, Ambazoa, Ambonaivo, Ambondro, Ambovombe, Ampamanta, Analamary, Andalatanosy, Anjeky, Ankilikira, Antanimora Sud, Erada, Jafaro, Maroalomainty, Maroalopoty, Marovato Befeno, Sihanamaro, and Tsimananada
	Ampanihy	Ampanihy Ouest, Androka, Ankiliabo, Amboropotsy, Ankilizato, Maniry, Antaly, Anlilimivory, Ejeda, Belafike Haut, Beahitse, Gogogogo, Vohitany, Beroy Atsimo, Fotadrevo, and Itampolo
	Bekily	Morafeno, Ankaranabo Nord, Besakoa, Anja Noprd, Antsakoamaro, Ambatosola, Tsirandrany, Tsikolaky, Manakompy, Ambahita, Maroviro, Belindo Mahasoa, Beteza, Tanandava, Bekitro, Beraketa, Vohimanga, Bevitike, and Anivorano Mitsinjo
	Beloha	Behabobo, Kopoky, Marolinta, Tranoroa, and Tranovaho
	Betroka	Ambatomivary, Analamary, Andriandampy, Jangany, Benato Toby, Beampombo I, Sakamahily, Iaborotra, Ambalasoa, Naninora, Ivahona, Ianabinda, Bekorobo, Isoanala, Nanarena Besakoa, Beampombo II, Ianakafy, Mahasoa Est, and Tsaraitso
	Tolagnaro	Analapatsy, Andranobory, Ankariera, and Ranopiso
	Tsihombe	Imongo, Antaritarika, Betanty, Anjampaly, Marovato, and Nikoly

TABLE 19: MEP MATRIX

MADAGASCAR MONITORING AND EVALUATION PLAN INDICATOR MATRIX

Updated: 12 September 2013

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
Component 1: Establish cost-effective supply chain mechanisms including procurement, distribution and storage of IRS-related commodities and execute all aspects of logistical plans for IRS-related activities.											
1.1 Procurement											
1.1.1 Number and percentage of international insecticide procurement orders delivered in country, at port of entry, at least 30 days prior to the start of spray operations	[*Numerator:* Number of international insecticide procurements delivered in country, at port of entry, at least 30 days prior to the start of spray operations] [*Denominator:* Total number of international insecticide procurements] *Calculation:* [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	*Data source*: Project records – ex: international procurement documents, air way bills, commercial invoices *Reporting frequency*: Each spray season (annual/ semi-annual)	By Spray Campaign	AIRS	N.A.; 80%	2; N/A%	2; 100%		#TBD; 100%	

[13] Results for Year 1 will be added to the matrix after the completion of the 2012 End of Spray Report.
[14] Targets for Year 2 will be added to the matrix after the 2013 Workplan has been approved.

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
1.1.2 Number and percentage of international procurement orders for equipment, including PPE, received at port of entry, 30 days prior to start of spray operations.	[*Numerator:* Number of international procurements for equipment, including PPE, at port of entry, 30 days prior to start of spray operations] [*Denominator*: *Total number of* international procurements for equipment, including PPE.*]* *Calculation:* [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	*Data source:* Project records *Reporting frequency*: Each spray season (annual/ semi-annual)	By Spray Campaign	AIRS	N.A.; 85%	02; 100%	1; 100%		#TBD; 100%	
1.1.3 Number and percentage of local PPE procurement orders that are delivered to the main warehouse 14 days before the start of spray operations	[*[Numerator:* Number of local PPE procurements delivered 14 days before the start of spray operations] [*Denominator*: *Total number of local PPE procurements.]* *Calculation:* [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	*Data source:* Project records – ex: such as delivery notes, goods receiving notes, inventory control cards *Reporting frequency*: Each spray season (annual/ semi-annual)	By Spray Campaign	AIRS	N.A; 80%	01; 100%	1; 100%		#TBD; 100%	

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
1.1.4 Successfully completed spray operations without an insecticide stock-out	Milestone: (Achieved/Not Achieved)	Y1, Y2, Y3	*Data source:* Project records – *ex:* inventory control cards *Reporting frequency*: Each spray season (annual/ semi-annual)	By Spray Campaign	AIRS	Achieved	Achieved	Achieved		Achieved	
1.2 In-country Logistics, Warehousing, and Training											
1.2.1 Number and percentage of logistics, warehouse managers, and storekeepers trained in IRS supply chain management	*[Numerator:* Total number of logistics and warehouse managers trained in IRS supply chain management using AIRS Project resources.] *[Denominator:* Total number of AIRS logistics and warehouse managers.] *Calculation*: [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	*Data source*: Routine training records *Reporting frequency*: Semi-annually	By Spray Campaign By Gender	PMI	179; 100%	145; 100% M: 107 F:38	58		TBD	

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
1.2.2 Number and percentage of base stores where physical inventories are verified by up-to-date stock records	*[Numerator:* Number of base stores where physical inventories are verified by up-to-date stock records] [*Denominator: Total number of base stores audited.]* *Calculation:* [Numerator ÷ Denominator] x 100 *(See PIRS for details on sample size for operational audits)*	Y2, Y3	*Data source: Project records - ex: inventroy control cards* *Reporting frequency*: Each spray season (annual/ semi-annual)	By Spray Campaign	AIRS	N.A.	84; 53%	58; 85%		#TBD; 100%	
1.2.3 Submit up-to-date inventory records to AIRS Home Office 30 days after the end of each spray campaign	Milestone: (Completed/Not Completed)	Y2, Y3	*Data source:* Project records - ex: warehouse inventory control cards *Reporting frequency*: Each spray season (annual/ semi-annual)	By Spray Campaign	AIRS	Completed	Completed	Completed		Completed;100%	

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
Component 2: Implement safe and high-quality IRS programs and provide operational management support											
2.1 Planning and Design of IRS Programs											
2.1.1 Annual IRS country work plan developed and submitted on time	Milestone: (Completed/Not Completed)	Y1, Y2, Y3	*Data source:* Project records *Reporting frequency*: Annually		AIRS	Completed	Completed	Completed		Completed	
2.2 Support of Safety and Health Best Practices and Compliance with USAID and Host Country Environmental Regulations											
2.2.1 SEA/letter report submitted on time[15]	Milestone: (Completed/Not Completed)	Y1, Y2, Y3	*Data source*: Project records – submitted SEAs/ letter reports *Reporting frequency:* Each spray campaign	By Spray Campaign	AIRS	Completed	Completed	Completed		Completed	
2.2.2 Number and percentage of soak pits and warehouses/storerooms inspected and certified by an environmental officer/AIRS Environmental Compliance Officer	[*Numerator: Number of soak pits and/or storehouses inspected and certified by AIRS Environmental Compliance Office]* [*Denominator: Total number of project soak pits and/or*	Y1, Y2, Y3	*Data source: Project records – Reports submitted by environmental officers* *Reporting frequency:* Each spray season	By Spray Campaign By soakpits and warehouses/ storerooms	AIRS	N.A. 100% inspected and approved prior to spraying	Total: 359 WH: 125 (84.46%) Soak Pit: 120 out of 159 (75.47%) Secondary Soak Pit: 114 out	100% WH: 58 Soak Pit 58 Mobile Soak Pit 45		100%	

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

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
prior to spraying	*storehouses]* *Calculation*: [Numerator ÷ Denominator] x 100						of 600 (19.00%)				
2.2.3 Number of government environmental and health officers trained in IRS environmental compliance	Total number of government environmental and health officers trained in IRS environmental compliance using AIRS Project resources	Y1, Y2, Y3	***Data source:*** Project training reports ***Reporting frequency:*** *Semi-annually*	By Spray Campaign By Gender	AIRS	N.A.	N/A	N/A		TBD	
2.2.4 Total number of spray personnel who attend a training in environmental compliance and personal safety standards in IRS implementation using AIRS Project resources, includes all staff who received environmental compliance training - spray operators, team leaders,	Total number of spray personnel who attend a training in environmental compliance and personal safety standards in IRS implementation using AIRS Project resources, includes all staff who received environmental compliance training - spray operators, team leaders,	Y1, Y2, Y3	*Data source: Project records – Training reports* *Reporting frequency:* Each spray season	By Spray Campaign By Gender	AIRS	3,027	5,562 M: 4,214 F: 1,348	1,205		TBD	

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
washpersons, storekeepers, etc.[16]	washpersons, storekeepers, etc.										
2.2.5 Number of health workers receiving insecticide poisoning case management training	Total number of clinical personnel trained in insecticide poisoning case management using AIRS Project resources	Y2, Y3	*Data source: Project records – Training reports* *Reporting frequency:* Each spray season	By Spray Campaign By Gender	AIRS	151	N/A	N/A		TBD	
2.2.6 Number of adverse reactions to pesticide exposure documented	Total number of incidents of pesticide exposure reported that resulted in a referral for medical care	Y1, Y2, Y3	*Data source: Incident report forms that are required for each incidence of pesticide exposure* *Reporting frequency: Each spray season*	By Spray Campaign By residential/occupational exposure	AIRS	0	2 (Washers & SO) 3 cats	0		0	
2.2.7. Number of vehicular accidents reported	Total number of vehicular accidents reported	*Y1, Y2, Y3*	*Data source: Vehicular incident report forms that are required for each accident* *Reporting frequency: Each spray*	By Spray Campaign	AIRS	0	01 Motorbike, 03 Vehicles	0		0	

[16] Number includes: environmental compliance assistants, sector coordinators, storekeepers, spray operators, team leaders, washers, technicians, and carriers.

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
			season								
2.3 Support Entomological Monitoring Activities and Insecticide Resistance Strategies											
2.3.1 Number of sentinel sites supported by the AIRS project	Total number of entomological sentinel sites supported by the AIRS project	Y1, Y2, Y3	*Data source: Entomological reports* *Reporting frequency:* Annually	By Spray Campaign	AIRS	10	10	10		TBD	
2.3.2 Number and percentage of entomological monitoring sentinel sites measuring all five primary PMI entomological indicators	*[Numerator:* Number of entomological monitoring sites measuring all five primary PMI entomological indicators] *[Denominator:* Number of entomological monitoring sentinel sites] *Calculation:* [Numerator ÷ Denominator] x 100	Y1, Y2, Y3	*Data source: Entomological reports* *Reporting frequency: Annually*	By Spray Campaign	AIRS	5; 50%	5;50%	5		TBD	
2.3.3 Number and percentage of entomological monitoring sites measuring at least one secondary PMI	*[Numerator:* Number of entomological monitoring sites measuring at least one secondary PMI indicator]	Y1, Y2, Y3	*Data source: Entomological reports* *Reporting frequency:*	By Spray Campaign	AIRS	10; 100%	10: 100%	10		TBD	

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
indicator	*[Denominator:* Number of entomological monitoring sites] *Calculation:* [Numerator ÷ Denominator] x 100		*Annually*								
2.3.4 Number and percentage of insecticide resistance testing sites that tested at least one insecticide from each of the four classes of insecticides recommended for malaria vector control	*[Numerator:* Number of insecticide resistance testing sites that tested at least one insecticide from each of the four classes of insecticides recommended for malaria vector control.] *[Denominator:* Number of insecticide resistance testing sites] *Calculation:* [Numerator ÷	Y1, Y2, Y3	*Data source: Entomological reports* *Reporting frequency: Annually*	By Spray Campaign By Type of Insecticide	AIRS	8;100%[17]	8: 100%[7]	8; 100%[7]		TBD	

[17] 100% to test: Pyrethroid, Carbamate, Organophosphate, Organochloring

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
	Denominator] x 100										
2.3.5 Number of wall bioassays conducted within 2 weeks of spraying to evaluate the quality of IRS	Total number of wall bioassay studies conducted in established sentinel sites to evaluate quality of IRS spraying activities	Y1, Y2, Y3	*Data source:* *Entomological reports* *Reporting frequency:* Per spray campaign	By Spray Campaign	PMI	5	5	5		TBD	
2.3.6 Number of wall bioassays conducted after the completion of spraying at monthly intervals to evaluate insecticide decay	Total number of wall bioassay studies conducted at monthly intervals in established sentinel sites to evaluate the rate of insecticide decay on sprayed surfaces	Y1, Y2, Y3	*Data source:* Entomological reports *Reporting frequency:* Per spray campaign	By Spray Campaign	PMI	15	14	15		TBD	
2.3.7 Number of vector susceptibility tests for different insecticides conducted in selected sentinel sites	Total number of vector susceptibility tests conducted to gauge the effectiveness of individual insecticides proposed for use in spray operations	Y1, Y2, Y3	*Data source:* *Entomological reports* *Reporting frequency:* Per spray campaign	By Spray Campaign By Type of Insecticide	PMI	48[18]	93[19]	48[8]		TBD	

[18] Type of Insecticide: Deltamethrine: 8, Permethrine: 8, Lambda cyhalothrine: 8, Bendiocarb: 8, Fenithrothion: 8, DDT: 8

[19] **CDC bottle**: Deltamethrine: 8, Permethrine: 8, Lambda cyhalothrine: 7, Bendiocarb: 8, Fenithrothion: 6, DDT: 6, Alphacypermethrine: 7
WHO tube test:: Deltamethrine: 8, Permethrine: 3, Lambda cyhalothrine: 8, Bendiocarb: 8, Fenithrothion: 8, DDT: 8

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
2.4 Conduct Communications Activities and Community Mobilization											
2.4.1 Number of radio spots and talk shows aired	Total number of radio spots and talk shows aired in target spray districts to stress the safety and benefits of IRS, ensure successful spray coverage, timely vacating of premises and adherence to IRS safety precautions by community members	Y1, Y2, Y3	*Data source:* District coordinatoor reports Invoice *Reporting frequency: Per Spray Campaign*	By Spray Campaign	AIRS	140	383	160		TBD	
2.4.2 Number of IRS print materials disseminated	Total number of IRS educational materials developed, printed and distributed to community members in target spray districts using AIRS Project resources	Y1, Y2, Y3	*Data source: Project records* *Reporting frequency: Semi-annually*	By Spray Campaign By Type of printed material and message(s)	AIRS	424,000	155,324	396101 Leaflet:396101 Brochure 396 101[20] Poster: 8850		TBD	
2.4.3 Number of people reached with IRS messages via door-to-door mobilization	Total number of adults reached with IRS message during pre-spray community, door-to-door mobilization	Y1, Y2, Y3	*Data source: Mobilization Data Collection Forms* *Reporting frequency: Daily per mobilization*	By Spray Campaign By Gender	AIRS	N.A.	1,611,432 M : 895,666 F : 715,766	1,588,180 M: 884,875 F: 703,305		TBD	

[20] Brochure 1,100,080 ; Pamphelets: 546265; Poster: 6800; SOP Brochure 750

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
			conducted								
2.5 Spray Targeted Structures According to Technical Specifications											
2.5.1 Number of structures targeted for spraying[21]	Total number of structures found in targeted spray districts by Spray Operators	Y1, Y2, Y3	*Data source: Daily Spray Operator Forms* *Reporting frequency: Daily per spray campaign*	By Spray Campaign	PMI	410,000	380,074[22]	396,101		TBD	
2.5.2 Number of structures sprayed with IRS[23]	Total number of structures sprayed in targeted districts	Y1, Y2, Y3	*Data source: Daily Spray Operator Forms* *Reporting frequency: Daily per spray campaign*	By Spray Campaign	PMI	348,500 (85% of 410,000)	371,391	336,686		TBD	
2.5.3 Percentage of total structures targeted for spraying that were sprayed with a residual insecticide (Spray Coverage)	[*Numerator: Total number of structures sprayed in targeted districts]* [*Denominator: Total number of structures in targeted areas*	Y1, Y2, Y3	*Data source: Daily Spray Operator Forms* *Reporting frequency: Daily per spray campaign*	By Spray Campaign	PMI	85%	Total: 97.7% CHL : 96.1% SOUTH:98.2%	85%		85%	

[21] The yearly targets for this indicator are from the applicable workplan. The yearly results are the number of structures found by Spray Operators during the spray campaign.
[22] Due to insecurity, AIRS Madagascar had to remove 15,623 structures from their target number of structures.
[23] The target per year for this indicator is based on 85% of the number of structures to be targeted as noted in the applicable workplan.

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
	found by spray operators] *Calculation: [Numerator ÷ Denominator] x 100*										
2.5.4 Number of people residing in structures sprayed (Number of people protected by IRS)	Total number of people residing in structures sprayed (Actual numbers are collected during spray operations; population estimates are not used.)	Y1, Y2, Y3	*Data source: Daily Spray Operator Forms* *Reporting frequency: Daily per spray campaign*	By Spray Campaign By Number of pregnant women By Number of children <5 years old	PMI	1,881,647	1,781,981[24] Pregnant Women: 60,146 Children under 5: 371,701	1,828,869		TBD	
Component 3: Provide ongoing monitoring and evaluation and quality control measures											
3.1 Submit Monitoring and Evaluation Plan (MEP) to PMI-Madagascar	*Milestone:* (Completed/Not Completed)	Y1, Y2, Y3	*Data source: Project records* *Reporting frequency: Semi-annual*		AIRS	Completed	Completed	Completed		Completed	
3.2 Submit a post-spray data quality audit (PSDQA) report to the AIRS M&E specialist in the	Milestone*: (Completed/Not Completed)*	Y1, Y2, Y3	*Data source: Spray operations reports* *Reporting*	By Spray Campaign	AIRS	N.A. – AIRS Madagascar has been	N.A.	N.A.		TBD	

[24] Due to insecurity, AIRS Madagascar had to remove 57,171 people protected from their target.

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
home office within 60-180 days of completion of spray operations			*frequency: Per spray campaign*			chosen to carry out the PSDQA in Year 3					
3.3 Submit a country-specific Eligible Structure Definition Document to local PMI advisors and NMCP	Milestone: *(Completed/Not Completed)*	Y1	*Data source: Project records* *Reporting frequency:* Semi-annually		AIRS	Completed	Completed	N.A.	N.A.	N.A.	N.A.
3.4 Supply chain review conducted by RTT	Milestone: (Completed/Not Completed)	Y1, Y2	*Data source: RTT supply chain review reports* *Reporting frequency:* Semi-annually	By Spray Campaign	AIRS	Completed	Completed	N.A.		TBD	
Component 4: Contribute to Global IRS Policy-Setting and Country-Level Policy Development of Evidence-Based IRS; Disseminate Experiences and Best Practices											
4.1 Number of guidelines/checklists/ tools related to IRS operations developed or refined with project support	Total number of implementation guidelines, process checklists and program tools related to IRS operations developed or refined using the technical and/or financial resources of the	Y1, Y2, Y3	*Data source: Project records – Activity reports* *Reporting frequency: Semi-annually*	By Guideline/checklist/tool	AIRS	5 (2 Environmental Compliance Officer checklists, 3 M&E Tools;)	5 (2 Environmental Compliance Officer checklists, 3 M&E Tools;)	9 (6 Environmental Compliance Officer checklists, 3 M&E Tools;)			

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
	AIRS Project										
4.2 Number of best practice presentations given at national/ regional/international workshops and conferences	Total number of project-related oral and poster presentations delivered in national, regional and/or international meetings related to IRS.	Y2, Y3	*Data source: Project records – Activity reports* *Reporting frequency: Semi-annually*	By IRS Technical Area	AIRS	N.A.	N.A.	1		TBD	
4.3 Number of best practice presentations given at national/ regional/international workshops and conferences	Total number of project-related oral and poster presentations delivered in national, regional and/or international meetings related to IRS.	Y2, Y3	*Data source: Project records – Activity reports* *Reporting frequency: Semi-annually*	By IRS Technical Area	AIRS	N.A.	N.A.	1			
Component 5 (Cross-cutting): Capacity Building, Knowledge Transfer, Gender Inclusion											
5.1 Capacity Building[25] (Gender Inclusion)											
5.1.1 Number of people trained in IRS implementation	Total number of personnel trained in IRS implementation using AIRS Project resources. This figure only includes spray	Y1, Y2, Y3	*Data source: Project records – Training reports* *Reporting frequency: Semi-annually*	By Spray Campaign By Gender Percentage of Women	PMI	2,894	3,379 M: 3,060 W: 319 W: 9.4%	770 M:670 W:100		TBD	

[25] See Annex B for the breakdowns of the training targets as presented in the 2012 AIRS Madagascar workplan.

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
	personnel such as spray operators, team leaders, supervisors, clinicians; it excludes data clerks, IEC mobilizers, drivers, washers, porters, pump technicians, security guards, etc			Trained							
5.1.2 Number of people trained to deliver or support IRS in target districts	Total number of people trained using AIRS Project resources to implement/support elements of IRS in target districts. This figure includes all cadre that serve a role in IRS.	Y1, Y2, Y3	*Data source: Project records – Training reports* *Reporting frequency: Semi-annually*	By Spray Campaign By Gender By Role (e.g., spray operator, storekeeper) Percentage of women trained	AIRS	14,507	14818 M: 11,235 W: 3,583 24.18%	925 M: 555 W: 370		TBD	
5.1.3 Number of personnel trained as IRS implementation trainers	Total number of personnel trained in Training of Trainers (TOT) for IRS delivery	Y1, Y2, Y3	*Data source: Project records – Training reports* *Reporting frequency:* Semi-annually	By Spray Campaign By Gender Percentage of women trained	AIRS	71	85 M:79 W: 6 7%	84 M:88 W: 8		TBD	
5.1.4 Number of government environmental and/or health officials trained in	Total number of national and sub-national/district government environmental	Y1, Y2, Y3	*Data source: Project records – Training reports* *Reporting*	By Spray Campaign By Gender	AIRS	N.A.	NA	TBD		TBD	

Performance Indicator	Indicator Definition	Project Year(s) Reporting	Data Source(s) and Reporting Frequency	Disaggregate	PMI/ AIRS Indicator	Annual Targets and Results					
						Year 1		Year 2		Year 3	
						Target	Results[13]	Target[14]	Results	Target	Results
IRS oversight[26]	and/or health officials who are trained in oversight of IRS implementation using AIRS Project resources		*frequency:* Semi-annually	Percentage of Women Trained Type of government official (e.g. environmental/ health)							
5.1.5 AIRS conducted a capacity assessment[12]	AIRS Madagascar program conducted an assessment of IRS capacity among national and sub-national/district government health officials	Y1, Y2	*Data source: Project records – Capacity assessment reports* *Reporting frequency:* Semi-annually		AIRS	N.A.	NA	Complete d		TBD	
5.1.6 Number of capacity-building MOUs signed by AIRS, NMCP and partners/ institutions[12]	Total number of Memoranda of Understanding (MOU) on provision of local capacity building finalized and signed between AIRS, the National Malaria Control Program, and other local partners and institutions	Y1, Y2, Y3	*Data source: Project records – MOUs* *Reporting frequency: Semi-annually*	By Spray Campaign	AIRS	N.A.	NA	TBD		TBD	

[26] AIRS Madagascar does not work with the Malagasy government