



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

**LIBERIA END OF SPRAY REPORT**  
**MARCH 23 - JUNE 30, 2012**

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# ACRONYMS

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<b>Abbreviation</b>	<b>Definition of Abbreviation</b>
AML	Arcelor Mittal Liberia
BCC	Behavior Change Communication
COP	Chief of Party
CFR	Code of Federal Regulations
CHW	Community Health Worker
CHT	County Health Team
DDT	Dichlorodiphenyltrichloroethane
DEOH	Department of Environmental and Occupational Health
DHO	District Health Office
EPA	Environmental Protection Agency
ECO	Environmental Compliance Officer
FL	Firestone Liberia
FY	Fiscal Year
GIS	Geographical Information System
GFATM	Global Fund to Fight AIDS, Tuberculosis, and Malaria
GPS	Global Positioning System
IEC	Information, Education, and Communication
ICC	Inventory Control Cards
LIBR	Liberia Institute for Biomedical Research
LLIN	Long-lasting insecticidal net
MIS	Malaria Indicator Survey
MOP	Malaria Operational Plan
MOU	Memorandum of Understanding
MOA	Ministry of Agriculture
MOHSW	Ministry of Health and Social Welfare
M&E	Monitoring and Evaluation
NMCP	National Malaria Control Program
NGO	None Governmental Organization
OPD	Outpatient Department
PSIR	Pre-Spray Inspection Report
SEA	Supplement Environmental Assessment
CDC	U.S. Centers for Disease Control and Prevention
UTM	Universal Transverse Mercator geographic coordinate
GHEO	USAID Global Health Environmental Officer
VCU	Vector Control Unit
WHO	World Health Organization
USAID	United States International Development
PMI	Presidential Malaria Initiative
IRS	Indoor Residual Spraying

TOT	Training of Trainers
PPE	Personal Protection Equipment
RTI	Research Triangle Institute
SOP	Spray Operator

# EXECUTIVE SUMMARY

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In August 2011, Abt Associates was awarded a three-year Africa-wide IRS project (AIRS), funded by USAID under the President's Malaria Initiative (PMI) and Liberia is one of the countries to receive support to implement Indoor Residual Spraying (IRS). The key objectives of the AIRS project in Liberia are to reduce malaria associated morbidity and mortality in 14 districts located in 5 counties and build upon previous achievements in IRS. The target for the 2012 IRS campaign was to spray 80,000 structures located in the same 14 districts sprayed last year. The IRS campaign consists of 2 rounds of spraying, one around March/April before the onset of long rainy season and a shorter spray round in October after the rainy season. The second round of spraying will be conducted only in the districts where a shorter acting carbamate insecticide was sprayed in March/April. This End of Spray Report covers spraying conducted from March 23- June 30, 2012.

Project implementation was conducted in close collaboration with the National Malaria Control Program (NMCP), County Health Teams (CHT) and local authorities in various counties and districts, and the Environmental Protection Agency (EPA). Spraying was implemented in phases and it took 83 operational days to cover 14 districts in the public sector, including 2 sites in the private sector.

The following are project achievements for the first round of spraying in 2012:

- Trained 716 seasonal spray operations personnel (83% male) which included spray operators, team leaders, supervisors, storekeepers, pump technicians and data clerks.
- Sprayed a total of 96,901 structures out of 99,236 eligible structures found resulting in 98% spray coverage. This exceeds the target of 80,000 structures.
- Protected a total population of 869,707 people, comprising 47,786 pregnant women and 145,845 children under age 5.

# I. INTRODUCTION

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The year 2012 marked the fourth year of IRS implementation in the Liberia post-conflict transition. These are important milestones in Liberia's history of malaria control. Reintroduction of IRS aims to reduce malaria morbidity and mortality in order to save human lives and promote economic and social growth. The AIRS project's target was to spray 80,000 structures, build local capacity and transfer skills and knowledge in IRS planning, implementation, and environmental compliance, and strengthen entomological monitoring with an emphasis on insecticide resistance surveillance and real-time efficacy monitoring.

IRS operations in 2012 were conducted in 14 districts in five counties: Grand Bassa, Margibi, Montserrado, Bong, and Nimba. Spraying was undertaken in two phases: a public sector spray campaign and a private sector campaign. The public sector campaign commenced on March 23<sup>rd</sup> and ended on June 2<sup>nd</sup>. The second phase, which focused on the private sector, began on June 5<sup>th</sup> and was completed on June 30<sup>th</sup>. The private sector spraying included support to spray the premises of Arcelo Mittal, an iron ore mining company located in Yekepa, Nimba County with a base in Buchanan, Grand Bassa.

## 1.1 KEY OBJECTIVES IN 2012

The two overall goals of the AIRS Liberia project are:

1. To contribute to the NMCP and PMI goal of reducing malaria associated morbidity and mortality in the 14 selected districts located in five counties in Liberia.
2. To establish a model IRS program at the county/district level that will set national performance standards and serve as a best practice among national and international implementers.

The specific objectives for 2012 include but are not limited to the following:

- Achieve spray coverage of at least 85% percent of the target number of 80,000 structures in 14 districts in five counties.
- Strengthen the capacity for IRS implementation, monitoring and supervision at the national (NMCP), district, and county levels (CHT). More specifically, support the NMCP to conduct entomological surveillance to monitor insecticide resistance and quality of the program.
- Ensure compliance with environmental regulations and establish local capacity for best practices in the target districts for insecticide handling and usage for IRS.
- Establish effective monitoring and evaluation of IRS activities.

## 2. PRE-SPRAY ACTIVITIES

### 2.1 DISTRICT SELECTION & GENERAL PLANNING

The IRS districts were selected based on Liberia’s strategic approach to give priority to rural communities where the malaria burden is high, and also factor in technical and epidemiological considerations, and geographical and logistical information for cost effective operations. The Ministry of Health and Social Welfare (MOHSW) policy on IRS strategy outlines 3 criteria for consideration in the selection of IRS sites:

- Areas with the highest malaria burden
- Under-served areas, in terms of access to health services
- Areas with relatively easy physical or geographical access

Implementation began from the coastal counties in the South Central region and moved into the interior counties of the North Central region. The project targeted the 14 districts that were sprayed in the 2011 IRS campaign (see **Table 1** below). Among the concession areas, two sites controlled by Arcelor Mittal (AML Yekepa in Nimba and AML Loop in Buchanan) were sprayed as part of a public-private partnership.

Table 1: List of operational sites for 2012 IRS campaign

County	Districts
Grand Bassa	Compound #1/ Worr; District # 2; District # 3 a&b; District # 3 c; District # 4 Neekreen/Owensgrove/ Buchanan/ Commonwealth
Margibi	Mamba Kaba
Montserrado	Careysburg
Bong	Kokoya, Kpaai, Panta and Fuamah
Nimba	AML Concession Area owned by Arcelor Mittal

Abt Associates conducted start up activities, such as opening an office, registering, and hiring staff, during November and December and the office was not fully operational until January. The first round of spraying was scheduled to commence the second week of March 2012, before the onset of the rainy season towards the end of April. As part of the preparations and taking into consideration time constraints, the program relied on demographic and geographic information used in the 2011 IRS campaign. Initial IRS awareness and advocacy meetings were conducted with community leaders and district health authorities, which included numerous field visits.

The AIRS project collaborated with local authorities and health authorities to select spray operators and community mobilizers, and also to encourage participation of the community at large. During this preparatory phase, the major activities consisted of the following: community awareness campaign on IRS activities, community leader meetings, and selection of spray operators and community mobilizers. A resource assessment was also conducted during this phase to determine the availability and the gaps so that local and international procurement orders could be placed. Finally, identification of warehouses was completed.

## 2.2 INSECTICIDE SELECTION

The selection of type of insecticides that would be used during the 2012 IRS campaign was decided by the IRS Task Force during a meeting held on November 2, 2011. The Task Force looked into bioassay data presented by RTI and decided that pyrethroids will be used to spray Grand Bassa (whole county), Bong (Fuamah, Kokoyah, Panta & Kpaai districts) and Nimba, whereas a carbamate will be used in Montserrado (Careysburg district) and Margibi (Mamba Kaba district).

The Task Force is chaired by the Assistant Minister for Preventive Health (MoHSW) and the NMCP Program Manager and has members from MoHSW, MoA, EPA, Department of Environmental and Occupational Health (DEOH), PMI/USAID Resident Advisors and other partners working on malaria control in Liberia. Please refer to **Annex 1** and **Annex 2** for the data collected by RTI on susceptibility and the wall bioassay results, and **Annex 6** which shows the minutes of the IRS Task Force meeting.

## 2.3 MICROPLANNING

Micro planning for spray operations took place in February. This exercise was facilitated by Abt Associates and it involved officials from the NMCP, CHT and local authorities (district commissioners, superintendent and clan chiefs, as well as youth and women group leaders) from the five counties. An activity plan was prepared containing personnel requirements and criteria for staff recruitment and mobilization. The logistic requirements were outlined, which included the number of vehicles to be utilized, number and location of stores and soak pit sites, IRS equipment and insecticide requirements, training schedule, and the commencement date for spray operations.

The following issues were highlighted during micro planning meetings:

- The need for the county, local authorities and community leaders to promote and support the IRS project. Their support is essential to the success of the program since the success of the program requires full community compliance.
- The importance of recruiting IRS personnel from the localities of the spray operation. Using personnel from their own community increases the confidence level of the beneficiaries and enhances compliance because they understand their own community, they are able to speak in the local dialect during the spray operations, and overall this approach enhances acceptance and a sense of ownership. Other criteria used for the recruitment exercise included a minimum age (above 18 years), academic qualifications required for each position, previous IRS experience, reputation in the community, physical fitness, and knowledge of the terrain. In addition, prospective female recruits were not allowed to participate if they were pregnant or lactating during the spray exercise.

## 2.4 PROCUREMENT

The following 2 tables list the items which were in stock before the spray campaign began and those which were procured internationally (**Table 2**) and locally (**Table 3**).

Table 2: List of materials in stock and purchases made internationally

Description	Quantity in Stock Before IRS Campaign	Quantity Procured Internationally	Total
Insecticide: FENDONA	20,365	0	20,365
Insecticide: FICAM	1,544	42,000	43,544
Insecticide: K-Othrine	19	55,050	55,069
Spray pumps (10 liters)	230	0	230
Spray pumps (8 liters)	130	0	130
Spray canisters	100	0	100

Table 3: List of materials in stock and purchases made locally

Description	Quantity in Stock Before IRS Campaign	Quantity Procured Locally	Total
Overalls	1,554	50	1604
Rain Boots	572	50	622
Nose Masks	4,628	21,000	25,628
Hand Gloves (Heavy duty)	832	1,200	2,032
Helmets	579	100	679
Helmets Inserts	0	87	87
Large Barrels	48	0	48
Medium Barrels	65	0	65
Small Barrels	13	0	13
Face Shields	579	500	1,079
First Aid Kits	0	100	100
Vitamin "E" Cream	1	200	201
Pregnancy Tests	50	150	200
Apo Furosemide tablets	0	3	3
Atrop 50 X1MC Ampules	0	13	13
Green Vests	85	0	85
Orange Vests	36	0	36

## 2.5 OPERATIONAL AND LOGISTICS ASSESSMENT

At the center of every IRS operation is logistics planning and coordination. Thus, assessing the logistics needs was part of the 2012 IRS work plan development and this characterized the early planning stage of the IRS activities. Planning took budget constraints into consideration and it included all AIRS project needs which could be procured locally and internationally. The logistics assessment took into consideration geography and access to various districts and communities during spray operations. A total of 3 central warehouses, 12 regional stores, and 14 soak pits were used to support spray activities in 14 districts. The majority of the stores were rented from the communities. The central warehouse and all the stores were refurbished to ensure optimal storage of project equipment and materials.

Warehouse management, transportation management, commodity distribution, and utilization tracking was a main focus during spray operations. In addition, spray staff attendance and vehicle use was closely monitored and tracked. A total of 3 field logisticians, 19 store keepers, and 3 logistics assistants were assigned to manage storage facilities. Logistics management tools were introduced and utilized in the warehouses and all of the stores to ensure the security of materials and equipment in storage and during transportation.

## 2.6 HUMAN RESOURCE REQUIREMENTS

The logistics assessment performed during the planning stage revealed on average a spray operator is expected to spray seven structures per day. The total number of targeted structures to be sprayed was 80,000 so it was determined that 520 spray operators would be required for the first round of the IRS campaign.

The spray operators were selected at the district level with assistance from the District Health Officers and local authorities from each of the operational districts, including the mayor and community leaders. The selection was done according to the following criteria: reading and writing ability, physical and medical fitness, and residence in the target community. Female spray operators were encouraged to apply.

Staff members of the AIRS Liberia project actively contributed to the successful implementation of IRS through regular field visits to oversee and supervise spray activities. Abt Associates collaborated closely with the EPA and NMCP teams, who also monitored and supervised implementation of IRS activities.

## 2.7 TRAINING

The objective of the trainings was to build the capacity of the host government at the national and district levels to implement a well-organized IRS program. Training was organized in two parts, the training of trainers (TOT) and the training of spray operators and community mobilizers. Field worker training took place in March 2012.

### **TOT Training:**

The TOT training was held from February 28 - March 3, 2012 at training centers in Monrovia. The training, which included both theoretical and practical sessions, was co-facilitated by officers from the NMCP (the Head of the IEC/BCC Unit & IRS Coordinators), the EPA and MoA. Forty six spray operator supervisors, 18 warehouse clerks, and 3 pump technicians representing each district were among the trainees. In addition, 18 mobilizer supervisors from three counties were trained for a total of 85 participants (80% male). Training topics included introduction to IRS; spray pump handling, use, assembly and maintenance; insecticide use, handling, and safety; and environmental compliance. The first day of training involved all participants because the topics covered were useful to everybody involved in the campaign. In subsequent training days, the group was split into two: (1) spraying operations for spray operator supervisors, store keepers and pump technicians (i.e. spray techniques, spray supervision, logistic management and performance monitoring, including M&E and data management), and (2) IEC/BCC mobilization for community mobilizer supervisors. The majority of the attendees had previous IRS experience, and thus, the training mainly served as a refresher course.

### **Spray Operator Training:**

The spray operator training was conducted for all staff working for the 2012 IRS campaign in the 14 districts. The training was conducted for 3 days for those with previous IRS experience and an additional day was added for those spray operators who were new to IRS. Graduates of the TOT training conducted the spray operator training with the support of Abt staff, and facilitators from the NMCP and CHTs. The training had both theoretical and practical sessions. Training at the district level involved a total of 619 spray operators (see **Annex 3**).

In addition to spray operators, 78 washers (24% males), security guards 72 (100% males) and 42 drivers (100% males,) as well as 15 conveyors (93% males) were trained on how to protect themselves from insecticide poisoning and prevent environmental contamination, which could result from accidental spillage of insecticide during transportation and PPE cleaning.

A general medical examination was performed on all trainees by the District Health Officer in each district to assess their capability to perform IRS activities. All female spray operators and washers were tested for pregnancy. The test results revealed that none of the women tested positive for pregnancy, and all spray operators were physically fit to conduct IRS activities.

### **IEC Mobilizer Training:**

The majority of mobilizers are community health volunteers with a strong visibility and extensive experience raising health awareness in the community. The selected community mobilizer received a refresher training, which was conducted in each of the region. In coordination with Abt and NMCP IEC/BCC officers, all mobilizer supervisors who attended the TOT training facilitated the refresher trainings. The training modules that were covered include:

- Introduction to IRS
- Communication basics and strategies
- Community entry approaches
- Overview of malaria parasite, transmission and control
- Data collection and reporting
- IRS messages (i.e. household preparation, handling of animals during spraying, safety measures and steps to take in case of exposure to insecticide)

A total of 386 mobilizers (80% male) from 14 districts were trained to conduct house-to-house mobilization during the first cycle of the IRS campaign.

### **Storekeeper Training:**

Training was conducted at the KTC Centre in Monrovia for 18 storekeepers (44% male) that were responsible for overseeing the 3 central warehouses and 9 sub-warehouses. The training curriculum included (1) proper storage procedures for insecticides and other IRS commodities; (2) inventory control, material handling and transportation; and (3) introduction and use of logistics management tools. The training was facilitated by the Abt Procurement/Logistics Coordinator.

### **Data Entry Clerk Training:**

Five data entry clerks (80% men) were trained at the AIRS Liberia project office in Monrovia. During the initial stages of data entry, it appeared that more data entry clerks would be needed in order to handle the amount of data delivered to the center daily. In order to meet the reporting deadlines and the data quality standards of the project, an additional seven data entry clerks (86% men) were recruited and trained. The data clerk training module covered (1) navigation of the AIRS Microsoft Access database; (2) orientation to the data collection tools; (3) protocol for raising issues to the Database and M&E Managers; and (4) data quality control and assurance procedures. Training and support continued on-the-job from the Database and M&E Managers and the Client Technology Center, located at Abt's home office in Bethesda, MD, as needed.

A summary of all staff training on AIRS throughout the project, broken down by job role and gender is provided in **Annex 3**.

## **2.8 ENVIRONMENTAL COMPLIANCE**

Prior to IRS operations, the Environmental Compliance Officer, in close collaboration with the NMCP, carried out environmental compliance assessments and evaluated warehouses, stores and soak pits in the 14 districts.

The following activities were conducted before the commencement of spray operations:

- An assessment of insecticide storage facilities and soak pits was performed to establish compliance with relevant local and international environmental compliance laws and standards during spray operations.

- An environmental compliance monitoring plan and checklists for the insecticide storage facilities and soak pits were developed, as well as accidental contamination safety responses during spray operations.
- All soak pits were constructed to meet international standards and repairs were performed.
- All degrading materials in the soak pits were well arranged according to prescribed dimensions.
- All warehouses were renovated to meet international standards and repairs were performed so they were ready for spray operations.
- Monitoring systems to track used insecticide sachets were established, and all storekeepers and washers were trained on the proper management of both storage facilities and soak pits.

### **Environmental Assessment**

In keeping with USAID's environmental compliance procedures, Title 22 Code of the National Regulations Part 216 is a broad document with details on environmental impact assessment procedures. They are intended to enforce the requirements of the National Environmental Policy Act of 1970, as amended (NEPA) as they affect the USAID program. 22 CFR 216 applies to all USAID programs, projects, activities and substantive amendments. A supplemental Environmental Assessment (SEA) was carried out in 2009, in order to take into account environmental measures and mitigations which must be considered before embarking on the IRS program in Liberia. The assessment was carried out by Research Triangle Institute (RTI) International in close supervision and consultation with the Environment Protection Agency (EPA) and was approved by the USAID Environmental Mission Officer in November 2009. This SEA is valid for 3 years from the date of approval. As a requirement, a Pre-Spray Inspection Report (PSIR) and a Letter Report were submitted to the USAID Global Health Environmental Officer (GHEO). The approval of the PSIR and Letter Report by USAID is official approval to commence spraying activities in all areas targeted for the IRS campaign for 2012.

## **2.9 IEC ACTIVITIES AND COMMUNITY MOBILIZATION**

Community mobilization is considered to be one of the core components of IRS. During the 2012 campaign, the IEC Coordinator worked closely with the NMCP, CHTs, and local authorities to raise awareness and seek support from local leaders and communities at large. The IEC Coordinator also worked with the Malaria Focal Persons from each of the 14 districts designated for spraying, mobilizers, town announcers, and spray operator team leaders. A total of 334 mobilizers and 46 team leader/ supervisors (**Table 4**) were involved in carrying out mobilization and community sensitization, covering all the 14 districts of the 5 counties. The mobilization and sensitization exercise lasted for 83 days.

Mobilizers were required to inform households about the purpose and benefits of spraying and what to do before, during and immediately after the spray. The mobilizers also noted the number of eligible structures for spray. Mobilizers used the pre-defined IEC/BCC Mobilization Form to collect data on households and structures. In addition, they handed out new IRS cards and retrieved IRS cards from previous spray rounds. The mobilizer documented the head of the household name and mobilization date and signed the IRS cards. Households were cautioned about the need to keep the cards in a safe and accessible part of the house. Mobilizers also distributed IEC materials, in the form of IRS brochures, to the communities.

## 3. SPRAY ACTIVITIES

### 3.1 SPRAY OPERATIONS

IRS operations started simultaneously in two of the five counties on March 23. The spray operations continued in the rest of the districts in phases and ended on June 30, 2012. The entire seasonal workforce involved over 1200 field staff, which included 656 spray operators, team leaders and supervisors and 380 community mobilizers including team leaders (see **Table 4 and 5**). Spraying in the public sector included a total of 102 teams, each team with five spray operators (see **Table 6**). Spray operations was monitored by Abt staff, the NMCP, MOH and local officials from the communities. As part of capacity building in IRS implementation, government officers from NMCP, CHT and DHO served as IRS supervisors in various districts.

Table 4: Number of Seasonal Spray Staff by District of Operation

Districts	Spray Operators	Team Leaders	Supervisors	Mobilizers	TL Mobilizers	Washers	Storekeepers	Dispatchers	Conveyors	Logistics Assistants	Security Guards	Cleaners	Pump technicians
Careysburg	40	8	2	25	4	4	1		0	0	3	0	0
Mamba Kaba	55	11	3	30	3	4	1	1	0	1	3	1	1
Fuamah	41	7	3	20	3	16	2		3	0	12	0	0
Kokoyah	30	6	2	25	2	4	2	1	0	1	6	0	0
Kpaai	30	6	2	15	2	4	2		0	0	3	0	1
Panta	25	5	2	9	2	4	1		0	0	4	0	0
District 1	65	13	4	55	8	9	2		5	0	9	0	0
District 2	51	10	3	30	4	4	1	1	0	1	3	1	1
District 2B	35	7	2	20	3	9	1		4	0	10	0	0
District 3A &B	30	6	2	20	3	5	1		0	0	3	0	0
District 3C	23	4	2	10	2	7	1		3	0	9	0	0
District 4	25	5	3	20	3	4	1		0	0	3	0	0
Neekeen	70	14	4	55	7	4	2		0	0	4	0	0
<b>Total</b>	<b>520</b>	<b>102</b>	<b>34</b>	<b>334</b>	<b>46</b>	<b>78</b>	<b>18</b>	<b>3</b>	<b>15</b>	<b>3</b>	<b>72</b>	<b>2</b>	<b>3</b>

Table 5: Number of Seasonal District Staff by Gender

Position	Males	Females	Total
Spray Operators	434	86	520
Team Leaders	83	19	102
Supervisors	31	3	34
Field logisticians	2	1	3
Storekeepers	10	8	18
Store dispatchers	3	0	3
Conveyors	14	1	15

Pump Service Technicians	3	0	3
Washers	19	59	78
Cleaners/Janitors	3	0	3
Security Guards	72	0	72
Mobilizers	263	71	334
Mobilizers team leaders	42	4	46
Data Clerks	10	2	12
<b>Total</b>	<b>989</b>	<b>254</b>	<b>1243</b>

The Director of Operations from Abt headquarters office visited spray operations during the first week and highlighted the areas that needed improvement. These recommendations were quickly implemented and many problems were observed to have been corrected during subsequent supervision visits. Examples of these issues included: logistics arrangements and the movement of spray operators from the warehouses/stores to the spray sites, inadequate number of IRS malaria service cards, and inappropriate PPE sizes leading to non-compliance with usage as well as non-observance of all spray protocols. Steps that were taken to address these problems included spot refresher trainings/reorientation for all mobilization personnel and the replacement of poor quality/under sized PPE. Shortage of M&E forms, particularly the malaria service cards, was due to low capacity of the supplier to print the amount ordered and timely delivery. Nevertheless, the logistic unit closely followed up with the supplier to speed up the delivery of the M&E forms.

In spite of the challenges of bad road conditions and frequent breakdown of some of the hired vehicles, the movement of spray operators and other staff went uninterrupted. In total, 15 trucks and 25 Toyota Land Cruiser 4x4 vehicles were hired to support the IRS campaign and the allocation varied depending on the terrain and road conditions in the area of operation. Most of 4x4 vehicles were allocated to support operational areas with poor roads such as District #2, District #3C, Fuamah and Mamba Kaba, or hard to reach communities located in other operational sites.

On average, it took 26 days to complete spraying in one site. The duration of operations varied with the size of the site and access to remote communities. For example, it took 18 days to complete spraying Panta district in Bong County and it took 34 days to complete spraying in Mamba Kaba district located in Margibi County (see **Table 6** below).

Table 6: Number of spray teams, spray start dates & number of days of spraying

County	Districts	Type of Insecticide Used	Start date	Days of Operation	Number of spray teams
Montserrado	Careysburg	Carbamate	March 23, 2012	30	8
Margibi	Mamba Kaba	Carbamate	March 27, 2012	34	11
Bong	Fuamah	Pyrethroid	May 4, 2012	26	7
	Kokoyah	Pyrethroid	March 26, 2012	20	6
	Kpaai	Pyrethroid	April 23, 2012	22	6
	Panta	Pyrethroid	May 7, 2012	18	5
Grand Bassa	Neekeen	Pyrethroid	March 24, 2012	31	14
	District 1/Worr	Pyrethroid	March 24, 2012	27	13
	District 2	Pyrethroid	March 23, 2012	23	10
	District 2B	Pyrethroid	May 4, 2012	23	7
	District 3A &B	Pyrethroid	March 23, 2012	34	6
	District 3C	Pyrethroid	May 7, 2012	24	4
	District 4	Pyrethroid	March 23, 2012	25	5
<b>Total</b>					<b>102</b>

Spray operations did not experience any disruption due to excessive rainfall or inadequate supply of insecticide. Daily spray operations activities commenced at about 8am and ended at 2pm. As spray operations progressed, there was an increase in the number of household members who were not found in their houses because they went out to attend to their farms. This problem became pronounced toward the last week of April, the time coinciding with farming season. In order to deal with this problem, spray operators were dispatched to the field early enough to arrive at the operational site before household members departed to attend to their farms. There were two vehicle accidents recorded throughout the duration of the spray exercise. No personnel were injured.

Overall, the communities were generally receptive to the spray teams and appreciative of the IRS campaign. Spray data was collected by the spray operators, collated and verified by their team leaders, and then deposited at the stores. The supervisors then picked up the forms from the stores, checked them, and returned them to the Monrovia office. Delivery of data forms from each field site to Monrovia office was done at least twice a week. In some areas, particularly hard to reach communities, there was a lag time to collect data forms and delivery to Monrovia took much longer.

In order to monitor the progress of spraying, the supervisors were required to send a daily summary of structures found and sprayed, number of population protected, and number of spray operators worked including information on insecticide usage. This summary data was sent as mobile text messages to the COP and Operations Manager. The daily summary data was valuable in determining the progress of the IRS campaign and the information was used to strategically plan supervision visits and it enabled the operations team to identifying sites that required more support.

## 3.2 PUBLIC PRIVATE PARTNERSHIP

The IRS public private sector partnership initiative involved Arcelor Mittal (AML), an Indian mining company operating in Liberia. Spraying was conducted in two concession sites, AML Buchanan in Grand Bassa county and AML Yekepa in Nimba country. AIRS Liberia provided training, insecticide and spray tanks, whereas AML provided spray operators and paid the cost of spraying. Spraying in private sector commenced on June 6th and completed June 29th. The progress of spraying was extremely slow because AML allocated few spray operators (around 5) and there was a high refusal rate because the majority of people work in the mines and they tend to start their day shift very early in the morning. The spraying operations in the AML sites coincided with the departure of the Health Care Prevention Manager who was instrumental in coordinating the IRS activities with the mining company. Despite these problems, a total of 848 structures were sprayed in the concession areas, protecting a population of 5,916 people of which 13% (753) and 2% (100) were children under 5 years and pregnant women, respectively.

## 3.3 IEC ACTIVITIES AND COMMUNITY MOBILIZATION

Successful mobilization plays a key role in the success of an IRS spray campaign. Door-to-door mobilization was conducted, which included the delivery messages about when and how households should prepare their homes for spray. Mobilizers accompanied the spray teams on spray days by going ahead to alert the community about the timing and logistics of spray. After the community had been notified, the mobilizers re-joined the spray teams to assist households with clearing out their homes to prepare for spray.

Mobilizers were assigned to a spray team and were expected to report to the team leaders accordingly. The IEC Officer kept in touch with the team leaders to monitor the mobilizers' performance and progress.

Prior to the commencement of mobilization, town announcers were sent out to alert the communities that the mobilizers were coming. Radio talk shows were held to announce the spray schedule, promote compliance, and address any misconceptions or question related to IRS (see **Annex 5**). Mobilizers also distributed various IRS materials, such as posters, brochures and T-shirts (see **Table 7** below).

Table 7: IEC materials distributed in intervention sites

County	Posters	Brochures	T-shirts
Margibi	16,000	7,000	80
Montserrado	4,000	5,000	59
Fuamah	3,000	5,000	50
Bong	2,388	2,000	21
Grand Bassa	24,000	39,000	273
<b>Total</b>	<b>49,388</b>	<b>58,000</b>	<b>483</b>

Several advocacy meetings were held in various communities that targeted the attention of local leadership and residents. The meetings were used as an entry point into the communities to notify and educate communities about the IRS campaign (**Table 8**). The meetings were co-facilitated Abt and NMCP staff and were held at communities, selected by their population size and geography.

Table 8: Community mobilization campaign activities to raise awareness of IRS

County	Location	Advocacy meetings	Radio talk shows
Margibi	Mamba kaba	2	5
Montserrado	Careysburg	1	1
Grand Bassa	District 1 / Worr	2	0
	District 2	1	0
	District 3A&B&C	2	2
	District 4	1	0
Bong	Neekreen/Buchanan	1	4
	Fuamah	2	1
	Panta	1	0
	Kpail	1	1
	Kokoyah	1	0
<b>TOTAL</b>		<b>15</b>	<b>14</b>

Activities related to community mobilization were supervised by Abt's IEC/BCC Officer, NMCP staff, and CHT communication officers. Communication officers organized and participated in radio talk shows and facilitated discussions at community meetings involving local leaders to discuss and clarify any issues related to the IRS campaign. As communication officers interacted with the community, success stories and community testimonies on the effectiveness of IEC/BCC activities were documented.

### 3.4 LOGISTICS AND STOCK MANAGEMENT

Inventory control cards (ICC) were used for stock keeping and record tracking, and every item has a card associated with it. They are kept in the central warehouse and regional stores. At the regional stores, records of material issued and received were recorded on the ICC with details of transactions and quantities involved. Weekly stock verification was conducted by the store keepers to ensure that the physical stock matched the records and identify items that need to be ordered from central warehouse.

Prior to the dispatch of commodities from the warehouse to the operational stores, the spray operators (SOPs) and PPEs were numbered to ease identification. Insecticides boxes in the stores were labeled with their intended destination. A dispatch note (quadruplicate copies) was used during the distribution process from the warehouse, which included signed copy as proof of delivery to the operational site warehouse. The quantities of each item received were entered on the ICC.

An insecticide tracking form was used to track stock of insecticide in every warehouse and the stores. The cards recorded information on the number of sachets issued to spray teams and the number of empty and full sachets returned after the day of work. Store keepers managed this process on a daily basis and alerted IRS program staff when discrepancies were observed. In addition, the store keepers prepared and submitted a comprehensive bi-weekly stock report to the Abt Logistics & Procurement Coordinator. The procurement reports were used to generate aggregated utilization data and helped to determine the quantity needed to order. The reports were important for planning insecticide distribution and provided the status of inventory items, as well as security across the warehouses.

### 3.5 ENVIRONMENTAL COMPLIANCE SUPERVISION

Since the AIRS project must adhere to environmental standards and regulations, the AIRS project worked closely with local EPA officials throughout the spray campaign. Environmental compliance inspections were carried out jointly to evaluate mitigation measures put in place during spray operations. These compliance inspections achieved the following objectives:

- Created a baseline of current compliance activities for the purpose of evaluating improvement in future IRS programs.
- Observed IRS activities in progress to determine and document whether the intervention is in full compliance with USAID requirements as included in the approved SEA.
- Determined, in consultation with EPA officials, the training and support required to improve and ensure future compliance with the SEA.
- Ensured adherence to relevant international rules and regulations, including USA Regulations.
- Ensured accurate record keeping and daily collection of empty sachets.
- Ensured that progressive rinsing methods were used in all spray sites and ensured that leftover insecticide solution was re-used for spraying the next day to prevent environmental contamination.
- Ensured that SOPs, washers, team leaders and supervisors were knowledgeable of the correct way to handle and apply insecticides.
- Ensured that all persons involved in the spraying campaign used PPE at all the times.

The inspecting teams were satisfied with the environmental compliance practices and measures put in place and spraying conducted in the field. No serious issues or adverse events associated with the spray campaign were reported.

# 4. POST-SPRAY ACTIVITIES

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## 4.1 CLOSING OF IRS OPERATIONS

IRS operations officially ended on June 30, 2012. The end of spray review meeting (post spray conference) was held on the first and second week of August 2012. Participants at the meeting included: NMCP, CHT, and selected members from the beneficiary communities (District Commissioners, Superintendents, Clan Chiefs, Youth and Women leaders). The review meetings documented challenges encountered during the spray operations, lessons learned, as well as recommendations to improve implementation during the next spray cycle. The review meetings were used as a forum to discuss and provide feedback on the following topics:

- Recruitment of spray operators and mobilizers, re-training and motivation of spray teams
- Effective mobilization of the communities
- Quality of spraying and data collection
- Preventing pilferage of IRS materials and the role of community leaders
- Effectiveness of the spray campaign and positive feedback

Overall the feedback from the community during the review meetings was that the IRS campaign was received favorably because it contributes to malaria control efforts and it also provides employment opportunities and a source of income for the local community. Community participants reported an immediate impact of IRS including the death of mosquitoes and other insects and one house reported a snake was dislodged from the house after the spray. Participants felt that the awareness campaign was helpful because many misconceptions that community had on IRS were clarified, thus increasing the community's understanding and acceptance of IRS. The community leaders from the Kokoyah district in Bong appreciated the opportunity to provide their feedback on the IRS campaign since it was the first time they attended a meeting organized by the implementing partner to hear the views from the beneficiaries. The community leaders were reminded that community support is important for the overall success of the IRS campaign and that the MOHSW and AIRS Liberia project staff work closely with local authorities when they enter a community. The local authorities serve as host and security for the program.

There is a consensus that spray operators should be recruited from within the communities and local authorities or the Ministry of Internal Affairs should facilitate the process. However, the selection of spray operators should be guided by criteria required by the program. Spray operators should be literate (know how to read and write), preferably with previous experience in IRS, and physical fit to endure spraying operations. Community mobilizers should be recruited among the CHV who support health promotion activities through their CHT.

Overall the awareness campaign and strategy used to disseminate health education related to IRS was received favorably by community members. Community mobilization through house to house awareness campaigns, radio broadcasts, and advocacy meetings with communities were considered the most effective ways to raise awareness and disseminate information on IRS activities. Community leaders complained that some mobilizers did not reach certain remote areas. In some areas the lead time between mobilization and the actual spraying was short and it was suggested that mobilization should start a week before the spray exercise.

The duration of the SOP training and actual operation was considered short and leaders feel that too few spray operators and mobilizers were recruited to work during the campaign. Remuneration for

spray operators was also considered inadequate and it was suggested that incentives such as food or extra cash should be provided to field staff.

Allegations related to insecticide pilferage were raised in the meetings held in Fuamah, Kokoyah and Careysburg. Overall the community leaders agree that such allegation on misuse of insecticide is not good for the program. Several suggestions were put forward to insure proper use of insecticide: community leaders should become good ambassadors of the IRS campaign and should help monitor spraying activities, and spray operators should sign a code of good conduct. In addition, local authorities and the community at large should be vigilant and monitor spray operators to ensure proper insecticide use. If there is evidence that someone misused insecticide, they should be apprehended to aid prosecution of those found misusing insecticide.

## 4.2 LOGISTICS

Prior to end of the spray campaign, the Logistics & Procurement Coordinator embarked on re-orientation of the store keepers on what should be done at the end of spray operation, as well as commodity retrieval mechanisms. The store keepers were all provided with clearance forms which listed project materials with quantities issued to each field staff during the spray period. On the last day of operations, staff that returned all of their materials (especially those which are intended for reuse) were cleared for final payments by the store keepers and team leader or supervisor. All of the retrieved project items from the various operational stores were transported to the central warehouse in Schiefflin.

Table 9: List of materials remaining and estimate of gap needed for the next spray cycle

Item	Unit	Quantity Before the Campaign	Quantity Used	Remaining Stock after Campaign	Quantity Recommended to be Replaced
Insecticide FENDONA	sachets	20,365	20,365	0	-
Insecticide FICAM	sachets	43,544	18,983	24,561	-
Insecticide K-Othrine	sachets	55,069	46,313	8,756	-
Spray Cans (10 liters Hudson)	Pcs	230	230	230	100
Spray Cans (8 liters Hudson)	Pcs	130	130	130	0
Canisters (Hudson)	pcs	100	0	100	0
Overalls	Pcs	1,604	1,495	1,495	0
Rain Boots	Pairs	622	622	622	300
Nose Masks	Pcs	25,628	14,953	10,675	6,000
Hand gloves	pairs	2,032	940	1,092	1000
Backpacks	pcs	655	612	37	600
First Aid Kits	Kits	100	99	1	100
Vitamin "E" Cream	pcs	201	185	16	150
Pregnancy Tests	pcs	200	200	0	200

## 4.3 DEMOBILIZATION AND WASTE DISPOSAL

Retrieved materials transported and stored in the Shiefflin warehouse included Hudson pumps, PPE, used insecticide sachets, unused sachets, and other commodities. Barrels and buckets used for progressive rinsing and washing were also collected and stored during the demobilization exercise. Solid waste from the campaign, including packaging materials, empty insecticide sachets, torn gloves and used disposable nose masks, were packaged in black bin liners, and stored in the central warehouse awaiting incineration. The Environmental Compliance Officer supervised the retrieval of materials used by spray operators that were contaminated with insecticides (empty sachets, hand gloves and nose masks) to ensure that all environmental compliance procedures were followed. A post spray environmental compliance assessment was also completed and documented. All IRS waste was transported to UNMIL property disposal unit on the 16<sup>th</sup> August 2012 and this exercise was supervised by the COP, ECO and an EPA official. On the day of delivery, the waste was stocked in a 20 feet container close to the incinerator and UNMIL staff started burning empty sachets in the presence of the ECO and EPA official. UNMIL disposed the waste bit by bit as the incinerator become available for use. Abt staff were notified on September 12 that all waste was incinerated and we are awaiting the certificate of disposal.

The PMI environmental officer visited Schefflin central ware house on July 3<sup>rd</sup> 2012. Environmental concerns related to stock management, vulnerability to pilferage, flooding, contaminating the environment, accidental poisoning and waste disposal were raised. At the time of visit, the IRS wastes were still at the central warehouse waiting response from UNMIL to help with disposal and the room used for storage of overalls produced a bad odor because of poor ventilation. The IRS wastes were transported to UNMIL disposal unit on August 16 and disposal already started. Ventilation at the Schefflin warehouse was also improved.

Clear instructions on how to deal with fires involving insecticides, and how to clean insecticide spills in the warehouse and vehicles have been prepared and these will be laminated and posted at all warehouses. Concerns were raised on plans to decontaminate the warehouse and the soak pit prior to the end of the lease, so it was recommended that a budget be created for this task. Also, another concern raised dealt with the quality of some of the IRS materials, particularly the cotton nose masks. During the inspection of nose masks, the straps broke off of two masks. The problem with quality of materials procured locally is pointed out in this report (see bullet 7 under the Recommendations section). Verification of insecticide consumption was under taken by comparing information from store keepers and data submitted by SOPs, which was captured on M&E data forms. Store keeper and spray operator data on the number of sachets issued, used and returned were checked and no mistakes were noted.

## 5. ENTOMOLOGY

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The IRS program worked closely with the Vector Control Unit (VCU) of the NMCP and the Liberia Institute for Biomedical Research (LIBR) to provide entomological monitoring of insecticide resistance and quality of spraying. The most experienced among the VCU technicians were engaged in some of the monitoring activities. Sentinel sites representing intervention and control site were selected to monitor mosquito densities, behavior, and insecticide resistance status. Abt developed data collection tools that enabled the collection of PMI entomology indicators.

## 5.1 MONITORING VECTOR DENSITY, DISTRIBUTION AND SEASONALITY

Entomological monitoring was conducted in six selected sentinel sites in four counties. The sites included: Doemah, Bokay, Frank town and Palala as the intervention sites and Firestone Division 43 in Mamba Kaba District, Margibi County and Jiniepita in Jorkole District Bong County as the control sites (**see Map**). Doemah in Mamba Kaba District, Margibi County was sprayed with bendiocarb (Ficam) on the 27th April 2012. Bokay in District # 1, Grand Bassa County was sprayed with pyrethroid (Fendona/K-Othrine) on the 26th April 2012. Frank town in Careysburg District, Montserrado County was sprayed with bendiocarb on 26th April 2012 and Palala in Kpaai District, Bong County was sprayed with pyrethroid (K-Othrine/Fendona) on the 27th April 2012.



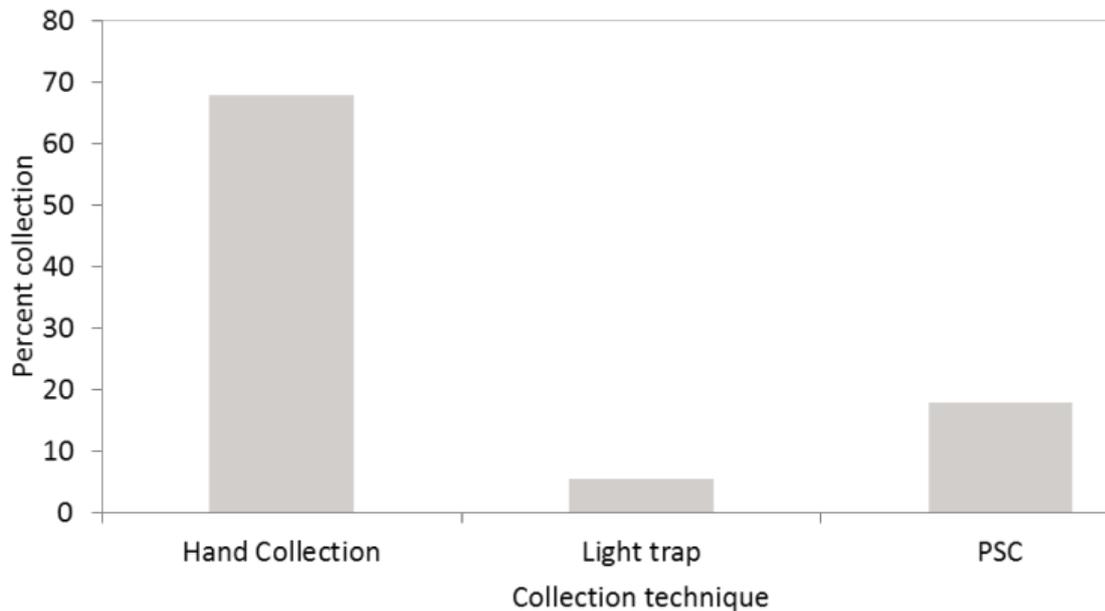
Monitoring of vector densities was conducted for both pre- and post-spray periods. The pre-spray surveillance was conducted in March/ April 2012 and the post spray surveillance was conducted in June 2012. The pre-spray surveillance was conducted in three pre-selected sentinel sites (Doemah, Bokay and Red Hill) while post spray surveillance was conducted in six sentinel sites (Firestone, Doemah, Frank town in VoA community, Bokay, Palala and Jiniepita) as shown on the map. However, Red Hill was discontinued as a sentinel site since it varied significantly from the rest of sentinel sites (details provided in the mid-term entomology report) and it was not further sampled. It was replaced by two control sites in Firestone and Jiniepita. Detailed entomological surveys and resistance monitoring was reported in the mid-term entomological report submitted to PMI on July 23, 2012.

## 5.2 MONITORING VECTOR RESTING/FEEDING BEHAVIOR

The hand catches by aspiration (HCA), light trap collection (LTC) and spray catch collection (PSC) methods were conducted to monitor host seeking mosquito vectors. Comparison of methods for indoor resting mosquitoes in Doemah's Towns suggests hand collection was the most productive, catching good numbers of mosquitoes (**see Figure 1**).

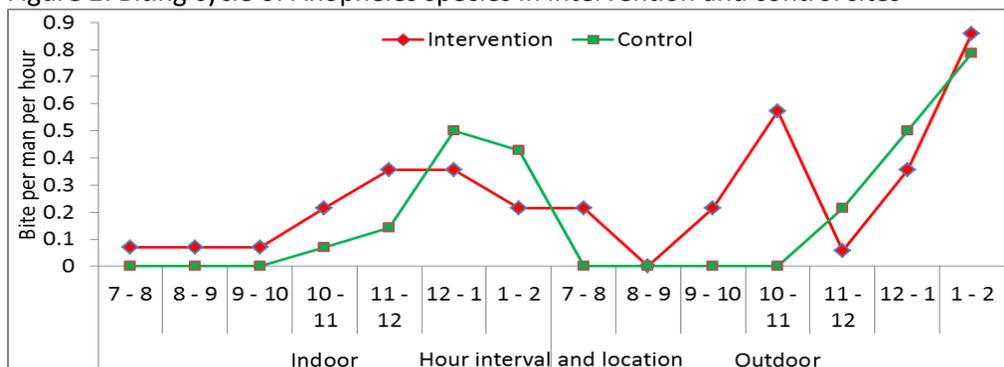
Hand catches through aspiration for indoor resting mosquitoes provided good results in Doemah and Red Hill and poor results in Bokay. However, this technique posed challenge due to lack of adequate experience with some collectors. With a requirement that sampling be conducted within a given time span, not past noon, it was not feasible to use this technique post spray. A total of 20 houses were sampled using this method, 10 in Doemah and 10 in Red Hill respectively.

Figure 1: Comparison of three collection techniques for indoor resting mosquitoes in Doemah



Human landing collections to monitor mosquito biting time/pattern were conducted in three intervention sites (Bokay – K-Othrine site, Frank town – bendiocarb site and Palala – K-Othrine site) and two control sites. A total of 100 host seeking anopheline mosquitoes were captured both indoors and outdoors from the five monitored sites. Pooled data show that intervention sites had higher (68%) outdoor host seeking vectors than control sites (60%). Indoor host seeking vectors were 31% and 40% for intervention and control sites respectively (see Figure 2).

Figure 2: Biting cycle of Anopheles species in intervention and control sites



## 5.3 VECTOR SUSCEPTIBILITY AND RESIDUAL EFFICACY

Cone wall bioassays to assess the quality of spraying and decay rate of insecticides were conducted in the four intervention areas between 20 days and two months post-spraying. Both wild caught indoor resting adults and those reared from field collected larvae were used in the bioassay. The wild caught *Anopheles gambiae* mosquitoes were collected by indoor resting hand catches in Firestone Division 43 (control site). Larvae were collected in breeding habitats in Margibi County (Schefflin, Doamah's Town and RIA), then transported to the insectary at LIBR and reared to adult mosquitoes, which were used for bioassay tests. Between 10 to 15 adult female mosquitoes, aged 2 to 5 days, were confined in WHO conical transparent chamber fastened on either sprayed (test exposure) or unsprayed (control exposure) wall surfaces using adhesive tapes for 30 minutes. After expiry of exposure time (30 min), the knocked down mosquitoes were counted and recorded, then transferred to holding paper cups. Then the mosquitoes were provided with 10% sugar solution soaked in cotton wool and the knocked down and dead mosquitoes counted after 60 minutes and 24 hours holding times respectively. The cone bioassay test mortalities in Doemah and Franktown were above 90% which, according to WHO standard, suggests good quality spraying and that mosquitoes are susceptible to the insecticide (a carbamate) used (see Table 10).

Table 10: Cone bioassay 24-hour mortality rates of *An. gambiae* after exposure for 30 minutes on sprayed walls

Site	Insecticide	Days post spray	No mosquitoes tested	24 hrs % test mortality	Total control	24 hrs % control mortality
Doemah	Bendiocarb	10	99	95.2	20	10.0
Frank	Bendiocarb	60	97	92.8	10	0.0
Doemah	Bendiocarb	60	105	67.6	10	0.0
Bokay	K-Othrine	18	154	10.4	30	3.3
Bokay	K-Othrine	60	101	1.0	10	0.0
Palala	K-Othrine	60	109	5.5	10	0.0

<sup>1<sup>st</sup></sup> bioassay in Doemah was done on 5/7/12 and <sup>2<sup>nd</sup></sup> on 7/3/12. In Bokay <sup>1<sup>st</sup></sup> bioassay was on 5/12/12 and <sup>2<sup>nd</sup></sup> on 6/25/12. In Palala was done on 6/29/12 and in Frank town on 6/26/12

Mortality rates in Bokay and Palala, two areas sprayed with K-Othrine and Fendona insecticides, were below 20%. Low mortality in Bokay/Palala could be attributed to either vector resistance to the pyrethroid insecticide used or poor quality of spraying. The results should be interpreted with caution because mosquitoes used for cone bioassay in Bokay / Palala were collected from Schefflin and Doemah in Margibi County. Exposure of local mosquitoes to nearby sprayed walls will give a better indication of the effect of spraying on the local mosquito population. Nevertheless, the contribution of poor quality of spraying to the observed low mortality rates could not be ruled out. Operations increased supervision and onsite training to ensure spraying was done properly.

The WHO tube test for susceptibility for mosquitoes sampled from Schefflin and Doemah showed mortality rates of 60% and 77% against deltamethrin treated filter paper (see Table 11). The mortality rates were low compared to the acceptable threshold of 90% and since the diagnostic concentration has been set at twice the minimum concentration that kills 100%, the observed mortalities of 60% and 77% suggest possible resistance of local *An. gambiae* s.l. against deltamethrin, but more data points are needed to confirm resistance and determine spatial distribution. It is recommended that the IRS Task Force review these and upcoming susceptibility results when selecting the insecticide which will be used for spraying in 2013.

Table 11: Mortality rates of *An. gambiae* s.l from two districts after WHO tube susceptibility test against cypermethrin and deltamethrin.

District	Insecticide tested	Tested	24 hrs % test mortality <sup>1</sup>	Total control	24 hrs % control mortality
Careysburg	Deltamethrin 0.05%	73	60.4	20	10
Mamba Kaba	Deltamethrin 0.05%	50	76.7	20	15
Mamba Kaba	Cypermethrin 0.5%	100	94.4	20	10

<sup>1</sup>Abbot corrected mortality. Susceptibility tests were done on 5/18/12 and 5/19/12

## 6. MONITORING AND EVALUATION

### 6.1 APPROACH AND KEY OBJECTIVES

The implementation of the AIRS Project in Liberia adopted the lessons learned from other countries, as well as those learned from the previous IRS implementer in Liberia to:

- Emphasize accuracy of both the data collection and the data entry process through comprehensive trainings and supervision at all levels
- Streamline and standardize data flow to minimize errors and facilitate timely reporting
- Ensure IRS data security and storage for future reference through establishment and enforcement of proper protocols.

### 6.2 M&E TRAINING

Early in 2012, the Abt home office held a regional training for M&E Managers and Operation Managers in Tamale, Ghana. During the training, M&E tools were standardized for AIRS but also customized to country-specific situations, to ensure high-quality and consistent data collection and data recording.

Additionally, ample time was devoted to the monitoring and evaluation portion of the TOT trainings for spray operators and mobilizers. Major topics covered during the trainings included:

- defining and understanding key definitions, like “household” and “eligible structure”
- completing the data collection tools and the IRS card
- responsibilities of M&E and Database Managers
- importance of accurate documentation of data
- data flow
- data security protocols

The AIRS Liberia Database Manager later trained the data entry clerks on the AIRS Microsoft Access database, as well as on identifying errors on data collection forms before entry into the database.

### 6.3 DATA FLOW

The data flow begins with mobilizers visiting communities to provide education about the IRS campaign, to disseminate an IRS Household Card, and to collect demographic information about the residents living in each eligible structure for spray. Mobilizers record the data on the IEC/BCC Mobilization Form and IRS Regional Coordinator delivers the forms to the data entry center. The IRS

Card serves as a reference document during spray operations and is used by SOPs and supervisors during spot checks to verify spray data.

Spray operators are the custodians of the primary data collection tool, the Daily Spray Operator Form, and collect several data points about the residents of both sprayed and unsprayed structures. Team Leaders are responsible for verifying daily each spray operator form and submitting them to their supervisors, who then do the same. Subsequently, correct spray forms are delivered to Regional Coordinators to transmit to the data center. Finally, the data are reviewed by both the Database and M&E Managers and handed to the data clerks for entry into the database.

The Liberia AIRS project used the AIRS Microsoft Access database that has the capability to provide real-time updates on mobilization and spray operations. Abt's Client Technology Center (CTC) developed the database and its accompanying software and provided remote support to the M&E Team before, during and after the spray campaign. Electronic data are secured by a daily backup process initiated by data clerks and verified by the Database Manager.

## 6.4 SUPERVISION/DATA QUALITY

As noted in Section 6.3, each IEC/BCC Mobilizer Form and Daily Spray Form was verified by respective team leads and supervisors for data collection and arithmetic accuracy before being delivered to the data center. In the event that forms were being submitted to the data center with errors not identified by field supervisors, the M&E Manager visited the field staff to reinforce the correct data collection method and address reporting inconsistencies that arose. In addition to field supervisors, the M&E Manager, the Database Manager and the data entry clerks also review each form for accuracy before data were inputted into the database. AIRS staff used quality control checklists to help identify errors and ensure forms were completed accurately. Verification and supervision was also conducted by NMCP and local officials.

Additionally, two types of random spot checks were conducted to ensure data quality: (1) Team Leads and supervisors conducted field checks on a sample of spray forms to verify the data collected are true to what happened in the field, and (2) the M&E Manager and Database Manager performed random checks on a sample of forms to ensure the data from the forms matches the data entered into the database. Finally, the AIRS Microsoft Database was built to incorporate data verification fields and pop-up error messages to prevent typos and data entry error.

Of the approximately 8,000 paper forms filled by the mobilization team, 50% of these forms were checked daily, while between 75 – 100% of the 10,000 spray operators forms were checked daily. At data processing center in Monrovia 100% of all the forms entered into the database were checked before database entry was made.

## 6.5 REPORTING

During the spray campaign, a total of thirteen weekly spray progress reports were prepared and submitted. The weekly report included data for all core indicators, as well as other data points of interest, which helped track spray activity and spray operator progress.

The first spray round was completed successfully with a spray coverage of 98% (96,901/99,236). A total of 869,707 people were protected, covering 47,786 pregnant women and 145,845 children under 5 years (**Table 12**). Residents reported 83,146 total available mosquito nets, with 23,454 of pregnant women and 43,224 of children under 5 years sleeping under a net (“last night”) (**Table 12** and **Figure 3, 4, 5 & 6**).

In total 81,691 sachets of insecticide were used for the spray campaign, and on average, 1.2 structures were sprayed per sachet. Each spray operator used an average of 6.6 sachets of insecticide per work day. The average spray performance was ~8 structures per spray operator per day (it ranged from 6.5 for Mamba Kaba to 9.4 and 11.6 for District # 4 and Yekepa, respectively). Please refer to **Table 13** for more details.

Table 12: Spray coverage and population protected by district

County	District	Structures Found	Structures Sprayed	% Structure Sprayed	Population Protected	Population Not Protected	% Population Protected	Pregnant Women in Sprayed Structures	Children <5 in Sprayed Structures	Mosquito Nets		
										Total Available	Pregnant women sleeping under nets	Children <5 sleeping under nets
Montserratado	Careysburg	9,411	9,103	97	75,875	2,028	97	3,687	11,917	5,288	1,814	2,951
Margibi	Mamba Kaba	12,575	12,441	99	106,987	558	99	5,394	14,538	21,147	3,617	8,611
Grand Bassa	Compound #1/ Worr	17,377	16,714	96	143,842	5,863	96	7,996	24,180	5,522	2,124	3,101
	District # 2	11,369	10,788	95	83,304	4,356	95	5,954	15,014	6,404	2,287	3,564
	District # 3 a&b	11,044	10,936	99	106,825	666	99	6,709	21,341	14,702	4,948	8,902
	District # 3 c	1,525	1,522	100	13,569	34	100	1,094	2,716	2,591	775	1,348
	District # 4	5,472	5,432	99	47,179	284	99	2,554	7,664	2,255	793	1,251
Bong	Neekreen/ Buchanan/ Commonwealth	10,219	10,141	99	107,540	809	99	5,447	15,741	7,036	2,025	3,787
	Fuamah	6,553	6,410	98	52,408	602	99	2,901	9,483	5,395	1,655	2,841
	Kokoyah	4,247	4,201	99	36,360	343	99	1,783	7,412	2,087	724	1,371
	Kpaai	5,299	5,097	96	55,970	145	100	2,444	9,159	6,435	1,421	2,999
	Panta	3,297	3,268	99	33,932	243	99	1,723	5,927	3,854	1,217	2,178
Nimba AML	Yekepa AML	848	848	100	5,916	-	100	100	753	430	54	320
	<b>Total</b>	<b>99,236</b>	<b>96,901</b>	<b>98</b>	<b>869,707</b>	<b>15,931</b>	<b>98</b>	<b>47,786</b>	<b>145,845</b>	<b>83,146</b>	<b>23,454</b>	<b>43,224</b>

Table 13: Insecticide consumption & performance of spray operators

Districts	Structures Sprayed	Insecticide consumption			Spray Performance		
		Sachets Issued	Sachets used	Lost / damaged	Structure / Sachet	Structure / SOP	Sachets / SOP
Careysburg	9,103	9,000	8,842	0	1.03	7.9	7.6
Mamba Kaba	12,441	11,740	10,643	0	1.17	6.5	5.5
Compound # 1/Worr	16,714	11,745	11,471	0	1.46	8.6	5.9
District # 2	10,788	10,352	9,604	0	1.12	7.2	6.4
District # 3 a&b	10,936	10,383	10,316	0	1.06	8.4	7.9
District # 3 c	1,522	1,240	1,240	0	1.23	7.2	5.9
District # 4	5,432	3,883	3,830	0	1.42	9.4	6.6
Neekreen/Buchanan/ Commonwealth	10,141	8,368	8,247	0	1.23	6.9	5.6
Fuamah	6,410	6,097	5,908	0	1.08	6.5	6
Kokoyah	4,201	3,444	3,440	0	1.22	7.7	6.3
Kpaai	5,097	4,446	4,426	0	1.15	7.8	6.7
Panta	3,268	3,165	3,155	0	1.04	8	7.8
Yekepa AML	848	1,024	569	0	1.49	11.6	7.8
<b>Grand Total</b>	<b>96,901</b>	<b>84,887</b>	<b>81,691</b>	<b>0</b>	<b>1.2</b>	<b>7.9</b>	<b>6.6</b>

As part of our weekly reports, we provided a visual calculating the current spray progress (**Figure 3**), which shows cumulative structures found (by spray operators) and cumulative structures sprayed compared with the estimated number of target structures (derived from the 2011 campaign.)

Figure 3: Spray progress for the 13 week campaign

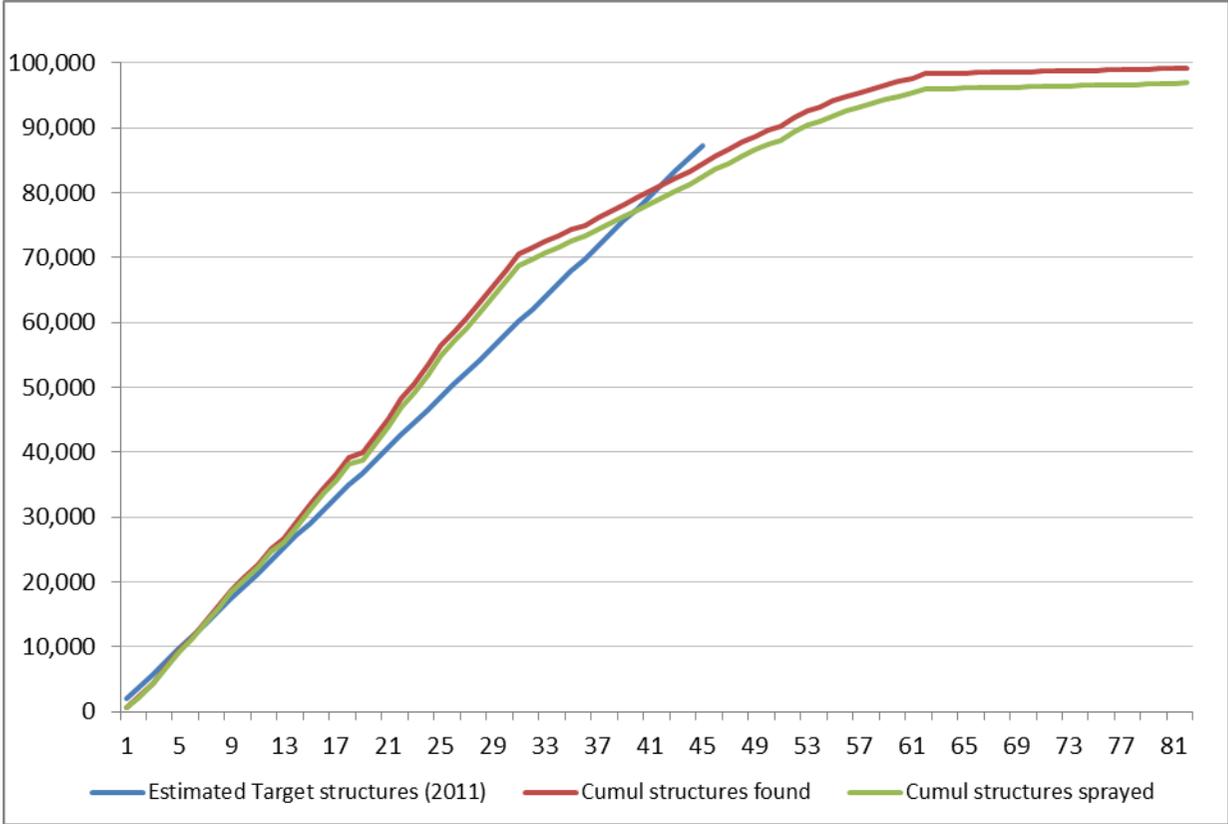


Figure 4: Number of ITNs reportedly available, by vulnerable group and district

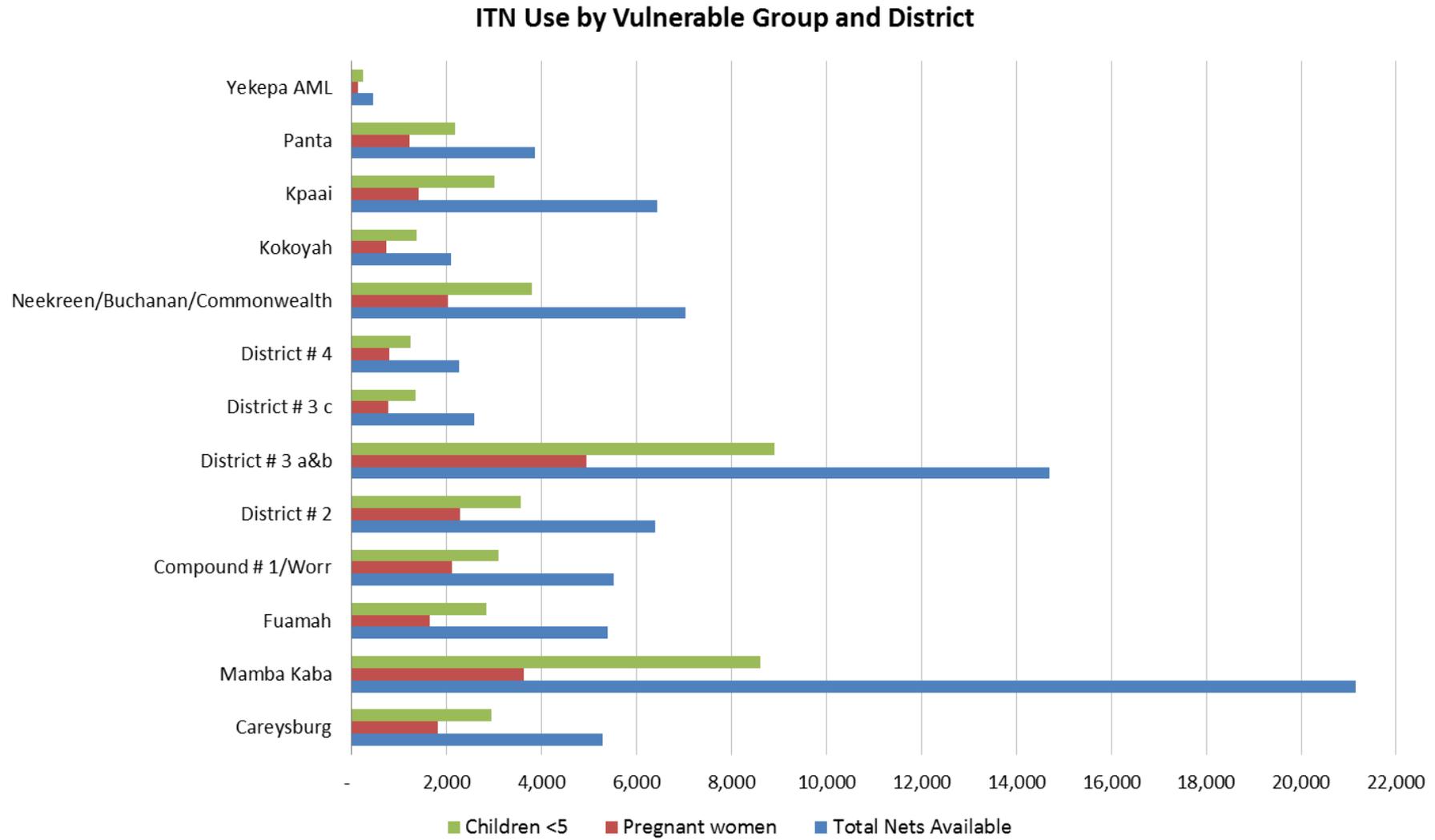


Figure 5: ITN use compared to population protected among pregnant women

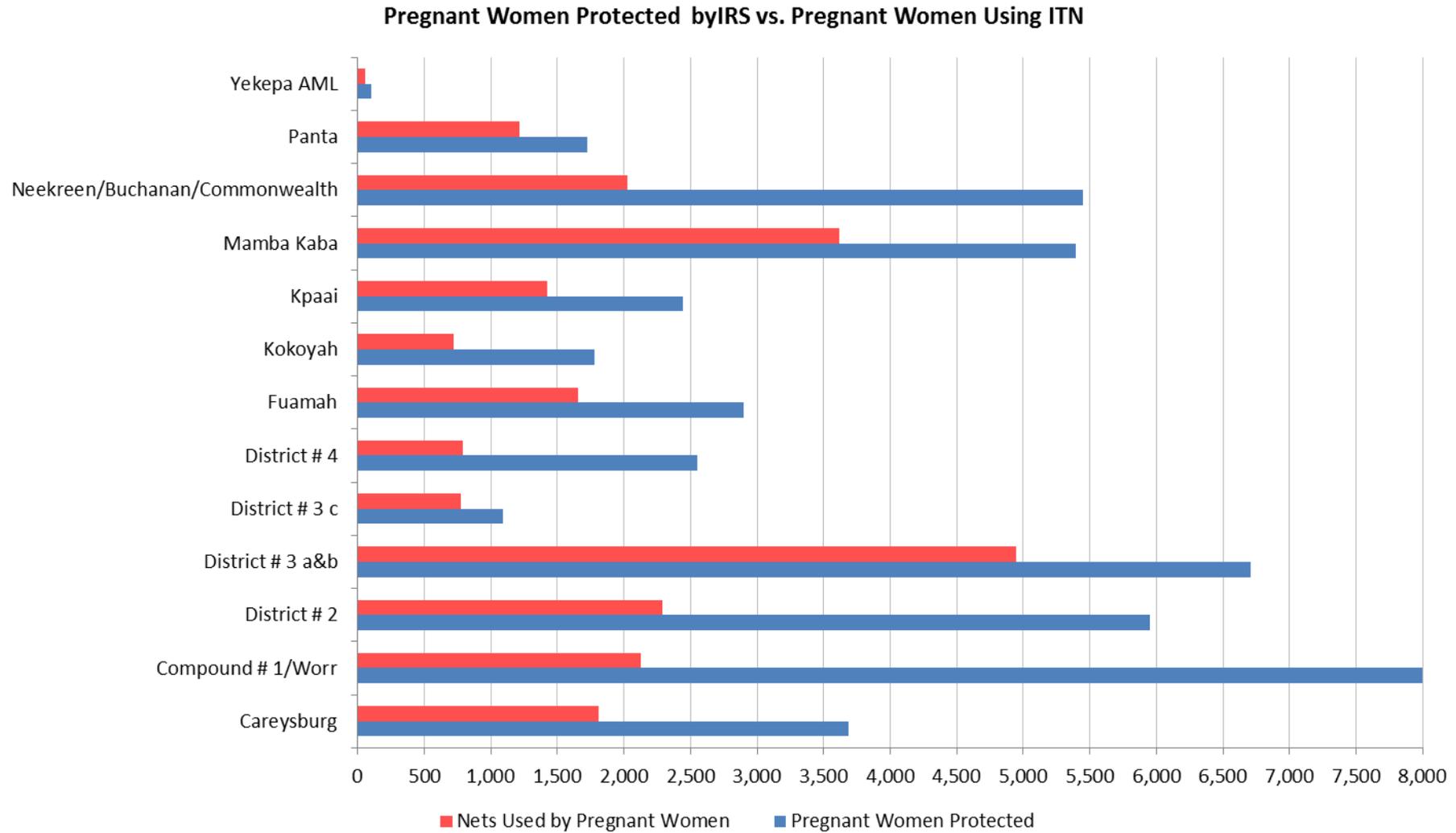
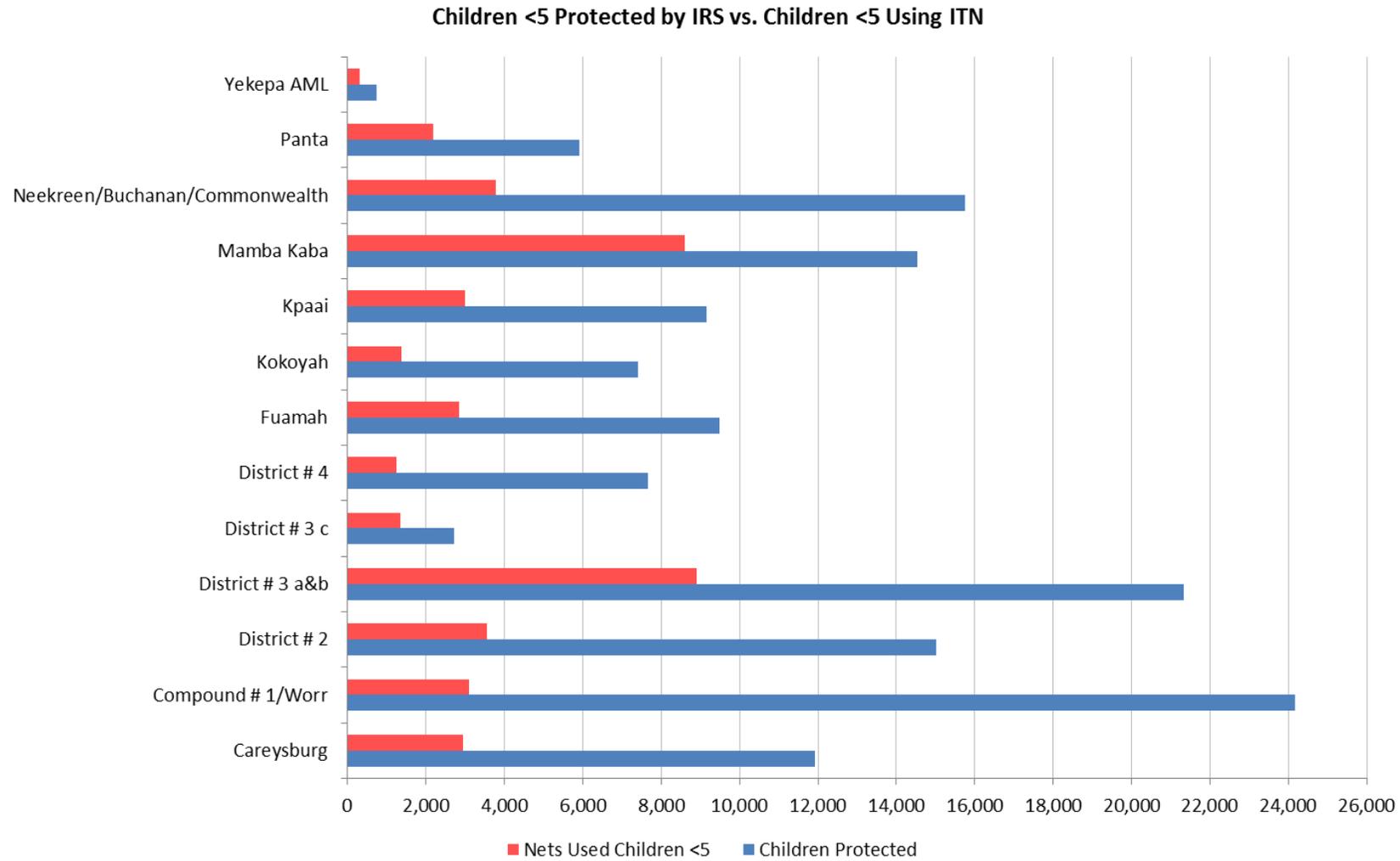


Figure 6: ITN use compared to population protected among children under 5 years



# 7. FINANCE AND PAYMENT STRATEGIES

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Adequate and timely financial planning is an essential component of IRS malaria programs. Successful IRS implementation requires team work involving experienced technical experts and operational teams to develop good operational and budget planning, and timely availability of funds to ensure smooth operations.

The Liberia F&A unit and home office worked closely with the technical and operational teams to budget for the project according to the work plan and to determine monthly financial needs and prevent cash flow bottlenecks. Given the remoteness of some of the Liberian communities and the absence of banking facilities in these communities, coupled with interest of ensuring transparency and accountability, the project established a system wherein the field workers were paid at the end of each contracted period. The finance team organized an on the spot paying system in the presence of the local officials in the various communities. On pay day, each field staff produced the contract he/she signed with the project and their identity was verified onsite by the supervisor.

# 8. CHALLENGES, LESSON LEARNED AND RECOMMENDATIONS

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The following are challenges, lessons learned, and recommendations which were identified by the AIRS project team throughout the process of spray implementation:

## 8.1 CHALLENGES

1. **Short lead time for spray operations preparation:** The Liberia office and staffing was finalized in January and February which left the team with very little time to plan and conduct pre-spray activities. This problem is unlikely to happen again because Abt is now fully operational in Liberia.
2. **Coordination with NMCP and MOH officials:** The short lead time for preparation and operation of first cycle of IRS meant that a lot of activities were to be completed within a very short time. The project team had to move very fast with planning and implementation of the activities and it was difficult in certain situations for NMCP and MOH officials to keep pace.
3. **AIRS Project Database deployment:** The AIRS Project database was deployed a few days after the mobilization by the mobilizers started. This did not give much time for familiarization and rigorous testing to inform repairs that would make for smooth use of the database. This resulted in having to do some manual counting in order to provide tentative reports. One of the challenges was the inability to track structure details disaggregated by districts. Remedial measures taken included: an increase in field supervision, sharing information on the M&E problem with staff members so that they could solve these

problems when encountered in the field, and re-training of field staff whenever problems were detected during supervision.

4. **Entomology:** Lack of a functional insectary to rear mosquitoes, lack of a sufficient preparatory phase for collection of baseline data, and the limited expertise of the NMCP – VCU staff were major challenges.
  - Lack of a functional insectary to rear and maintain mosquitoes affected aspects of work that required use of large number of mosquitoes, such as testing for insecticide susceptibility, quality control, and insecticide decay rates on the sprayed walls. The project is currently using the insectary located at LIBR. Long distance (70 km one way) from LIBR to NMCP or Abt office is a challenge because it limits movement of staff who are supposed to visit and maintain the facility.
  - Insufficient preparatory phase for entomological baseline data collection: Pre-spray data collection should have been done at least one or two months before the start of spraying, but it was conducted 3 weeks before the start of spraying. This did not give sufficient time for determining which mosquito collection method was efficient and suitable for the Liberia setting. Previously, only three sentinel sites had been picked and one site was not suitable at all for entomological monitoring of the malaria situation. This meant that no meaningful data were acquired from that site; all was due to limited time to plan for entomological monitoring for IRS.
  - Lack of requisite expertise among individuals from the collaborating partner the NMCP and the general challenge of finding people trained in entomology. For instance, sampling mosquitoes using aspiration was the most efficient method to collect indoor resting mosquitoes, but most field staff members do not have experience with this technique and the technique was not used in subsequent surveys after the baseline data collection. Pyrethrum spray catches, the second best method, was used instead because using aspiration would have required more time sampling while the team was already faced with time limitations.
5. **Availability of water:** Water for IRS operations proved to be a challenge in some operational sites for various reasons. In some sites, the water source (wells and streams) dried up due to prolonged dry season. In some others, the local authorities had given assurance that they were going to provide water but disengaged mid-way due to acute water scarcity, a result of prolonged dry season.
6. **Bad road network and poor infrastructures:** Reaching some communities proved to be challenging, particularly those in Bong County where rivers needed to be crossed by canoe. The poor road network was a challenge during operations particularly in Grand Bassa and Bong Counties. In order to reach certain operation sites, it required travelling long distances, at times going through other districts. This was particularly pronounced in Faumah, Bong County and Compound, District #3c in Grand Bassa. In several districts the program could not secure a standard house to be used for a warehouse, so the project renovated storage facilities. The local vehicle rental companies own old and heavily used vehicles. Some of these vehicles were unreliable leading to frequent break downs in the field.
7. **Field workers welfare and payment modalities:** The field workers were of the opinion that their daily remuneration should be increased from 10.00USD. This occasionally affected their motivation for work. The project was forced to pay field workers in cash because of limited banking facility and lack of alternative means of delivering finances to rural operational sites in rural areas. All necessary precautions were taken to minimize risk associated with cash payment and to confirm the identity of field staff receiving payments.
8. **PPE concern:** Inadequate numbers of overalls and boots caused some spray operators to wait for other operators to complete their task before the commencement of their daily task. Some of the overused PPE were ineffective, posing as a risk to spray operators. In order to alleviate the problem, 50 overalls and 10 pairs of boots were bought.

9. **Training period:** The project's strategy was to recruit field staff with previous experience in IRS, who were then re-trained for 3 days. The NMCP complained the days allocated to training at the district level was insufficient, especially for those with no prior IRS experience. During the re-training exercise, all potential field staff with no prior experience in IRS were identified and given an extra day of coaching to bring them up to speed.
10. **Poor community compliance in some areas:** The head of households in certain communities were reluctant to move their property outside even when mobilizers and spray operators were willing to assist; some refused spraying because they thought Abt was responsible to also distribute mosquito nets. The communication units of Abt and NMCP intervened by holding meetings with community leaders and aired radio broadcast to clarify the situation, eventual the problem was solved.
11. **Low capacity of seasonal workers:** Overall the capacity of seasonal workers was low due to the high illiteracy level in Liberia, which is a result of 14 years of civil war. As most of the IRS field workers are supposed to come from within the communities, it was difficult to get people with the required background to work on the project. This also became a political issue as most of the community leaders and local authorities insist on having people from their own communities working for the project.
12. **Private sector initiative:** Arcelor Mittal (AML) is the only private company that participated in the first cycle of the IRS campaign on a cost sharing basis. The spray campaign at AML took longer than expected because the company allocated very few spray operators (five) so it took 20 days to spray only 881 structures.
13. **Finance & administration staffing:** Since our Finance and Administration Manager was not compliant with finance procedures and impeded the timeliness of activities during spray operations preparation, the project was forced to release him, bring in a staff member from Bethesda to fill in, and re-hire.

## 8.2 LESSON LEARNED

1. **M&E:** The finalization of all the requisite tools (data collection, database) in advance of the commencement all spray activities is important. Clear data movement protocols and requisite logistics should be in place to ensure smooth entry and timely reporting. Late deployment of the database leads to a rushed approach to data entry and collection, thereby leading to unforeseen complications when using an untested database.
2. **Supervision:** Effective supervision is strategic to IRS implementation irrespective of the level of experiences, training, and knowledge level of the teams.
3. **Agreements:** Finalization of MOU, structure definition and other documents required to guide IRS implementation are critical to the success of operation.

## 8.3 RECOMMENDATIONS

1. **Timing of operations:** Spraying should begin earlier before the raining period and activities should start from the inaccessible communities. In particular, the next spray cycle should commence after the rains, preferably in early October, 2012.
2. **Stores to support operations:** Long-term contract should be entered into with the warehouse owners to guarantee sustainable usage of the warehouses.
3. **Supervision and monitoring:** Rigorous supervision and monitoring of operations, as well as M&E activities should be routine, especially at the beginning of a spray cycle and during the entire spray period. Whenever problems are discovered then onsite training should be provided. We experienced frequent breakdown using locally hired vehicles. The project has

one reliable Toyota Land Cruiser (4x4), but this vehicle is not adequate to support both field work and office errands. Therefore, it is recommended that another vehicle be procured.

4. **Insectary:** Measures to improve the insectary facilities at LIBR were instituted this included the installation of a battery powered back up system. Procurement of a humidifier for use in the insectary is also recommended. Despite this investment, the LIBR insectary is not yet fully functional and the long distance to reach the facility is a big concern. It is recommended that a new mobile insectary be created which should be located close to NMCP/ Abt office for easy access and maintenance. A fully functional insectary equipped with temperature control equipment is needed in order to be able to establish and maintain mosquito colony required for quality assurance and resistance monitoring as well as training of entomologists.
5. **Entomology staffing:** In order to maintain a mosquito colony insectary technicians need to be recruited and stationed at the insectary facility. Abt's Technical manager will continue mentoring and conducting on the job training of VCU/NMCP staff to improve competence in various entomological techniques.
6. **Resistance monitoring:** Earlier results of cone and tube bioassays on local mosquitoes suggest possible resistance to deltamethrin. More susceptibility bioassay data is needed in order to confirm resistance.
7. **Suppliers of IRS materials:** Adequate stock of M&E forms, especially the Malaria Service Cards should be maintained during mobilization to avoid stock-out. In part, supply of M&E forms were hampered by low capacity of the supplier. In the next spray cycle measures will be taken to solve this problem. Also, some of IRS materials produced locally were of poor quality. For the next spray cycle, vendors will be required to submit samples of materials for quality testing before purchase.
8. **Monitoring project performance:** Timely submission of field reports, field workers timecards and data summary is important to monitor progress of spray activities, and timely payment of field workers is important.
9. **Human resources:** Given high illiteracy in Liberia, there is need to continue training to build capacity of field staff at all levels of IRS operation. This also means supervision and monitoring of field activities should be enhanced. IRS training curriculum for field staff should include an examination to assess background knowledge, critical thinking skills, and ability to perform simple arithmetic. Recommendation of field workers should come from community leaders but selection should be based on recruitment criteria of the project.

ANNEXES

Annex 1: Summary of susceptibility test data conducted under RTI (2011)

	County	replicate	Lambdacyhalothrin		Bendiocarb		Fenitrothion		
			# Anopheles exposed	% corrected mortality	# Anopheles exposed	% corrected mortality	# Anopheles exposed	% corrected mortality	
Tests were conducted in May 2011	G Bassa	Replicate 1	20	90	21	94.5	21	95.5	
		Replicate 2	20	89	20	94.5	20	100	
		% Mean mortality	90		95		98		
		Status	P		P		S		
	Margibi	Replicate 1	24	92	20	100	22	100	
		Replicate 2	21	90	20	100	23	100	
		Replicate 3	21	90	20	100			
		Replicate 4	21	100					
		% Mean mortality	93		100		100		
	Status	P		S		S			
	Monsterrado	Replicate 1	19	89	20	100	20	100	
		Replicate 2	20	85	19	100	25	100	
		Replicate 3	25	86	21	95	26	100	
		Replicate 4	24	89	25	100	25	100	
		% Mean mortality	87		99		100		
		Status	P		S		S		
	Tests were conducted in Sept 2011	Bong	Replicate 1	20	77	22 79		19	100
			Replicate 2	24	86	18	87		
Replicate 3			21	84	20	88			
% Mean mortality			82		85		100		
Status			P		P		S		
Nimba		Replicate 1	20	88	20	100			
		Replicate 2	21	89	20	100			
		% Mean mortality	89		100				
		Status	P		S				

**P (yellow)** – Possibility of resistance; **S (green)** – Susceptible

Annex 2: Wall Bioassay tests data conducted under RTI (September 2011)

Site	Insecticide used	Date IRS	Wall substrate	Period post IRS	Corrected Average % Mortality
<b>Monsterrado; Caresburg</b>	Bendiocarb	09-May-11	Mud	4½ Months	66.67
		09-May-11	Mud	4½ months	70.00
		09-May-11	Mud	4½ months	68.89
		09-May-11	Mud	4½ months	73.33
<b>G-Bassa Eye to Eye</b>	Deltamethrin	5-April-11	Concrete	5 months	76.67
		5-April-11	Mud	5months	77.37
		5-April-11	Mud	5 months	90.00
		2-April-11	Mud	5 months	84.52
		2-April-11	Mud	5months	80.66
<b>Margibi county, Mamba kaba District; Schieflin</b>	Alphacypermethrin	27-Apr-11	mat	5 months	73.13
		27-Apr-11	Concrete	5 months	80.54
		27-Apr-11	mat	5 months	70.00
		27-Apr-11	mat	5 months	74.00
<b>Margibi county, Mamba kaba District; Charlesville</b>	Alphacypermethrin	27-Apr-11	Concrete	5 months	80.00
		27-Apr-11	mat	5months	74.00
		27-Apr-11	Concrete	5months	80.00
<b>Bong, Wolota District; Swahta Village</b>	Bendiocarb	23-Sep-11	Mud	1 day	100
		23-Sep-11	Mud	1day	100
		23-Sep-11	Cement	1 day	96.3
		23-Sep-11	Mud	1 day	96.30
<b>Bong, Kpai District; Yopea Village</b>	Bendiocarb	27-Sep-11	Mud	1 day	100
		27-Sep-11	Mud	1 day	100
		27-Sep-11	Mud	1 day	100
		27-Sep-11	Mud	1 day	100

Annex 3: IRS Trainees, by role and gender

Persons Trained	Training on IRS Delivery						Other Trainings							
	Training of Trainers		Spraying Operations		Data Capture		IEC/BCC Mobilization		Overalls Washing & General cleaning		Security		Transport Security	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Mobilizers	17	1												
Supervisors	40	6												
Spray Operator			518	101										
Data entry clerk					10	2								
Store keepers	8	10												
Pump Technicians	3	0												
IEC Mobilizers							265	75						
Team Leader							42	4						
Supervisor														
Washers									19	59				
Janitors									3					
Security											72	0		
Drivers													42	0
Dispatchers													3	
Conveyors													14	1
<b>TOTAL M/F</b>	<b>68</b>	<b>17</b>	<b>518</b>	<b>101</b>	<b>10</b>	<b>2</b>	<b>307</b>	<b>79</b>	<b>22</b>	<b>59</b>	<b>72</b>	<b>0</b>	<b>59</b>	<b>1</b>
<b>TOTAL</b>	<b>1315</b>													

Annex 4: Environmental Compliance field assessment and maintenance of warehouses and soak pits

<b>District</b>	<b>Site Location</b>	<b>Facilities (Warehouse/Health Center/etc)</b>	<b>Site Refurbished (soak pit, warehouse, fencing, etc)</b>
Panta	Garmu	Warehouse/Health center	Crush rocks added and soak pit fenced
Kpaai	Zowienta	Warehouse/Health center	Crush rocks added and soak pit fenced
Fuamah	Hindi	Warehouse/Health center	Site reconditioned, crush rocks added and soak pit fenced
Careysburg	Careysburg	Warehouse/Health	Fenced soak pit, water wells serviced and crush rocks added
Kokoya	Botota	Warehouse/ Health ce	Fenced soak pit
Mamba kaba	Scheffellin	warehouse	Site reconditioned, crush rocks added, water wells serviced, store room windows fixed, and soak pit fenced. Gates are in tact
District 3a&b	Compound 3	Warehouse/ health facility	Crush rocks added and soak pit fenced
Compound 4	Compound 4	warehouse	Crush rocks added and soak pit fenced
Commonwealth	Nekreen	warehouse	Crush rocks added and soak pit fenced
Compound 2	St. John	Warehouse/ Health center	Crush rocks added and soak pit fenced
Compound 2	Camwood	Warehouse/ health facility	Crush rocks added and soak pit fenced
District 1	Compound # 1	Warehouse	Crush rocks added and soak pit fenced
District # 3c	Gardour's town	Warehouse/ health facility	Crush rocks added and soak pit fenced
Worr District	Jacob Larteh's town	Warehouse/ health facility	Crush rocks added and soak pit fenced

Annex 5: Summary of Radio Talk shows / programs broadcasted during the IRS campaign

County / District	Radio Station/ Frequency/ Duration	Affiliation of Participants	Date 2012	Comments
Grand Bassa / N0.3	LAC Radio 92.5 45 minutes	IEC Coordinator NMCP IEC, Officer Abt Associates	March 27	Callers complained of inconvenience of carrying things in and out, SOPs spraying over diluted insecticide, IRS bringing more mosquitoes; a single caller called to praise the IRS team
Grand Bassa / Buchanan	Radio Gbezon 106.3 1 hour	IEC Coordinator NMCP IEC, Officer Abt Associates	March 26	Callers said IRS brings more mosquitoes in the house
Grand Bassa / Buchanan	Radio Dukpa 89.1 1 hour	IEC Coordinator NMCP, IEC Officer Abt Associates	March 26	
Grand Bassa / N0.3	LAC Radio 92.1 1 hour	IRS Coordinator NMCP, IECBCC Officer Abt Associates, Sop supervisor	April 27	
Grand Bassa / Buchanan	Radio Gbezon 106.3 1 hour	IRS Coordinator NMCP, IECBCC Officer Abt Associates, Sop supervisor	April 26	
Grand Bassa / Buchanan	Radio Dukpa 89.1 1 hour	IRS Coordinator NMCP, IECBCC Officer Abt Associates, Sop supervisor	April 27	
Margibi / Kakata	Atlantic Radio 1 hour	DHO Mamba Kaba, IEC Officer Abt Associates	March 21	
Margibi / Kakata	Radio Kakata 104.6 1 hour	DHO Mamba Kaba, IEC Officer Abt Associates	March 21	
Margibi / Firestone	Radio Firestone 89.5 1 hour	IEC/BCC Officer Abt Associates	March 28	
Margibi / Firestone	Eagle FM 101.1 1 hour	IEC/BCC Officer Abt Associates, SP supervisor, Mobilizer supervisor	March 29	Callers asked why they did not receive mosquito nets, and if they still need to sleep under LLIN after their houses had been sprayed.
Margibi / Firestone	Eagle FM 89.5 1 hour x 7days			IEC Officer wrote a radio announcement clarifying issues on LLIN distribution in Cotton Tree and Dolo Town which the station read for a week
Bong / Suakoko	Radio Gbarnga 96.5 1 hour	Malaria Focal person Bong County, IEC Officer Abt Associates	March 22	Callers wondered why we were spraying only a few districts and not the whole of Bong County.
Bong /	Palala Radio	IRS Coordinator NMCP	May 3	

Kpail	104.1 1 hour	Mobilizer supervisor, IEC/BCC Officer Abt Associates		
Bong / Fuamah	Bog Mines Community Radio 1 hour	IRS Coordinator NMCP Mobilizer supervisor, IEC/BCC Officer Abt Associates	May 5	

Annex 6: Minutes from IRS Task Force Meeting

**IRS TASK FORCE MEETING  
WEDNESDDAY, NOVEMBER 2, 2011  
CONFERENCE ROOM OF THE NMCP- MOH SW, LIBERIA  
10:20 AM – 12:00 NOON**

Mrs. Jessie E. Duncan, Assistant Minister for Preventive Services, Deputy CMO and Chair of the IRS Task Force chaired the meeting.

**AGENDA**

- (Need to modify???)
- Only to add introduction (comment by Mr. Fahnbulleh – MOA)
- Self-introduction was done by each person

Chair: take 5 minutes to go through the minutes of the meeting

Matters arising from the minutes: page 2 – unethical to continue with DL study and continuation (not only spraying)

- Nets used : permanent

Action point:

- How do we strengthen entomological monitoring, what has been done, what will be done (for NMCP to give update in next meeting)

Page 3; why was DDT included? It was placed as an option for discussion

Page 4: Bifenthrin has been banned so why is it listed? This is WHO's latest list of insecticides

Page: scope of work of Jacob Williams – he was only to do IRS strategic plan

Power point presentation by Martin Netsa (RTI)

- As the target increases maybe the whole of Nimba & Bong can be sprayed
- Bioassays: we have people capable of doing bioassays
- We need a resistance management plan
- The same structures are being followed on for 4 ½ months
- Are maps available where bioassays were done?
- We will map the areas; didn't have GPS
- LISGIS will be the best option to do mapping of areas where we have worked. They are partners with the NMCP
- The cadre of people trained? From NMCP, they are coordinators, also people from the county government
- For the recommendation regarding capacity building what roles can we ship to NMCP for the upcoming campaign? Why rural areas (considering the cost)
- The health facilities are far apart
- The IEC/BCC unit of the NMCP has been fully involved

Fahnbulleh: volunteer workforce – do you have the adequate number of volunteers. Do you have the information on the mosquito population in the 15 counties; in implementation you should work with concerned agencies in monitoring your activities

- The volunteers per district list we have
- The residual effect on the volunteers? We have a medical committee that can look
- NMCP should provide the information on the malaria prevalence in the intervention areas
- Have been working with EPA to check on the chemicals

PPP Abt Associates:

- One of the indicators missing
- Any risk management plan? USAID contracted them and there is a risk management plan

Preliminary reports:

The preliminary report from the entomologist of RTI, Mrs. Rodaly Muthoni was read and explained by Gracella Cooper of NMCP. Also included was the analysis of the results by the CDC chemical experts.

Dr. Jones: in his own opinion we should use DDT

MOA: Looking at result – possibility of resistance (87%) compared to 90% susceptibility what consideration should you take in regard to the use of the chemical

- More areas could be sprayed but the cost is huge

- Going for a pyrethroid we can spray more houses
- Decision of task force: **Margibi & Montserrado – Carbamates; Nimba, Bassa & Bong – pyrethroids**

#### AOB

- EPA only 1 entity to work with; suggest: the 3 entities MoH, MoA & EPA work closely in monitoring the implementation
- Evaluation of the IRS activities for 3 years. Let Filiberto tell us if it's necessary or not. It's possible to do an evaluation of the spraying quality. It's not possible to measure the impact on the population because other methods have been used such as LLINs, drugs, etc.
- The only case where only IRS is used and no other interventions
- Working with HMIS to see where IRS was done and decrease in malaria cases from clinics

Sarah: is the evaluation for RTI or decrease in malaria?

PMI already doing that (Dr. Jones)

Should the same organization doing the IRS be doing the bioassay? It should be done independently

Martin: NMCP capacity has been built to do bioassay; insectary needs to be fully equipped  
2 or 3 persons need to be placed on the payroll to take full responsibility of the insectary

- Call for adjournment
- Vote of thanks by Dr. Jones
- Closing prayer
- Meeting adjourned at 12:00 noon

#### ATTENDANCE

#	NAME	ORG	POSITION	CELL#	E-MAIL
1.	Augustus B. G. Fahnbulleh	MoA	Director	0886-439982	<a href="mailto:augustusfahnbulleh@ymail.com">augustusfahnbulleh@ymail.com</a>
2.	Bethany Tomala	Abt	FCA	0776-329750	<a href="mailto:Bethany-tomala@abtassoc.com">Bethany-tomala@abtassoc.com</a>
3.	Wes Negussie	Abt	FCA	0776-329751	<a href="mailto:Wes-negussie@abtassoc.com">Wes-negussie@abtassoc.com</a>
4.	U. Wollo Jetoh	NMCP	V.C. Officer	0886-591599	<a href="mailto:uwollojetoh@yahoo.com">uwollojetoh@yahoo.com</a>
5.	Sarah Hoibak	MENTOR	Acting CD	0880-992048	<a href="mailto:sarah@mentor-initiative.net">sarah@mentor-initiative.net</a>
6.	Caroline Maxwell	MENTOR	Study Coordinator	0880-258594	<a href="mailto:Caroline.maxi@gmail.com">Caroline.maxi@gmail.com</a>
7.	Wilfred T. Gortor	DEOH/MOH SW	Coordinator	0886-966408 / 0777-061979	<a href="mailto:Sayegortor54@yahoo.com">Sayegortor54@yahoo.com</a>
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