



PRESIDENT'S MALARIA INITIATIVE



INDOOR RESIDUAL SPRAYING FOR MALARIA CONTROL

Quarterly Report

Indoor Residual Spraying (IRS) for Malaria Control
Indefinite Quantity Contract (IQC) Task Order 1

October 1, 2009–December 31, 2009

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Acronyms

ACT	Artemisinin-based combination therapy
ADEMAS	<i>Agence pour le Développement de Marketing Social</i> /Agency for the Development of Social Marketing
ASACO	<i>L'Association de Santé Communautaire</i> /Community Health Association (Mali)
BCC	behavior change communication
CAME	Coalition Against Malaria in Ethiopia
CAMERWA	Rwanda Drug, Consumables and Equipment Central Procurement Agency
CA-USA	Crown Agents USA, Inc.
CCF	Christian Children's Fund
CCM	Country Coordinating Mechanism
CCN	Cooperating Country National
CDC	U.S. Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
CLD	Local Development Committee
CMCP	<i>Constructions Mécanosoudées Caoutchouc et Plastiques</i> /Caustic Soda, Rubber, and Plastic Plant
COP	chief of party
COTR	Contracting Officer's Technical Representative
CPM	Chiefs of Medical Posts
CREC	<i>Centre de Recherche Entomologique de Cotonou</i> /Entomological Research Center of Cotonou (Benin)
CS	capsule suspension
CSCOM	<i>Centre de Santé Communautaire</i> /Community Health Center (Mali)
CSREF	<i>Centre de Santé de Référence</i> /Referral Health Center (Mali)
DC	district council
DCMO	district chief medical officer
DDS	<i>Direction Départementale de la Santé</i>
DDT	dichloro-diphenyl-trichloroethane
DEEC	<i>Direction de l'Environnement et des Etablissements Classés</i> (Environment and Classified Factories Directorate)
DHMT	district health management team
DHO	district health offices
DHT	district health team
DPS	<i>Departamento Provincial de Saúde</i> /Provincial Department of Health (Mozambique)
DPV	Plant Protection Directorate
DRACPN	<i>Direction Régionale de l'Assainissement et du Contrôle de Pollution et des Nuisances</i> /Regional Directorate of Sanitation, Pollution, and Nuisance Control
ECZ	Environmental Council of Zambia
EPA	Environmental Protection Agency
FAO	Food and Agriculture Organization of the United Nations
FM	finance manager
FMOH	Federal Ministry of Health (Ethiopia)
FY	fiscal year
GF	Global Fund

GFATM	Global Fund to Fight AIDS, Tuberculosis, and Malaria
GHS	Ghana Health Service
GPS	global positioning system
GR	geographical reconnaissance
GSCP	Ghana Sustainable Change Project
HCC	health communication center
HCG	human gonadotropin
HIV	human immunodeficiency virus
ICON [®]	lambda-cyhalothrin
ICP	Health Post Head Nurse
IEC	information, education, and communication
INS	<i>Instituto Nacional de Saúde</i> /National Institute of Health (Mozambique)
IPCM	inventory and property control management
IPM	<i>Institut Pasteur de Madagascar</i>
IPT	intermittent preventive treatment
IQC	Indefinite Quantity Contract
IRS	indoor residual spraying
IRS TO1	IRS Task Order No. 1
ITN	insecticide-treated net
IVM	integrated vector management
KCCR	Kumasi Centre for Collaborative Research (Ghana)
LATH	Liverpool Associates for Tropical Health
LEVP	Lev Pharmaceuticals, Inc.
LIBR	Liberia Institute for Biomedical Research
LLIN	long-lasting insecticidal net
M&E	monitoring and evaluation
MEO	USAID Mission Environmental Officer
MEWS	Malaria Early Warning System
MOE	Ministry of Environment
MOH	Ministry of Health
MOHFP	Ministry of Health, Family Planning and Social Protection (Madagascar)
MOHSW	Liberia's Ministry of Health
MOP	Malaria Operational Plan
MOU	Memorandum of Understanding
MRC	Malagasy Red Cross
MRL	Minimal Residual Level
MRTC	Malaria Research Training Center
MSF	Médecins Sans Frontières
NEMA	National Environment Management Authority
NGO	nongovernmental organization
NMCC	National Malaria Control Centre (Zambia)
NMCP	National Malaria Control Program
NMIMR	Noguchi Memorial Institute for Medical Research, Ghana
ORHB	Oromia Regional Health Bureau (Ethiopia)
PASP	Programme Africain Relatif aux Stocks de Pesticides/African Program on Pesticide Stocks
PDA	personal digital assistant
PERSUAP	Pesticide Evaluation Report and Safe Use Action Plan

PID	<i>Programme Africain Relatif aux Stocks de Pesticides/African program on Pesticide Stocks</i>
PMI	United States President's Malaria Initiative
PNILP	Programme National Intégré de Lutte contre le Paludisme/National Integrated Malaria Control Program (Rwanda)
PNLP	Programme National de Lutte contre le Paludisme/National Malaria Control Program (Benin, Senegal)
PPE	personal protective equipment
PSI	Population Services International
RBM	Roll Back Malaria
RTI	RTI International
SEA	Supplemental Environmental Assessment
SLAP	<i>Service de Lutte Anti-Parasitaire/Pesticide Control Service (Senegal)</i>
SLP	<i>Service de Lutte Contre le Paludisme/National Malaria Control Program (Madagascar)</i>
TDY	temporary duty
TO	task order
TOT	training of trainers
UCAD	<i>l'Université Cheikh Anta Diop</i>
UGP	<i>L'Unité de Gestion du Programme/Program Management Unit (Madagascar)</i>
UNZA	University of Zambia
USAID	United States Agency for International Development
USG	United States Government
WHO	World Health Organization
WHOPES	WHO Pesticide Evaluation Scheme
WP	wettable powder

Angola

Country Background

Angola became one of the first three countries to receive funding from the U.S. President's Malaria Initiative (PMI) in May 2006 to support malaria control activities through indoor residual spraying (IRS) in selected provinces with a high burden of malaria. At the time, Angola was recovering from three decades of civil war, which decimated approximately 80% of the country's public health system, leaving only about 30% of the population with access to public health services.

The aim of IRS in Angola is to contribute toward lowering malaria morbidity and mortality by 50% by 2010. RTI International was identified and contracted by PMI as the implementing partner for IRS in Angola and tasked to provide technical, strategic, managerial, and operational support to the Angola National Malaria Control Program (NMCP) to implement IRS. In addition, RTI works with the NMCP to carry out entomological monitoring and training in the provinces where IRS is implemented. The Angola IRS program under PMI runs from 2005 to 2010.

This quarterly report summarizes the IRS program's activities in Angola from October 1 to December 31, 2009.

Current Activities and Accomplishments

Summary

- The IRS solid waste from the previous four rounds was incinerated in Luanda.
- IRS implementation in Huila and Huambo provinces was accomplished. IRS implementation began on October 1, 2009, and ended on December 2, 2009. Final reports show 95.7% of structures found were sprayed, protecting 485,974 residents. All geographical areas identified in the 2009 Malaria Operational Plan were sprayed. In addition, enough insecticide remained to spray Bairro Chioco in Lubango, which had previously been removed from the list of targeted areas when the number of targeted structures in Huila province was reduced from 80,000 to 60,000 in August 2009.
- Spraying was sporadically interrupted for six days because of heavy rain.
- Solid waste generated during the 2009 IRS campaign was collected in the central warehouses in Huambo and Huila, and will be incinerated in early 2010.
- The entomological baseline survey in Huambo province concluded, and a report detailing the finding has been submitted to PMI.
- RTI secured appropriate office space in Huambo and began preparations to move the national office from Luanda to Huambo.

Planning and Assessment

- Planning and preparations for the entomological baseline survey in Huambo were conducted in the first part of the quarter.

Procurement and Logistics

- Insecticide procured was sufficient to cover the geographic areas targeted for IRS in Huambo and Huila provinces.
- Adequate transport and storage for IRS materials was secured for the IRS campaign. RTI maintained previous warehouse space in both Huambo and Huila provinces.

Environmental Compliance

- Waste generated from the last four rounds of IRS in Huila was incinerated at an approved incineration facility in Luanda.
- The regional environmental manager conducted the midspray environmental compliance inspection in late November 2009.
- RTI instituted strict insecticide control measures ensuring that all the sachets of insecticide were accounted for from the store to the end user and vice versa.

Information, Education, and Communication (IEC)

- The IRS community mobilizers completed door-to-door mobilization through the course of the IRS campaign.
- Using feedback from the Direccção Provincial de Saúde (DPS, Provincial Department of Health) from previous IRS campaigns, IEC brochures were enhanced and improved for the 2009 campaign. During this quarter, the brochures were photocopied and distributed to households and in other gathering places, such as markets and churches.
- Social mobilization through radios and TV spots started the second week of September 2009 and continued through the end of the IRS campaign.
- Mobilizers were trained for two days in each of the provinces.

Spray Operations

Spraying commenced in the country on October 1, 2009, in Huambo and on October 2, 2009, in Huila. Spraying concluded on November 27, 2009, in Huambo and on December 2, 2009, in Huila, covering all the identified geographical areas and Bairro Chioco in Lubango as mentioned above. Table 1 below shows the summary results of the fifth round of IRS in Angola.

Table 1: IRS Coverage by Province

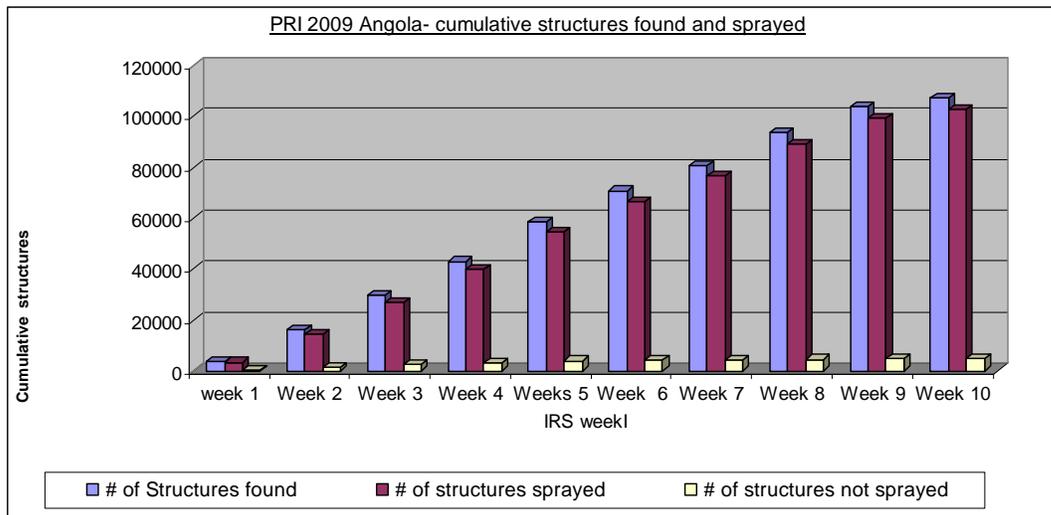
Province	Structures		Population Protected			Insecticide Use (use ratio, structures per sachet)
	Found	Sprayed (Coverage)	Total	Children under Five Years of Age	Pregnant Women	
Huambo	47,155	45,698 (96.9%)	217,490	49,026 (22.5%)	12,347 (5.7%)	19,420 (1:2.35)
Huila	60,222	57,033 (94.7%)	268,484	52,119 (19.4%)	15,169 (5.7%)	34,603 (1:1.65)
Total	107,377	102,731 (95.7%)	485,974	101,145(20.8%)	27,516 (5.7%)	54,023 (1:1.90)

IRS coverage:

- *Structures coverage*

A total of 102,731 structures were sprayed out of 107,377 structures found, yielding a coverage of 95.7%. Figure 1 shows the structures found, sprayed, and not sprayed in this round of IRS.

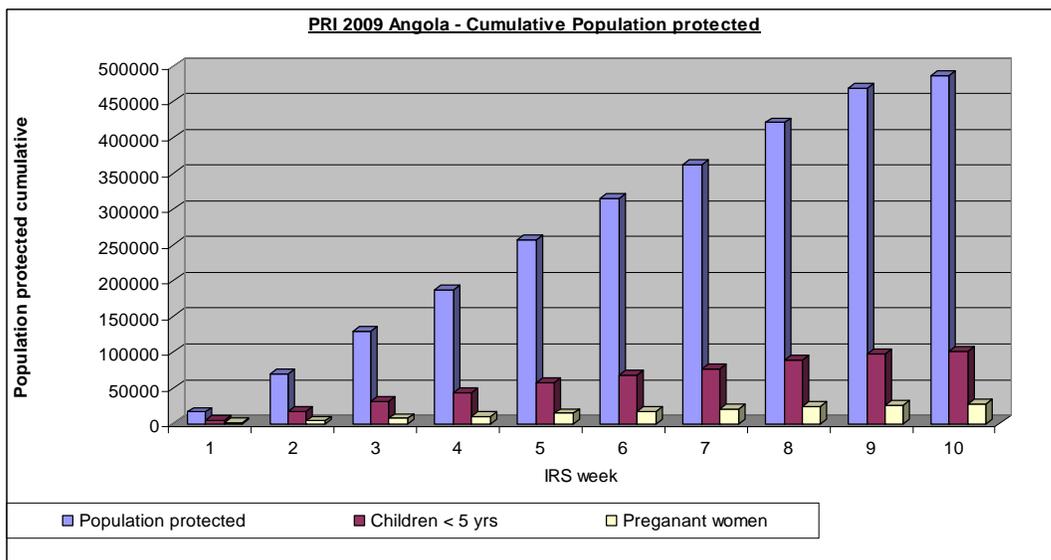
Figure 1: Cumulative Structures Found, Sprayed, and Not Sprayed



- *Population protected*

The population protected in the sprayed structures was 485,974, out of which 27,516 (5.7%) were pregnant women, and 101,145 (20.8%) were children under five years old. Figure 2 shows the population protected in this round of IRS.

Figure 2: Cumulative Population Protected



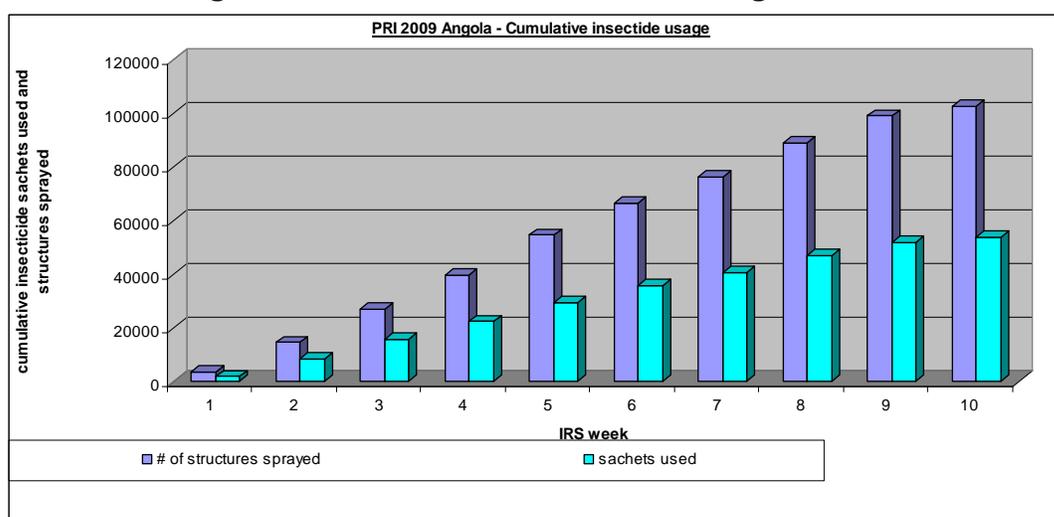
- *Insecticide utilization*

A total of 54,023 insecticide sachets were used to spray 102,731 structures, resulting in a ratio of one sachet for 1.90 structures. The insecticide consumption was higher than expected and this was attributed to some spray operators who:

- Did not comply with the insecticide water reconstitution ratio. Spot checks and information received from suspended spray operators revealed that most of them used less water (five liters) per sachet than the recommended eight liters because they thought eight liters were too heavy to carry.
- Did not maintain the recommended distance between the nozzle tip and the wall, resulting in higher insecticide usage rates. Constant monitoring and spot checks from supervisors and team leaders helped to mitigate these problems.

Figure 3 shows the cumulative insecticide use in this round of IRS.

Figure 3: Cumulative Insecticide Usage



Other Activities

Entomological Monitoring

A consultant conducted the Huambo entomological baseline survey, which took place in November 2009. The consultant trained a total of nine people from RTI and the DPS on basic entomology theory and field techniques. The entomologist leading the study trained the team; they then conducted tests on insecticide resistance, indoor resting densities, biting rates, and insecticide efficacy and susceptibility. The results were positive, because only culicine mosquitoes and no anopheles mosquitoes were found inside houses. When the anopheles mosquitoes collected from aquatic habitats near the study were exposed to lambda-cyhalothrin, the insecticide used for IRS, the mortality rate was 94.4% 24 hours after exposure, indicating that the insecticide used for IRS has been effective at controlling anopheles mosquitoes. The survey results have been shared with the PMI team in Angola and a final report will be translated and shared with the DPS and the NMCP.

Capacity Building of the Ministry of Health

The biologists trained in entomology in Huambo will be monitoring mosquito species in Huambo. This will facilitate the sustainability of the program in the province. This practice will be replicated in other provinces such as Huila in 2010.

DPS Huila provided two people to supervise the IRS campaign in Huila; the Huambo DPS provided one person. This collaboration helped to build the DPS's capacity to manage IRS.

Project Management and Administration

- Office space in Huambo was secured and the national office is scheduled to relocate there in January 2010. This office will be both the national office and provincial office for Huambo.
- The country received short-term technical assistance from Erica Wetzler, the technical program manager; Tito Kodiaga, regional senior environmental manager; Jabez Ojowa, regional finance manager; and consultant Joseph Mwangangi for the entomological baseline survey.
- Information technology services in the country are challenging, causing significant delays in responding to the RTI offices in Nairobi and the U.S.
- The RTI Angola office identified a nationwide security firm in Huambo to secure the warehouse and office there. However, the finalization of the contract has been delayed because the RTI home office in North Carolina has requested some modifications before it can approve the contract. The logistics assistant in Huambo is currently negotiating the modified version of the contract with the security company.

Partnership and Collaboration

- DPSs in both Huambo and Huila have been very collaborative and appreciate that RTI is consulting and working closely with them on IRS.
- Frequent contact with the PMI team in Angola was maintained.

Outstanding Activities

- Complete the security contract with DSL, the company in Huambo

Upcoming Activities

- Submit the 2010 IRS work plan for approval by PMI/USAID
- Conduct end-of-spray inventory and incinerate the 2009 IRS solid waste
- Finance end-of-year closeout
- Submit End of Spray Report for Round 5 of IRS
- Register RTI in Angola
- Move the Luanda office to Huambo and close the Luanda office
- Identify office space in Cunene
- Hire staff in Cunene

- Engage RTI subcontractor Crown Agents to begin vehicle procurement once the 2010 work plan is approved
- Begin preliminary steps for insecticide selection for IRS round six
- Continue entomological monitoring in Huambo and initiate monitoring in Huila.

Benin

Background

With funding from the U.S. Agency for International Development (USAID) and the U.S. President's Malaria Initiative (PMI), RTI International, in collaboration with Crown Agents USA and the Centre de Recherche Entomologique de Cotonou (CREC, Entomological Research Center of Cotonou), supports the Benin National Malaria Control Program—the Programme National de Lutte contre le Paludisme (PNLP). RTI provides strategic, technical, management, and operations support for indoor residual spraying (IRS) activities in four epidemic-prone districts of the Ouémé-Plateau (Ouémé for short) Department: Adjohoun, Akpro-Misséréfé, Dangbo, and Sèmè-Kpodji.

During the 2008 spray round, the Benin IRS program and the PNLN successfully treated 142,814 houses and protected 521,738 people from malaria. The program also distributed long-lasting insecticidal nets (LLINs) to houses in the targeted zones that were not sprayed due to environmental concerns. The 2009 IRS round began on March 10, 2009, and ended on April 28, 2009. An estimated 156,233 structures were sprayed, representing 99% of those targeted for spraying, and 41,160 LLINs were distributed. The total population protected was 512,491, which included 30,707 pregnant women and 64,236 children under five.

This quarterly report presents the program's progress in Benin from October to December 2009 and summarizes the program's current activities and achievements, outstanding issues, and upcoming activities.

Current Activities and Accomplishments

During this reporting period, the project's activities were particularly focused on preparations for the third round (in fiscal year [FY] 2010) of IRS. The following activities were also conducted: drafting the FY 2010 IRS work plan and budget and preparing for and participating in the Pan African Malaria Vector Control Conference in Zanzibar, Tanzania, on October 26–29, 2009.

Planning and Assessment

The Benin IRS work plan, covering FY 2010, from January 1 to December 31, 2010, was submitted in December 2009 and is still being revised.

On December 28–30, 2009, the Benin IRS program organized a workshop in Porto Novo with participants from the Ouémé Direction Départementale de la Santé (DDS, Regional Department of Health), including the chief medical officer. By the end of this important meeting, the participants completed planning DSS Ouémé's FY 2010 activities and integrated FY 2010 and 2011 IRS operations activities for the two next rounds.

Procurement and Logistics

During this quarter, the project logistician initiated field visits to the four districts to update logistics information for the next spray round. He developed specifications and quantifications for insecticide, gloves, pregnancy test kits, and first aid kits; determined the

number of buses needed for spray operator transportation; and updated the geographical mapping of villages for the next rounds.

After receiving training on inventory and property control management for IRS, IRS program staff completed the global inventory of all Benin IRS project property and submitted their report.

Environmental Compliance

There were no environmental compliance activities during this reporting period.

Information, Education, and Communication (IEC)

Workshop on IEC training on malaria

To strengthen the capacity of stakeholders in malaria control on IEC, the PNLN organized a meeting with the Government Teacher Training College at the Ministry of Health (MOH) on December 3, 2009. RTI Technical Coordinator, Mr. Eugene Kiti, attended a training workshop on behavior change communication (BCC) on malaria at the PNLN conference room, along with all partners working on malaria control in Benin. Catholic Relief Services; Population Services International (PSI); Projet Intégré de Santé Familiale (PISAF, Integrated Family Health Project) /University Research Co., LLC (URC); USAID; Africare; and RTI joined PNLN's communication team to share IEC strategies. RTI used this opportunity to share its IRS communication strategy and all IEC materials developed during the last two IRS rounds in Benin. The participants appreciated learning about RTI's IRS communication strategy.

A meeting was held on December 7, 2009, with the PSI communication officer to hand over RTI IEC materials to complete the pictures box for Malaria mobilization activities. The process is headed by the PNLN.

Spraying Operations

At the end of the End-of-Spray Workshop in August 2009, the following decisions were made:

- Conduct two IRS rounds in 2010 and one round in 2011 in the same four communes.
- Start IRS in the same four communes no later than March 2010.
- Collect chronological data on malaria morbidity and mortality in the four pilot IRS communes before and after the operation. This activity will be conducted by the MOH.
- Elaborate long-term IRS strategy for Benin PNLN.

Benin PNLN has since developed an IRS long-term strategy. In the FY 2010 work plan, IRS rounds will be conducted in March–April and August–September 2010.

Other Activities

Entomological Monitoring

Since the beginning of spray operations on March 10, 2009, the CREC team has been conducting the entomological evaluation of IRS in the four communes. The reports were submitted between December 22 and 24, 2009, and included

- Particularly encouraging results, including a significant decrease in malaria transmission as measured by the entomological inoculation rate and in malaria incidence among children under and over five in Ouémé Department. In Ouidah-Kpomasse-Tori Bossito Health Zone, where we implemented a small-scale trial of IRS, the decrease was not as significant as that in Ouémé.
- The next step in disseminating results, including a detailed analysis of results and publishing or presenting papers and other scientific communications in international journals and conferences.

IRS long-term strategic plan

The availability of the long-term strategy document was a requirement for the continuation of PMI funding for IRS in Benin. USAID Benin requested that RTI hire one international consultant and one national consultant to assist the PNLN to develop a long-term IRS strategy for Benin. The two consultants were hired from July to September 2009 to assist the PNLN. They spent four weeks working with national stakeholders involved in malaria control in Benin, including holding several meetings with MOH staff at central and department levels to collect necessary documents to develop the strategy. The first draft of the strategy was presented to MOH stakeholders during a consensus meeting organized on September 8, 2009, by the MOH. About 30 people attended this meeting. In addition to senior MOH staff, participants included representatives from the ministries of Environment, Agriculture, and Foreign Affairs. In-country partners working on malaria including USAID, the U.S. Centers for Disease Control and Prevention, and World Bank were also present at the meeting. During this meeting, the consultants collected views and comments from stakeholders to finalize the strategy document.

The consultants completed the IRS long-term strategy on September 18, 2009, and the final version has been submitted to USAID and MOH. Based on this plan, the Benin government can easily decide which new areas to cover with IRS in 2011.

Monitoring and Evaluation

PMI requested health district-level IRS data for 2008 and 2009. The Benin IRS program staff completed and delivered these reports.

Project Management and Administration

Recruitment

Dr. Seydou Doumbia, Benin IRS program chief of party (COP), left the program on November 30, 2009. Mr. Eugene Kiti is the acting COP. Recruitment for the new COP is ongoing.

Revised job descriptions were sent to all the Benin staff for review and were also sent to human resources in the RTI Nairobi Regional Office.

Audit of USAID/Benin's implementation of the PMI for FY 2009

The RTI team needs to get the following ready for the PMI FY 2009 audit:

1. Award agreements (and amendments) with cooperating agencies
2. FY 2009 work plan, monitoring plans, and progress reports
3. Any internal and/or external assessment/evaluation or surveys of PMI activities, including RTI responses to any recommendations from USAID or other cooperating agencies
4. Data quality assessment for related performance indicators done in the past three years.
5. Site visit reports produced by the program
6. Reports of FY 2009 obligated and expended amounts

The date of the audit will be confirmed by USAID. We suggest that this audit be scheduled as soon as possible because the next IRS round will be launched on March 1, 2010.

Partnership and Collaboration

The Benin IRS program held many meetings with partners during this reporting period to keep them informed about the project progress and to find solutions to difficulties that arose during IRS activities. The USAID/PMI team and the PNLN senior staff also conducted several field visits during this reporting period.

COP leaves the program

PNLN staff, headed by PNLN National Coordinator Dr. Imorou Yacoubou, were at RTI's office in Benin on November 30, 2009, to say good bye to Dr. Seydou Doumbia, the departing COP. On this occasion, they confirmed their satisfaction with the program and hoped that the quality of partnership would be the same or better with the new COP.

Participation in COP and Finance/Admin Conference

From October 20–24, 2009, Dr. Seydou Doumbia and Mrs. Josephine Kpeto Tossa, finance manager, attended the COP and Finance/Administrator Conference in Zanzibar, Tanzania. This conference was an excellent opportunity to better understand the financial and program needs for each PMI IRS country. At the end of this conference, each participant improved his or her comprehension of RTI policies and standard operating procedures (SOPs). In Benin, Dr. Doumbia and Mrs. Kpeto Tossa shared the SOPs with the staff.

Participation in Pan African Malaria Vector Control Conference

From October 25–29, 2009, Dr. Yacoubou Imorou and Dr. Seydou Doumbia attended the Pan African Malaria Vector Control Conference in Zanzibar, Tanzania. At the conference, Dr. Imorou presented Benin PNLN's vector control strategy and Dr. Doumbia share the Benin IRS program's IEC/BCC strategy. The two presentations were much appreciated and Benin's IEC strategy is recommended as a model for all IRS countries.

PMI coordination meeting

The RTI Benin team attended the PMI review meeting at USAID/Benin on November 24, 2009. All the PMI implementing partners working in Benin attended this meeting, including John Snow Inc., Management Sciences for Health, URC, Institut Régional de Santé Publique (Regional Public Health Training Center), and PSI. In-country PMI implementing partners exchanged information and identified problems that occurred during the last quarter and discussed solutions. The meeting was chaired by USAID's Family and Health Team Leader Mr. Pascal Zinzindohoue. RTI team was invited to present the accomplishments of the IRS project during last quarter and achievements from the second IRS round. At the end of the meeting, Mr. Zinzindohoue announced his departure and introduce to the participants to Dr. Milton, who would probably be the new Family and Health team leader.

Participation in DDS Ouémé workshop on FY 2010 work plan

RTI attended the DDS Ouémé workshop on the FY 2010 work plan organized by DDS with the support of PISAF/URC/PMI from December, 28–30, 2009, in Porto Novo. All health implementing partners in Ouémé region attended this workshop. At the end of this important meeting, participants completed DDS Ouémé's FY 2010 work plan and integrated IRS operations activities for FY 2010 and 2011.

The local PMI team supported the Benin IRS team to implement this project.

Memorandum of Understanding (MOU) submission to PNL

On September 22, 2009, the IRS Benin team sent the MOU between the Government of Benin and RTI on IRS to the MOH for their final signature. At the final meeting, and with the support of IRS focal point at the PMI Benin Mission Dr. Salam Gueye, the PNL national coordinator promised to do his best to get the MOU signed before the end of January 2010.

Outstanding Activities

- Sign the MOU between RTI and the Benin government
- Complete the FY 2010 IRS work plan
- Incinerate empty sachets

Upcoming Activities (January 1–March 31, 2010)

Third IRS round preparation and launch:

- Hold the IRS task force committee meeting
- Recruit monitoring and evaluation, IEC, and environment consultants to come on board on February 1, 2010
- Recruit and train spray operators and IEC mobilizers
- Repair warehouses and review IRS materials (spray pump)
- Procure bendiocarb locally
- Conduct microplanning for IRS operations
- IRS operations from March 10 to April 28, 2010

Ethiopia

Background

The Indoor Residual Spraying (IRS) program targets 23 districts in four zones (Arsi, East Shoa, West Arsi, and West Hararghe) in Oromia Regional State. This effort involves procuring sprayers, personal protective equipment (PPE), and supplies; rehabilitating storage facilities; mapping areas to be sprayed; training local staff in IRS operations; and managing spray operations, in addition to conducting pre- and post-campaign surveys to assess the effectiveness of information, education, and communication (IEC) activities and the population's satisfaction with IRS operations. The project also supports entomological monitoring and insecticide susceptibility surveying.

The IRS program in Ethiopia is led by RTI International with funding from the United States Agency for International Development (USAID) in collaboration with Crown Agents USA, the Oromia Regional Health Bureau (ORHB), the Ethiopian Health Nutrition Research Institute, Addis Ababa University's Institute of Pathobiology, Academy for Education and Development, the Health Education and Extension Center, the Ministry of Agriculture National Environmental Protection Authority, World Health Organization (WHO), the United Nations Children's Fund, and other implementing partners.

This quarterly report presents the IRS program's progress in Ethiopia from October 1 to December 31, 2009, and summarizes the program's current activities and achievements, outstanding issues, and upcoming activities.

Current Activities and Accomplishments

During this reporting period, RTI Ethiopia completed a survey of house replastering rates in 11 districts; a behavioral assessment of malaria vectors after IRS operations in three districts; an insecticide susceptibility study at 11 sentinel sites; shipment of soil samples for analysis of dichloro-diphenyl-trichloroethane (DDT) environmental compliance; and rehabilitation of the Adama Malaria Control Training Center and 19 of 23 district storage facilities.

Planning and Assessment

The evaluation meeting for the second round of IRS operations (fiscal year [FY] 2009) was held from October 2–3, 2009, at the Pan Africa Hotel in Adama. Seventy participants attended the meeting, including district administrators, district health chiefs, malaria focal persons, and environmental health focal persons representing all beneficiary districts. The four zonal health departments also attended, along with the ORHB Malaria Control Department and PMI/Ethiopia. Successes and challenges of the FY 2009 spray round were evaluated, and best practices were shared among districts. Challenges were identified and recommendations were made to avoid or overcome these challenges before the next round.

Microplanning for the third round of IRS (FY 2010) was held on December 7, 2009, at the Gete Hotel in Adama. During this microplanning exercise, seven new districts were added to the RTI program. These included one district from the West Arsi zone and six districts from the Jima zone. Each of the 30 districts then prepared a draft IRS plan with guidance and technical support from RTI, ORHB, the zonal malaria focal persons, and PMI/USAID. Each

district conducted a logistics assessment to identify the availability of and gaps in requirements. They also identified anticipated problems and sought solutions ahead of time during the planning exercise. Each draft plan was then presented to the stakeholders at the plenary and discussed. The stakeholders reached a consensus on the number of unit structures to be sprayed and the human resources, vehicles, and PPE required for the operation. Based on this microplanning exercise, a draft FY 2010 work plan and budget were prepared for upcoming spray operations.

Procurement and Logistics

During this reporting period, storage space shortages at Adama, Dodota, Gimbichu, and Sire districts were resolved. In each district, suitable warehouses for storing insecticide and IRS materials were completely rehabilitated.

Environmental Compliance

The RTI Environmental Compliance and Quality Assurance Officer, along with the respective district malaria focal persons, inspected and assessed the condition and status of evaporation tanks and storage facilities. The field assessment results indicated that some empty sachets and cartons needed to be transported to central storage from five districts. As soon as we received these field reports, we transported these waste materials from four districts, but we could not do so for Anchar district because of rain and inaccessible roads. However, we are prepared to transport them as soon as the rain has stopped and road access is available again. Out of 38 currently used evaporation tanks only nine were completely drained, with the residues being ready for transport to central storage.

Environmental samples from the FY 2009 spray round, containing 58 bottles of crops, 197 bottles of soil, and 3 bottles of sediment samples, were sent to the AgriQ laboratory in Nairobi, Kenya, for DDT residue analysis.

Information, Education, and Communication

The house replastering rate survey was conducted in 11 districts on 1,050 households to evaluate the effectiveness of IEC, as well as to identify the message gap and to improve upon it for the FY 2010 spray operations. The survey and data entry were completed but analysis and report writing is not finalized.

Spray Operations

An IRS micro-planning meeting for the FY 2010 spray round was held on December 7, 2009, with 30 district health office chiefs and malaria focal persons with the guidance and technical support of RTI, zonal, and ORHB malaria focal persons and PMI/USAID. They reached a final consensus on the number of unit structures and population to be protected by IRS, and are presented below in Annex 1.

Other Activities

Entomological Monitoring

During this reporting period, two major entomological studies, namely monthly vector density monitoring using larval, pyrethrum spray catches, and human landing collections at

four villages, and insecticide susceptibility study at 11 representative sites, were completed. The entomological monitoring was conducted for four months (May to September 2009) for two weeks in each month in four selected villages: Eddo Kontola, Kolonel Camp, Mechefera, and Ziway Town Kebele 02. Ziway Town Kebele 02 was the control village. The other three villages were protected with IRS.

During the study period, a total of 2,312 adult female anophelines were collected using pyrethrum spray sheet and human landing collection techniques. These comprised

- 1,904 (82.4%) *Anopheles gambiae complex*
- 287 (12.4%) *An. pharoensis*
- 121 (5.2%) *An. coustani*

Likewise, a total of 359 anopheline larvae were collected, comprising

- 170 (47.4%) *An. gambiae complex*
- 185 (51.5%) *An. pharoensis*
- 4 (1.1%) *An. coustani*

A total of 661 anophelines were collected during the study period by pyrethrum spray catches, out of which 646 (97.7%) were *An. gambiae* s.l. and the rest 15 (2.3%) were *An. pharoensis*. The average monthly density of fed *An. gambiae* per hut per night in each village varied from 0 to 19.8. Similarly the average monthly man-biting rate in the villages was between 0 and 5.7 bites/man/night. The highest density of fed *An. gambiae* per hut per night was at Eddo Kontola village in September 2009. The highest man-biting rate was seen at Ziway Town Kebele 02 in August 2009.

Man landing collection was done once a month in each village on three nights in different houses. During the study period, a total of 1,651 anophelines were collected attempting to bite human baits. Of these 1,258 (76.1%) were *An. gambiae*, 272 (16.8%) *An. pharoensis*, and 121 (7.1%) were *An. coustani*. The proportion of indoor to outdoor collection for the main vectors was 662 (43.3%) to 867 (56.7%), exhibiting a tendency toward exophagic habits. The dissection results of *An. gambiae* s.l. showed an average parity rate of 92.4% in the study area, indicating that the population is long-lived and has the capacity to be an efficient malaria vector. The parous to nulliparous ratio was high before and after IRS in all monitored villages. In each village, the observed man-biting rate for the man landing method was larger than that obtained using the pyrethrum spray catch method, again indicating a tendency towards exophagy.

Both *An. gambiae complex* and *An. pharoensis* are exophagic in the area if given equal opportunity to be indoors or outdoors. About 55% of the *An. gambiae complex* and 65% of *An. pharoensis* were captured while trying to bite human baits outdoors, suggesting a tendency to exophagic behavior. Biting by both species continued throughout the night. Peak outdoor and indoor biting of *An. gambiae complex* occurred from 9 pm until early morning.

This study result indicates that *An. gambiae complex* is still the predominant species for malaria transmission, preceding *An. pharoensis*. The comparison of man landing density to spray sheet collections indicates that *An. gambiae complex* has an outdoor resting habit. An

earlier study observed a similar result in Ziway Town Kebele 02 village (Abose et al., 1998).¹ This exophilic habit of the mosquitoes needs further investigation in additional areas with sufficient sample size.

Most of the *An. gambiae complex* specimens were collected while the mosquitoes were attempting to bite outdoors, similar to those seen in a previous investigation by Abose and co-workers (Abose et al., 1998). The highest man-biting density of *An. gambiae complex* occurred in Ziway Town Kebele 02 village where IRS was not conducted.

Previous investigations (Abose et al., 1998; Yohannes et al., 2005)² reported on the early biting habit of *An. gambiae complex* before people retired to bed. However, in contrast to these studies, our present study results indicated a similar pattern of indoor and outdoor biting cycles to a study that was conducted in the Sille area, which reported peak biting in the latter part of the night (Taye, et al., 2006).³

According to the results from our study, proper use of insecticide-treated nets is a good method of malaria control. In general, these preliminary study results have shown that there is no significant difference between villages that have or have not been sprayed with DDT with respect to anopheline density in all utilized collection methods.

The insecticide susceptibility study was conducted between August and December 2009 in 11 selected localities in the Oromia Regional state. The localities were Asebot (Miesso, West Hararghe zone), Asendabo (Omo, Jimma zone), Babile (Babile, East Hararghe zone), Bedele (Bedele, Ilubabora zone), Golgota (Merti, Arsi zone), Jimma (Kersa, Jimma zone), Medo (Wondo, West Arsi zone), Shoboka (Bako Tibe, West Shoa zone), Sodere (Adama, East Shoa zone), Wama Kusaye (Sibu Sirre, East Wollega zone), and Ziway (Adamitulu, East Shoa zone). All the localities are malaria endemic and DDT IRS has been the mainstay of vector control to prevent frequent waves of malaria epidemics. No IRS has been applied in Bedele in the past 35 years.

An. gambiae complex, the major vector of malaria in Ethiopia was exposed to 4% DDT, 0.05% deltamethrin, 5% malathion, 0.1% bendiocarb, and 5% pirimiphos methyl. Susceptibility tests were conducted using WHO standard test kits on 2–3-day-old, non-blood-fed female mosquitoes reared from larvae and pupae collected from different breeding habitats. Male mosquitoes from some localities were also tested. Based on mortality counts after a 24-hour holding period, the vector population was classified either susceptible or resistant to an insecticide following the WHO criteria. The results showed the existence of a vector population that was very highly resistant (0–35% mortality) to DDT in nine of the localities. A susceptibility level of 85% was recorded from a locality (Bedele) in the west. The difference between the sexes is almost negligible. Resistance to deltamethrin in some

¹ T. Abose, Y. Yeebiyo, D. Olana, D. Alamirew, Y. Beyene, L. Regassa, and A. Mengesha. "Re-orientation and Definition of the Role of Malaria Vector Control in Ethiopia." WHO/MAL/98.1085 (1998).

² M. Yohannes, M. Haile, T.A. Ghebreyesus, K.H. Witten, A. Getachew, P. Byass, and S.W. Lindsay. "Can Source Reduction of Mosquito Larval Habitat Reduce Malaria Transmission in Tigray, Ethiopia?" *Tropical Medicine and International Health* 10, (2005):1274–1285.

³ A. Taye, M. Hadis, N. Adugna, D. Tilahun, and R.A. Wirtz. "Biting Behavior and *Plasmodium* Infection Rates of *Anopheles arabiensis* from Sille, Ethiopia." *Acta Tropica* 97, no. 1 (2006), [doi:10.1016/j.actatropica.2005.08.002](https://doi.org/10.1016/j.actatropica.2005.08.002)

localities was also alarmingly high (46%–78% mortality). Susceptibility to malathion ranged from 68% to 100%. On the other hand, susceptibility to bendiocarb is very high with a mortality rate of between 96% and 100% for *An. gambiae* s. l. From four localities where pirimiphos methyl was tested, 100% susceptibility was detected. These findings suggest the need to apply a rotation of insecticides for IRS to effectively utilize the available insecticides and not allow mosquitoes to build a resistance to any one insecticide.”

Capacity Building of Federal Ministry of Health (FMOH)

Entomological surveillance and vector density monitoring has been conducted every month in collaboration with FMOH staff from different districts as a means of capacity building and skills transfer. Insecticide susceptibility studies at 11 sentinel sites were completed by FMOH staff and with the coordination of RTI staff, who selected appropriate insecticides for IRS in the country.

Monitoring and Evaluation

There were no monitoring and evaluation activities during the reporting period.

Project Management and Administration

During this quarter, the IRS program in Ethiopia hosted the regional human resources and administration manager, who provided training in management experience with the acting chief of party (COP) and the team. He facilitated the hand-over process from the former COP to the acting COP and conducted a comprehensive employee orientation and training on project standard operating procedure.

Partnership and Collaboration

The IRS Ethiopia team is a member of the Coalition Against Malaria in Ethiopia and participated in a half-day partners’ meeting organized by the FMOH on November 12, 2009, in Addis Ababa. The meeting participants discussed the findings of mapping and geocoding house structures conducted with the support of the Malaria Control and Evaluation Partnership in Africa/PATH in two districts of Oromia Regional state. They agreed to establish an ad hoc committee to review the findings and identify the implications of the findings on malaria and other health-related disease control activities. One of the project staff also attended a five-day workshop, organized by USAID Ethiopia, that introduced geographic information systems and how they could be used to map and geocode house structures and conduct other activities.

Outstanding Activities

- Analyze and report on the house replastering survey in RTI/PMI project districts
- Map and geocode house structures for better targeting and quality of IRS operation

Upcoming Activities

- Conduct training of trainers (TOT) on geocoding and mapping structures
- Rehabilitate district storage facilities
- Construct 15 evaporation tanks/soak pits and fence in newly added districts
- Conduct TOT on spray pump maintenance and use

- Conduct training on insecticide poison management
- Conduct TOT for 2010 IRS implementers
- Conduct IRS in 30 districts starting June 1, 2010

Table 1

Activities Description	Numbers
No. of districts targeted for IRS	30
No. of Household structures to be sprayed	616,187
Population protected	2,053,925
Children <5 years of age protected	338,898
Pregnant mothers protected	65,726
No. of Households mobilized	388,356

Ghana

Background

Ghana was identified by the U.S. Agency for International Development (USAID) as one of the third wave of countries to receive funding under the U.S. President's Malaria Initiative (PMI). In 2008, USAID and the National Malaria Control Program (NMCP) agreed to focus spraying activities in Gushegu, Karaga, Savelugu/Nanton, Tolon/Kumbungu, and West Mamprusi, and expanded into East Mamprusi in 2009.

Spray operations for the second round of Ghana Indoor Residual Spraying (IRS) operations took place from May 11 to July 31, 2009, in East Mamprusi, Gushegu, Karaga, Savelugu/Nanton, Tolon/Kumbungu, and West Mamprusi districts. The overall coverage at the end of spray round was 94 percent across all six districts. In August and September 2009, all logistical and operational materials were retrieved from the operational sites in the various IRS districts and deposited at the Tamale office and warehouse. Daily household data was collected during the second spray round and compiled at the district level to be submitted to the RTI International monitoring and evaluation (M&E) unit in Tamale for further analysis and dissemination to all relevant stakeholders. The solid waste (empty insecticide sachets, nose masks, and hand gloves) generated from the previous two rounds of IRS operations were appropriately disposed of using an incinerator that met USAID and Environmental Protection Agency (EPA) required standards.

The post-spray evaluation meeting was held on August 20, 2009, to solicit views from stakeholders at the district and regional level about round two of spray operations and determine measures to ensure successful subsequent spray rounds. Key IRS partners participated in the meeting, including NMCP, Ghana Health Service, Noguchi Memorial Institute for Medical Research (NMIMR), AngloGold Ashanti, PMI, and RTI.

The RTI Ghana team completed and submitted the following reports to the RTI home office and USAID during the quarter:

- The Ghana IRS Third Quarter Report (July–September 2009)

- The 2009 End of Spray Round Report

- The 2010 IRS Work Plan and Budget

This quarterly report presents the program's achievements and progress during October to December 2009. The report summarizes and highlights monitoring and environmental issues, demobilization of spray operations, the project's current activities, and the excellent collaboration with the relevant stakeholders at all levels. It also provides information on upcoming activities.

Current Activities and Accomplishments

Planning and Assessment

In October 2009, the U.S. Centers for Disease Control and Prevention/PMI advisor, the RTI Ghana M&E officer, and officials from the NMIMR visited current and potential IRS beneficiary districts in the Northern Region to assess the feasibility of a planned anaemia and parasitaemia prevalence study. The visit enabled the research team to engage with the District Health Management Teams (DHMTs), the Ghana Education Service, and other stakeholders at the regional and district levels.

Procurement and Logistics

During October to December 2009, as part of the demobilization and preparation process, spray equipment was serviced and maintained. Inventory and property control management processes were adhered to. All commodities were counted and inventory was recorded. A procurement assessment was carried out and a list of needed commodities and equipment was created for inclusion in the 2010 work plan budget.

Environmental Compliance

Within the quarter, the Tamale IRS warehouse had been decontaminated as part of the environmental compliance procedures. The EPA director in the Northern Region and his team monitored and supervised the exercise. The Ghana IRS program team was commended by the EPA for maintaining good environmental standards in its operations.

Information, Education, and Communication (IEC)

In October 2009, the IEC coordinator of the Ghana IRS program participated in the National Malaria Control Communication task team meeting organized by the NMCP at Elmina, in the Central Region of Ghana. The objective of the meeting was to harmonize all communication materials for malaria control in Ghana.

Spray Operations

The final count at the end of the second round of spray operations in 2009 indicated that a total population of 708,103 was covered by IRS, including 140,782 children under five and 16,881 pregnant women. The total number of structures sprayed was 284,856 out of 301,704 sprayable structures, equaling 94% coverage.

As part of the demobilization process after the spray operations, post-spray medical examinations for district spray teams were conducted on each spray operator from all the IRS beneficiary districts. At the end of the medical examinations there were no reports of adverse effects from the spraying or the chemical on any spray operator.

From October 19–24, 2009, the chief of party (COP) of the Ghana IRS Program and the finance manager (FM) participated in the first joint COP/FM conference organized by RTI in Zanzibar. The Ghana IRS finance and management issues were among the issues presented and discussed during the meeting. Following the COP/FM conference, the COP attended the first Pan Africa Malaria Vector Control Conference, organized by RTI in partnership with the World Health Organization (WHO), Roll Back Malaria Secretariat, PMI, and the Government

of Zanzibar from October 25–29, 2009, in Zanzibar. A team from Ghana comprising staff of the NMCP, PMI, AngloGold Ashanti, and RTI participated in the meeting.

The Ghana IRS Program team also participated in the 2009 Global Business Coalition (GBC)/Corporate Alliance on Malaria in Africa West and Central Africa Technical Workshop, organized by the GBC on HIV/AIDS, Tuberculosis and Malaria, in Accra, Ghana, from October 20–22, 2009.

Management Activities

The COP developed a draft of the 2010 Ghana IRS Work Plan and submitted it to the home office for review. The COP and FM jointly drafted the field budget and submitted it for use in creating the 2010 work plan budget.

Entomological Monitoring/Capacity Building of Ministry of Health

The scheduled monthly entomological evaluations for monitoring vector behaviour, densities, and bioassays for the quarter were conducted. The Ghana Health Service field supervisors were mobilized for the exercise and were coordinated by the Northern Regional biologist, the RTI entomologist, and M&E officer. NMIMR provided oversight and supervisory functions during the field evaluations and laboratory activities. The RTI Ghana team visited the Navrongo Health Research Centre to discuss collaboration efforts in the management and support of the Tamale field insectary.

Partnership and Collaboration

RTI Ghana IRS program provided technical support for presentations and facilitated travel and logistics arrangements for three NMCP staff (program manager, vector control manager, and northern zone manager) to attend malaria conferences in Zanzibar and Nairobi. The RTI Ghana IRS Program team also held meetings with the regional director of health services and his team to brief them on the progress of work and the challenges of IRS operations in the region.

The RTI Ghana team participated in the USAID/PMI partner work plan coordination meeting that took place on December 9, 2009. The objectives of the meeting were to

Identify gaps in funding from the Global Fund to Fight AIDS, Tuberculosis and Malaria where PMI can provide assistance

Identify areas for coordination within the PMI partners

Discussions on these topics are still taking place. The agreed outcomes will be shared when they become available.

RTI facilitated the organization of the Malaria Vector Control Oversight Committee meeting on December 10, 2009. In attendance were representatives from EPA, WHO, NMIMR, USAID/PMI, and AngloGold Ashanti. The meeting was chaired by NMCP.

Upcoming Activities (January–March 2010)

- Conduct geographical reconnaissance of districts
- Recruit and deploy RTI district teams

- Set up district offices, warehouses, and operational sites
- Select potential spray operators by District Assemblies and DHMT
- Conduct training of trainers workshop
- Train spray operators
- Develop and disseminate IEC materials
- Train IEC implementers and launch IEC activities
- Release tender notice for procurement and logistics
- Conduct microplanning at district and regional levels
- IRS operations planned for April–June 2010

Liberia

Background

Liberia was identified by the United States Agency for International Development (USAID) as one of the second wave of countries to receive funding under the United States President's Malaria Initiative (PMI). The National Malaria Control Program (NMCP), with financial support from PMI, is undertaking an Indoor Residual Spraying (IRS) program on a large scale. The program's objective is to achieve universal access (85% coverage) to interventions.

This program, which USAID has contracted to RTI International, started in two counties, Grand Bassa and Margibi. In 2009, the operation targeted two districts in each of these counties: Owen's Grove and District #1 in Grand Bassa County, and Mamba-Kaba and Firestone in Margibi County. The government of Liberia plans eventually to expand IRS to more counties, depending on epidemiological and entomological suitability for IRS, and the availability of funding. Districts now under consideration are discussed below.

This quarterly report presents the program's progress in Liberia from October 1 to December 31, 2009, and summarizes the program's current activities and achievements, outstanding issues, and upcoming activities.

Current Activities and Accomplishments

The main activities accomplished during this quarter include the following:

- Conducted the Supplemental Environmental Assessment (SEA)
- Conducted insecticide susceptibility testing
- Selected spraying sites for the 2010 operation
- Recruited a logistician
- Reached agreement with Firestone to participate in the 2010 spraying campaign

Planning and Assessment

Initial visits were made to the new targeted districts—Worr/District #1B in Grand Cape Mount County, District #2 in Grand Bassa County, Firestone in Margibi County, and Careysburg in Montserrado County—to assess the logistical and operational needs for launching IRS operations. For Worr/District #1B and District #2, the assessment also established the type and number of structures to be sprayed, households to be covered, and the population to be protected. These two areas are hard to reach, and the operation will be executed largely on foot because there are no roads. Due to the lack of infrastructure, temporary field storage facilities will be used to reduce the distances spray operators have to walk. The IRS team made use of the Community Health Volunteers (CHVs) to gather some of the important data. CHVs will be further equipped to mobilize people for the IRS campaign.

Procurement and Logistics

Due to the destruction caused by the Liberian Civil War, it is difficult to find government structures to use as warehouses, especially those belonging to the Ministry of Health and Social Welfare (MOHSW). The project has managed to secure a central warehouse at Schlieffin Town on a long-term basis. Operational sites in the new districts have been identified and will be renovated accordingly.

Environmental Compliance

The first SEA for pyrethroids for Liberia's IRS program was conducted in early 2009 and approved in March 2009. Because the MOHSW had communicated its desire to use DDT as one of the insecticides of choice, a second SEA focusing on DDT—which also included other classes of insecticide to allow flexibility in implementation for PMI and the government of Liberia—was done in October 2009. The SEA detailed the potential adverse impacts of using these insecticides in different environmental settings and backgrounds, and also proposed mitigation measures.

Results

The report contained a detailed analysis specific to the use of DDT. According to the analysis, selecting DDT as the insecticide of choice as compared to the other two classes, pyrethroids and carbamates, will require additional mitigation measures and burden that must be factored in advance during the planning phase of the program.

Information, Education, and Communication

The project held sensitization meetings in the new districts of operation. These meetings offered opportunities for the organization to discuss with stakeholders (traditional and government leaders, chiefs, and elders) the possibility of undertaking IRS activities in the newly targeted districts. The major conclusions from the meetings were that

- Malaria is the number one public health problem.
- Information regarding malaria disease transmission and prevention exists in some communities.
- In Worr/District #1B, the community indicated that filariasis is also a problem.
- The incomplete long-lasting insecticidal net (LLIN) distribution is likely to affect the spraying campaign, as some communities are not happy at having been left out of the distribution.
- The District #2 in Grand Bassa County and Worr/District #1B, areas are hard to reach and the operation has to be executed on foot.
- In District #2 and Worr/District #1B, temporary field operational sites may have to be established.

The roles and responsibilities of each partner were also discussed. Table 1 shows the participants according to district reached during the sensitization meetings.

Table 1: Participants by District (Sensitization Meetings)

• District	• No. of Meetings	• No. of Participants
Careysburg	2	32
District #2	6	128
Firestone	2	12
Worr/District #1B	2	74
Mamba Kaba	4	90
Total	16	336

During this reporting quarter, an IRS poster was designed and pretested. It will be further developed for use in this year's campaign.

Spray Operations

No spraying was done during this quarter.

Other Activities

Entomological Monitoring

In October 2009, the program carried out insecticide susceptibility testing. The main objective was to test the susceptibility of *Anopheles* mosquitoes in the spray areas in Liberia to the insecticides approved for IRS use.

The specific activities carried out were to

- Collect *Anopheles* larvae in IRS and non-IRS areas.
- Determine species composition and the density of *Anopheles* mosquitoes in sprayed and unsprayed houses.
- Conduct insecticide susceptibility testing using World Health Organization (WHO) bioassay kits.

Larva Collections

Mosquito larvae were collected from breeding sites in three counties by dipping. A range of habitat types were sampled, including old car tires, tire tracks, temporary rain pools, discarded containers around homes, coconut shells, polythene/canvas rooftops, banana leaves, and pools forming in marshy beds/swamps. Despite the numerous pools of water in the marshy swamps, they yielded less than 10% of all the larvae collected. Over 80% of the larvae were collected from tires no longer in use and from a wide range of containers that were mainly around homesteads. Both *Anopheles* and *Culex* larvae were found in these breeding places. The larvae were taken to the lab at the Liberia Institute of Biomedical Research (LIBR) and were reared to adults.

Sampling of Adult Mosquitoes

Pyrethrum spray collections (PSCs) were conducted in 10 randomly selected rooms in each of the three counties. A total of 259 female mosquitoes were collected from the 30 rooms. Table 2 summarizes the results.

Table 2: Mosquitoes Collected Indoors by PSCs

County	Mosquito Species				
	<i>An. gambiae s.l.</i>	<i>An. funestus</i>	<i>Culex</i>	<i>Aedes</i>	Total
Margibi	56	18	89	03	166
Grand Bassa	24	00	27	00	51
Montserrado	19	00	23	00	42
Total	99	18	139	03	259

The number of people sleeping in the sampled rooms ranged from 1–10, with a mean of four. The mosquito density per room was 7.4 mosquitoes in Margibi, 2.4 in Grand Bassa, and 1.9 in Montserrado.

Insecticide Susceptibility Bioassays

Insecticide susceptibility assays were performed on adult nonblood-fed *Anopheles* mosquitoes aged 2–5 days. All the mosquitoes assayed were reared from field-collected larvae. The tests were carried out using DDT, bendiocarb, and deltamethrin, using the WHO bioassay kits (WHO/CDS/NTD/WHOPES/GCDPP/2006.3). For each of the insecticides tested, mosquitoes were divided into batches of 15–20 and exposed to insecticide-treated papers for one hour. A control assay was run each day, and test mortalities were corrected for control mortality using Abbot’s formula where necessary.

Table 3 provides a summary of the susceptibility test results.

Table 3: Susceptibility Tests Results

County	DDT (4%)			Deltamethrin (0.025%)			Bendiocarb (0.1%)		
	n*	No Dead	% Mortality	n*	No Dead	% Mortality	n*	No Dead	% Mortality
Margibi	37	37	100	41	40	97.56 (~98%)	20	20	100
Grand Bassa	58	57	98.3	40	40	100	38	38	100
Montserrado	42	41	97.6 (~98%)	38	38	100	39	39	100

n* number of mosquitoes tested

The test replicates varied between one and three depending on the numbers of *Anopheles* mosquitoes that were available for each county. All of the three survivors were morphologically identified as *An. gambiae s.l.*

Conclusions and Recommendations

Pyrethrum Spray Catches

Of the three counties, Margibi showed the highest indoor mosquito density from the PSCs, compared to Grand Bassa and Montserrado counties.

Mosquito Identification

Morphological identification showed that malaria vectors sampled belonged to *An. gambiae s.l.* and *An. funestus*.

Recommendation

The results showed that IRS can be carried out using any WHO-approved insecticide from any of the three classes—pyrethroids, carbamates, or DDT—with very close monitoring of the susceptibility levels of the vectors, especially to deltamethrin (Margibi) and DDT (Montserrado).

Capacity Building of Ministry of Health

Four NMCP staff received hands-on training in techniques in entomology. The areas covered included the following:

- Survey of mosquito breeding sites
- Mosquito larvae collection and identification into genera
- Rearing field-collected mosquito larvae to adults
- Sampling of indoor resting mosquitoes
- Adult mosquito identification into genera
- Step-by-step procedure of the WHO tube bioassay test

The project is working with NMCP personnel in the logistical assessment activities, which serves to provide hands-on training in IRS logistical assessment.

Monitoring and Evaluation

Clinical data on malaria were collected in the new districts targeted for the coming round. However, the calculation of incidence rates is a challenge due to disparities in catchment area population. The graphs below show confirmed cases of malaria in two districts.

Figure 1: Confirmed Malaria Cases District #2, 2008–2009

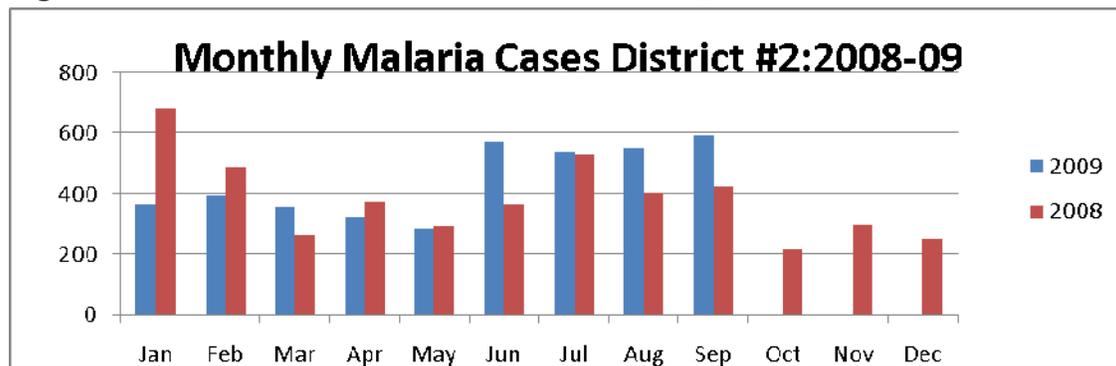
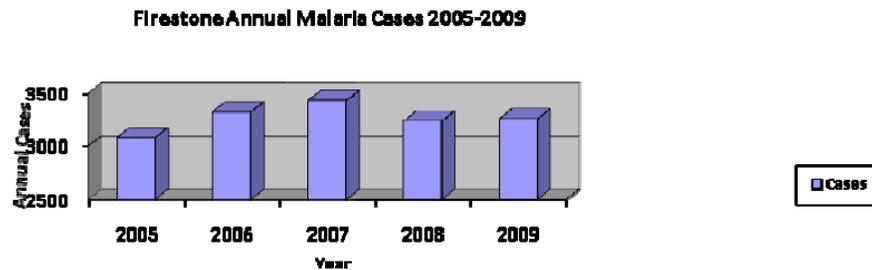


Figure 2: Annual Malaria Cases in Firestone District, 2005–October 2009



In these figures, cases for 2009 are represented to October 2009.

Project Management and Administration

The project was joined by a logistics officer, Prince Borbor. A two-member delegation from the U.S. Government Auditor General department carried out a logistics audit in November 2009.

Partnership and Collaboration

The RTI chief of party (COP) attended several meetings, including participation in the revision of the National Malaria Strategic Plan, and contributed to the IRS/Integrated Vector Management (IVM) section of the plan. The plan has been concluded, and the country is going to scale up IRS to protect 50% of the population by 2011. He also attended the regular monthly Malaria Steering Committee and the IRS Task Force meetings. Presentations and updates were provided on IRS at these meetings.

RTI staff also attended an important meeting with Firestone management. The company has agreed to be part of next year's IRS campaign and will contribute human, material, and financial resources. The IRS team had meetings with the County Health Team of Grand Bassa and Montserrado. The mission was to update them on the IRS campaign and to have them as part of next year's campaign.

Upcoming Activities (January 1, 2010–March 31, 2010)

- Entomological training of MOHSW personnel
- IRS training spray operations trainings
- IRS is scheduled to start on March 1, 2010.

Madagascar

Background

This quarterly report presents the program's progress in Madagascar from October to December 2009 and summarizes the program's current activities and achievements, outstanding issues, and upcoming activities.

Key partners in the Indoor Residual Spraying (IRS) Madagascar program include the U.S. President's Malaria Initiative, the Malagasy Red Cross (MRC), Institut Pasteur de Madagascar (IPM), and RTI.

Table 1 illustrates the schedule for the 2009 IRS campaign.

Table 1: 2009 IRS Schedule

Training of trainers	October 12–20
Geo survey	October 21–31
Training of the team and spray operators	November 2–14
IRS campaign	November 16–December 19

Current Activities and Accomplishments

Procurement and Logistics

RTI International district staff identified 106 secondary storage facilities at the commune level and rehabilitated the facilities to ensure compliance with United Nations Food and Agriculture Organization (FAO) storage recommendations and with environmental compliance standards. At each storage facility, insecticide stocks were stored on pallets and separated from other materials and equipment. The facilities were also stocked with buckets of sand and water to extinguish fires; they were guarded 24 hours per day, and equipped with lockable doors.

All warehouses were staffed with one storekeeper and two guards trained by RTI Madagascar staff on safety measures and the management of side effects from accidental exposure to insecticide.

The MRC team conducted a geographical reconnaissance survey from October 21 to 31, 2009. The data from this survey is displayed Table 2.

Table 2: Results of Geographical Reconnaissance Survey

District	Communes	Village	Population	Structures			Rooms	Areas (in meter ²)
				With Floor	Without Floor	Total		
Anjozorobe	18	179	193,476	16,996	20,214	37,210	112,241	4,489,640
Ankazobe	13	143	160,845	18,122	9,521	27,643	105,658	4,226,320
Mandoto	8	75	120,733	9,020	12,077	21,097	68,372	2,734,880
Betafo	18	151	240,510	30,902	7,862	38,764	136,128	5,445,120
Ambositra	23	277	206,634	29,011	9,934	38,945	145,990	5,839,600
Ambatofinandrahana	9	81	168,489	22,791	4,617	27,408	107,899	4,315,960
Ambohimahaso	18	166	230,383	35,061	1,787	36,848	160,311	6,412,440
Total	107	1,072	1,321,070	161,903	66,012	227,915	836,599	33,463,960

Environmental Compliance

In all communes, the construction of soak pits was completed before the start of spray operations, following the IRS program time line. In addition, smaller soak pits were constructed for spray can rinsing in villages that were located far from the commune center where the main soak pits are located. Progressive rinsing was implemented for the pump washing and the rinse water that remained was reused to mix insecticide for the next spraying day.

Gaspard Bikwemu, IRS environmental compliance inspector, traveled to Madagascar from October 31 to November 17, 2009, to conduct the pre-spray environmental compliance inspection and ensure that all mitigation measures were considered. Mr. Bikwemu assisted in ensuring that the IRS program had adequate primary and secondary warehousing capacity and appropriate soak pits and wash areas in place for the spray round. Mr. Bikwemu also assisted in the spray operators training and conducted a brief training session for IRS personnel on best practices in environmental compliance for IRS.

During spray operations, Mr. Autman Tembo, an Environmental Officer based out of the Nairobi Regional Office, traveled to Madagascar to conduct the midspray environmental compliance assessment from November 30 to December 10, 2009. During his visit, Mr. Tembo followed up on the identification of an IRS waste disposal facility and visited the new incinerator for the Adonis group although it is not yet installed.

Information, Education, and Communication (IEC)

The MRC staff, along with the local authorities at the commune level, recruited six agents for each village. These agents ensured that accurate data was collected for the geographic survey and mobilized the communes before, during, and after the spray campaign.

The zone and sector managers, who had previously been through the training of trainers (TOT) for the IEC campaign, lead the training of the IEC mobilizers. In total, 7,399 IEC mobilizers were trained.

The IRS project supported the costs for printing the IEC materials. The mobilization strategies for this campaign were mainly centered around door-to-door communications, focus groups lead by IEC mobilizers and the village leaders, and local radio spots.

Spray Operations

Dr. Jean Desire, vector control manager, led the TOT with two national consultants and the Madagascar RTI staff from October 12 to 20, 2009. Along with the chief of party (COP), he also played a lead role in supervision of the spray operators training and the overall IRS campaign.

Table 3 presents the participants at the TOT (MRC technical staff).

Table 3: Training of Trainers Participants

National coordinator	1
Central supervisor	2
Regional coordinators	4
Zone managers	10
Sector managers	27

Before commencing spray operations, the MRC team worked with community authorities to identify and recruit spray operators and team leaders. The sector and zone managers oversaw the training of the supervisors, team leaders, spray operators, and IEC mobilizers. During the training, each spray operator was issued a full set of personal protective equipment (PPE). The IRS district managers worked with the local authorities to identify storekeepers and the security guards for the commune warehouses where insecticide, spray equipment, and PPE were stored during spray operations. District managers also provided oversight during training.

Pregnancy tests were administered to all females before the start of IRS activities and all tests had negative results. During spray operations, washers and carriers were recruited, trained by sector managers on safety measures and management of side effects of exposure to insecticide, and assigned to soak pits in each commune. Table 5 in the monitoring and evaluation (M&E) section lists the number of people identified and trained.

Other Activities

Entomological Monitoring

The IPM and RTI finalized the subcontract for entomological monitoring activities in this quarter. Table 4 illustrates the activities underway in the three selected entomological monitoring sites.

Table 4: Activities in Entomological Monitoring

	Principal Activities	Dec	Jan	Feb	March	Apr	May
1	Identify the vector species composition in the sentinel sites	x	x	x	x	x	x
2	Determine the bio-ecology of the vectors	x	x	x	x	x	x
3	Observe and assess dynamics of the transmission	x	x	x	x	x	x
4	Test vector insecticide susceptibility					x	
5	Test the effectiveness of insecticide on treated surfaces	x	x	x	x	x	x

Mr. Raymond Beach (U.S. Centers for Disease Control and Prevention) assisted the field entomological activity from December 15 to 18, 2009.

Monitoring and Evaluation

Spray operators recorded data on spray cards as they moved from structure to structure. The spray cards were then transmitted to team leaders, who filled out team leader data cards from the household data. The team leaders submitted data cards to the sector managers for further compilation. Finally, zone managers verified the data before providing it to the RTI M&E officer to analyze and track core IRS indicators. The spray coverage and other indicators will be reported in the next quarterly report and the End of Spray Report.

Table 5 displays the number of people trained in the various IRS positions.

Table 5: People Trained in IRS by Position Assignment

District	Storekeepers	Security Guards	Washers	Carriers	Mobilizers	Spray Operators	Team Leaders	Spray Trainers
Anjozorobe	18	36	32	32	1,169	79	16	7
Ankazobe	13	26	36	36	1,001	83	18	4
Mandoto	8	16	34	34	525	85	17	3
Betafo	18	36	46	46	1,057	114	23	7
Ambositra	23	46	52	52	1,974	125	26	8
Ambatofinandrahana	9	18	32	32	560	73	16	4
Aambohimahasoa	17	34	44	44	1,113	110	22	4
TOTAL	106	212	276	276	7,399	669	138	37

Project Management and Administration

The COP and finance manager (FM) attended the Zanzibar COP/FM conference from October 20 to 24, 2009.

The U.S. Ambassador to Madagascar visited the IRS program in Anjozorobe on December 15, 2009.

Partnership and Collaboration

The subcontract between RTI and MRC was finalized for support during spray operations.

The subcontract between RTI and IPM for entomological monitoring activities was finalized and the statement of work is currently underway.

Outstanding Activities

- Compiling IRS data
- Warehousing the equipment and materials
- Collecting and disposing IRS solid waste

Upcoming Activities (January–March 2010)

- Write End of Spray Report
- Inventory equipment and material
- Establish a relationship with the Adonis Group to move forward on the disposal of IRS solid waste
- Develop 2010 work plan

Malawi

Background

The United States Agency for International Development (USAID) with funding from the United States President's Malaria Initiative (PMI) supports the Malawi National Malaria Control Program (NMCP) in implementing its indoor residual spraying (IRS) program. The IRS program targets the Nkhotakota District. RTI provides assistance to the NMCP to carry out the IRS program in a number of ways, including operational management; procurement of IRS equipment and supplies; establishment of storage facilities; IRS campaign planning; information, education, and communication (IEC) campaign management; data management, management of operational transport; and the training and management of spray operations personnel and supervisory personnel. RTI also provides environmental assessments to ensure the IRS program is operating according to IRS environmental standards. Key partners in IRS in Malawi include PMI, the Ministry of Health (MOH), NMCP, District Health Office (DHO), and Health Surveillance Assistants (HSA).

This quarterly report presents the IRS program's progress in the district of Nkhotakota in Malawi from October 1 to December 31, 2009, and summarizes the project's current activities, achievements, and upcoming activities.

Current Activities and Accomplishments

This quarter was focused on the implementation of the third round of IRS in Malawi. Activities included implementation and oversight of the IEC campaign, supervision of spray operators in the field, analysis of IRS data, environmental compliance, and demobilization and close up of operations.

Procurement and Logistics

The majority of the procurement was completed in the previous quarter (June to September 2009). In this quarter, the focus of logistics was on close-up of operations. IRS commodities were collected from the five operational sites and were transported to the warehouse at Nkhotakota BOMA. IRS items were all counted at operation sites before disposition from those sites to the main warehouse.

Environmental Compliance

During the spray round, the IRS technical team, including the chief of party (COP), district managers, and supervisors, constantly monitored the spray operators in the field and at the operational sites on all environmental compliance points to prevent human or environmental exposure to insecticide. In October, a team of auditors from USAID visited during the spray operations and assessed areas of environmental compliance. The team found the Malawi operations to be satisfactory.

The district environmental inspector from the district assembly and Mr. Autman Tembo, RTI IRS Environmental Compliance Officer, conducted a mid-spray inspection. Mr. Tembo inspected all operational sites and evaluated compliance based on recommendations made during the pre-spray inspection and his observations during the mid-spray period. All

warehouses, store rooms, and soak pits were inspected during the mid-spray inspection to ensure they met required standards.

Other environmental compliance activities included daily monitoring and recording of warehouse temperatures to ensure that the insecticide was not exposed to extreme temperature.

Spray operators were strictly monitored for correct use of personal protective equipment to minimize the human exposure to the insecticide. Spray supervisors monitored the soak pits so that any mistake made by a spray operators or washers during the triple rinse of spray cans could be caught immediately and corrected.

Waste Management and Disposal



Figure 1. *Spray pumps stored in the warehouse*

All IRS waste was counted and stored until IRS operations were completed on November 25, 2009. The solid waste generated by the IRS campaign was disposed of using the incinerator located at Nkhotakota District Hospital. The incinerator had previously passed inspection and was approved for use during this spray round.

The COP, District Environment Inspector (DEI), District Health Environment Officer (DEHO), and RTI Logistician supervised the first day of the incineration on December 11.

The DEI, DEHO, and RTI Logistician continued to supervise the process until it was completed. Empty sachets (Figure 1) were incinerated first, and then other solid wastes followed.

All waste categories incinerated are reflected in the table below.

• Description of Equipment/Item	• Qty Disposed
Fendona empty sachets	31,157
ICON® empty sachets	10,360
Respiratory masks	5,207
Plastic black sheets	94
Rack sack bags	350
Gloves	1,019
ICON empty cartons	259
Fendona empty cartons	741
Mutton cloths pieces	750

The incineration process was completed on December 22, 2009.

Information, Education, and Communication

As in previous quarter, IEC volunteers continued to disseminate information about IRS activities by focusing on door-to-door sensitization and appearing on local radio spots. Moreover, radio stations broadcasted the District Commissioner’s speech promoting IRS, and the District IEC Manager’s message continued to run three times a day.

Capacity Building of Ministry of Health

Throughout the spray round, the COP gave training to program managers to empower them with skills in program supervision, field program management, IRS program strategizing, field crisis management, and reporting. During the spray round, the RTI COP lead a training of 10 sector program managers and district program managers on rehabilitation of operational sites for environmental compliance.

Spray Operations



Figure 2. Spray Operators from Round 3 IRS

During this reporting period, RTI and DHO conducted a successful scale up of IRS to cover the entire district of Nkhotakota. The total number of structures sprayed was 74,772 out of 82,250 found during spray operations, representing a coverage rate of 91%. In terms of households (HHs) covered, 70,625 HHs were found and 63,183 were sprayed, equaling 89% coverage. A total of 41,520 sachets of insecticide (Fendona, alpha-cypermethrin wettable powder) were used throughout the spray round.

The spray round included 280 spray operators, 57 team leaders, 22 supervisors, 10 operation site managers, 71 IEC volunteers, 242 HSA mobilizers, 20 washers, 15 guards, 5 data entry clerks, and 30 drivers. Figure 2 shows a sample of IRS spray operators.

Spray operations were originally scheduled to end on November 14, 2009, but the mop up exercise extended the operation until November 25, 2009. Closure of IRS operations was held the same day of ending of spray activities. This was conducted at each operation site to prevent transport costs. The DHO and the representative from the District Commissioner's Office conveyed the closing remarks at Nkhotakota BOMA operation site. Other members from the District Assembly also attended the IRS closing event (Figure 3).



Figure 3. Closing remarks by the District Assembly

• Indicator	• Fiscal Year 2009 Result	
Total HHs visited/found	70,625	89% coverage
No. of HHs sprayed with insecticide	63,183	
Total No. of structure found	82,250	91% coverage
No. of structure sprayed with insecticide	74,772	
No. of people trained in IRS	848	236 women 612 men
Total population found	331,804	90% protected
No. of people protected by IRS	299,744	
Total under 5 protected by IRS	66,136	
No. of pregnant women protected	7,815	
Total nets found	113,464	
Total pregnant women in visited HHs	8,743	
Pregnant women sleeping under a net	6,150	
Total No. of children under 5 in visited HHs	73,512	
Children under 5 sleeping under a net	50,372	

Results of Third Spray Round IRS

Post-spray Activities

In December 2009, after the close of the spray round, IRS program staff sponsored community meetings (Figure 4) with the aim of sharing results of IRS campaign and obtaining feedback from community members. These meetings were instrumental in clarifying causes of anxiety, mistaken beliefs, and reasons for refusal of IRS. Sixteen open forum meetings were held within the intervention area.



Figure 4. *IRS Community Meeting*

Each health sector area also conducted at least one meeting. Because of the tight closeout schedule, meetings could not be scheduled in each village, but a total of 21 meetings were conducted and a total of 885 participants attended the meetings, of which 412 were women. Participants included village headmen, religious leaders, political leaders, head teachers, policemen, and chairpersons of the village health

committees as community representatives.

The following topics were discussed:

- Malaria profile in their respective areas
- Side effects/complaints experienced following IRS operation
- Mosquito population before and after spraying
- 2009 program performance compared with 2008 spray campaign
- Reasons for refusals, spray operation critiques, and challenges
- Areas that needed thorough clarification during mobilization and spraying
- Misconceptions and rumors surrounding the IRS
- Community recommendations for improving IRS Program

Project Management and Administration

Mr. Akililu Mulate served as the acting Finance Manager during the quarter. He managed all finance systems during this quarter and gave financial reporting trainings to program managers and he trained two accounting clerks on policies and procedures.

PMI requested that we initiate program close-out and set Jan 10, 2010, as the close-out date. This date has since been extended because of the USAID audit of the Malawi office. However, the office is still on track for close-out and during the quarter the staff has been working on ensuring all vendors were paid and staff contracts were amended for termination on the close-out date. All commodities have been counted and inventory has been carefully reviewed in order to carry through commodity disposition to PMI.

Partnership and Collaboration

The IRS project team held a series of meetings with Traditional Authorities and District Assembly to brief them on the progress and challenges experienced during the IRS round.

These collaborations produced positive results and improved the program acceptance in the community. The COP worked closely throughout the spray round with the NCMP assigned IRS Program Manager. The NMCP IRS Program Manager was instrumental in securing community buy-in of the program and infusing local ownership. Mr. John Chiphwayna from Malawi NMCP was also actively involved in supervision and program management. Various meetings at the central level with MOH, NMCP, and PMI took place throughout the quarter to discuss IRS progress and challenges and the future of the program in Malawi.

Outstanding Activities

- Financial close out of the IRS program pending audit completion
- IRS commodity disposition from Nkhotakota project PMI identified location
- Disposition of office furniture and equipment

Mali

Background

The indoor residual spraying (IRS) project in Mali funded by the United States Agency for International Development (USAID) and the United States President's Malaria Initiative (PMI) to support the *Programme National de Lutte contre le Paludisme's* (PNLP's, or National Malaria Control Program) IRS campaign that targets Bla and Koulikoro districts. In 2009, the IRS program sprayed 126,922 structures (93% of the targeted structures), protecting a total population of 457,374 in Bla and Koulikoro districts, and trained 2,607 persons in support of spray operations, including 424 spray operators, 43 team leaders, and 1,951 information, education, and communication (IEC) mobilizers.

RTI International leads IRS implementation in collaboration with the PNLP, National Center for Information, Education, and Communication; Ministry of the Environment; African Program on Pesticide Stocks; Ministry of Agriculture; Malaria Research Training Center; referral hospitals in Bla and Koulikoro districts; and community health centers.

This quarterly report presents the program's progress in Mali from October to December 2009 and summarizes the project's current activities and achievements, outstanding issues, and upcoming activities.

Current Activities and Accomplishments

Efforts this quarter were dedicated to finalizing the 2009 IRS campaign report and submitting the 2010 Mali IRS Work Plan and Budget to USAID/PMI.

Planning and Assessment

To assist with program planning for the 2010 Mali IRS campaign, IRS program staff organized a needs assessment.

Procurement and Logistics

Along the same lines as the needs assessment, we conducted a general inventory of the two central warehouses of Koulikoro and Bla.

Environmental Compliance

During this quarter, program staff conducted inspections of all the 42 IRS sites in Koulikoro and Bla. These inspections allowed us to evaluate the state of all secondary warehouses, wash areas, and soak pits; and plan for repairing the sites with problems/damaged.

As part of the inspection process, personal protective equipment (PPE) and spray pumps were inventoried. Used gloves were examined: those in a good state were kept for use in 2010 IRS campaign; those that were damaged will be destroyed with other contaminated solid waste. Overalls and boots were washed; and the pumps were cleaned and lubricated and repaired if damaged.

Information, Education, and Communication

There were no IEC activities completed during this reporting period.

Spray Operations

We began with the updating of the cartography and chronogram activities. This important activity will be finalized in the first quarter of 2010. It will allow us to determine exactly the number of structures per operator per day and to elaborate a spray activities calendar for Koulikoro and Bla during the 2010 IRS campaign.

Other Activities

Entomological Monitoring

The IRS program completed the entomological and monitoring report for the 2009 IRS campaign that provides results for the Bla district; the report does not contain results for Koulikoro because the mosquito stock had decreased and was not enough to cover the tests. The stock is back up and the MRTC team will be in the field shortly in Koulikoro.

During the monitoring, different sprayed houses were selected to conduct the cone bioassays. Results showed variations in the mean mortality rates of anophelines as well as in the knock down rates. With the newly selected houses, some of the mortality rates were more than 80%, whereas others were less. In all cases, the mean mortality rates did not reach 90%. However, if mortality rates are looked at for individual houses, we could sometimes achieve 100% mortality.

Capacity Building of Ministry of Health

There were no capacity building activities during this reporting period.

Other Activities

Program staff participated in the Chief of Party and Finance Administration Conference organized by RTI in Zanzibar October 24–29, 2009.

Monitoring and Evaluation (M&E)

- 1- Update of the forms for the IRS M&E system and the households cartography.
- 2- Resignation of the Mali IRS M&E Officer.

Project Management and Administration

- 1- The Technical Coordinator and the Logistician have achieved their approbatory period of three months.
- 2- Orientation of the all team of the project on RTI in general and on RTI procedures in particular.
- 3- Visit of the Nairobi IT Regional Coordinator: Training of RTI IT policy and to solve some computers issues.

Partnership and Collaboration

- 1- The COP has met the new General Secretary of the Ministry of Health and presented the Mali IRS program and discuss with the Secretary General about the incineration of the ICON[®] sachets.
- 2- The COP worked with the PMI/USAID team to come to agreement on the 2010 Mali IRS Work Plan and Budget before their elaboration by RTI.

- 3- The COP and the Technical Coordinator participated in the USAID meeting on the review of the Specific Objective 6 Health Strategic framework and Performance Management.
- 4- Steering Committee meeting that featured
 - a. COP presentation on the main IRS activities during this 2009 fiscal year
 - b. Discussion about the incineration of the ICON sachets
 - c. Discussion about the signature of the memorandum of understanding (MOU)

Outstanding Activities

- Continue with the updating of the cartography and activities chronogram
- Organize the national level end-of-spray workshop restitution
- The Ministry of Health to sign the MOU
- The IRS program and the *Programme Africain Relatif aux Stocks de Pesticides* (African Program on Pesticide Stocks) to agree on the steps to follow for proper disposal of solid waste.

Upcoming Activities

- Finalize the Work Plan and the Budget of the FY 2010 Mali IRS campaign
- Incinerate the ICON sachets
- Order spray pumps, PPE, insecticide, and pregnancy tests for the 2010 Mali IRS campaign.

Mozambique

Background

Mozambique was identified by the U.S. Agency for International Development (USAID) as one of the second wave of countries to receive funding under the U.S. President's Malaria Initiative (PMI). Subsequently, USAID and the Mozambique National Malaria Control Program (NMCP) identified six epidemic-prone districts in Zambezia province (Milange, Mocuba, Morrumbala, Namacurra, Nicoadala, and Quelimane) to receive PMI support for indoor residual spraying (IRS) activities.

The 2009 IRS seasonal activities began in March with a two-day microplanning meeting in Mocuba district involving all district malaria team members from the six targeted districts, as well as the provincial health team and RTI support team. The number of target structures for the 2009 IRS campaign was set at 523,773 structures in the same six districts, facilitated by the addition of two operational bases in Mocuba and Milange. Because of limited dichloro-diphenyl-trichloroethane (DDT) stock available for the current year, only Mocuba district was sprayed with DDT; all other districts used pyrethroid stocks procured by the Ministry of Health (MOH). Final spray data show that 571,194 structures were sprayed in Zambezia, exceeding the target by nearly 48,000 structures. Coverage (houses sprayed against houses found) was 96.8%.

This quarterly report presents the program's progress in Mozambique during October 1 to December 31, 2009, and summarizes current activities and achievements, outstanding issues, and upcoming activities.

Current Activities and Accomplishments

During the current quarter, the program carried out post-spray activities focused on compiling and analyzing spray data, settling payments, conducting other administrative and logistic functions, and carrying out environmental monitoring activities. All material used during spraying operations were collected, inventoried, stock balanced, sorted, and stored for next year's campaign.

IRS implementation activities in Mozambique officially ended on October 2, 2009. The 2009 campaign was a success, covering 571,194 structures from 25 operational bases. The coverage rate was 96.8% of the houses visited. The IRS operational team of seasonal workers consisted of approximately 1,400 individuals in different categories, including spray operators, mobilizing agents, district supervisors, and the provincial technical team.

Twenty-one out of 23 wash slabs and evaporation tanks were functional during the reporting period, enabling secure handling of insecticide and avoiding environmental contamination. Four out of five district base storage and office facilities—Mocuba, Morrumbala, Namacurra, and Nicoadala—were functional during the entire spray campaign; the storage facility in Milange district became functional during the last month of the operation.

Activities that took place during the reporting period are highlighted below.

RTI Mozambique successfully recruited an entomologist to train junior biologists; she is stationed at the MOH in Maputo.

As part of the DDT transfer evaluation study, air and crop samples were collected to test for residual DDT and DDT isomers. An environmental inspection and sampling of evaporation tanks was also carried out.

A post-IRS review meeting was took place at Salala to discuss the results and lessons learned from the 2009 IRS campaign.

Routine entomological monitoring activities were completed during the quarter, which will lead to a separate report from RTI's subcontractor, Liverpool Associates for Tropical Health (LATH).

Planning and Assessment

This quarter immediately followed the IRS campaign, so few planning and assessment activities were necessary.

Crown Agents handled the final payment/settlement of IRS personnel. They officially terminated their activities and closed the field office in Zambezia at the end of November 2009. The payment of incentives for community leaders who participated during the IRS mobilization efforts was handled by the RTI team because the payroll list was only finalized in December 2009 by the respective districts.

Procurement and Logistics

Insecticides

RTI does not procure insecticides for the Zambezia province IRS program. The insecticides are provided by the MOH.

Spray pumps and parts

All the spray pumps and personal protective equipment (PPE) used for the spray operation in were checked for reuse, repaired as necessary, and stored for next year's IRS campaign. These activities were supported by the RTI logistic officers, temporary storekeepers, and pump repair technicians.

Personal protective equipment

No PPE was procured during this reporting period.

Environmental Compliance

During this quarter, all but two evaporation tanks were used to store and evaporate insecticide waste water. DDT was used only in Mocuba district with all standard precautions; all other districts used pyrethroids. All empty sachets were collected and stored in district storage facilities pending transfer to the Quelimane warehouse.

Routine maintenance on the evaporation tanks was completed during the transition from the dry to the rainy season. Daily monitoring of evaporation tanks was also carried out; evaporation tanks were allowed to dry and all residual materials were collected and stored for safe disposal. In anticipation of heavy rains in December 2009, any remaining waste water in the evaporation tanks was pumped into plastic tanks for safe storage by the last week of November 2009.

The Supplemental Environmental Assessment document, which was submitted in last quarter, is still pending approval because RTI is awaiting the official results of soil and crop samples that were being analyzed for DDT residues. In December 2009, some preliminary baseline results on DDT levels in samples of soils and crops were made available by AgriQ, the lab in Nairobi contracted by RTI to analyze these samples. The full and complete set of finalized results as forwarded to PMI in late January 2010.

The process to safely dispose of DDT waste material collected and secured in the RTI warehouses is now in the final stages. The RTI Maputo office received an official quote from Enviroserve, a government-approved waste disposal company in Maputo, and a contract was executed to handle the task. A formal requisition was sent to the Basel Convention to approve the transborder shipment of DDT waste. Once the Basel Convention feedback is received, combustible DDT waste will be transported from Zambezia province to South Africa, where it will be destroyed at the Thermopower incineration facility.

Both official reports presented by the Ministry of Environmental Affairs (MICOA) and the Ministry of Agriculture (MINAGRI) officers from the provincial office during the post-IRS review meeting in Salala clearly emphasized the great improvement in handling insecticide in the field, as well as the improvement in storage practices in all six districts. Reports also indicated no significant theft or misuse of insecticides by the spray teams in the field. No reports of pilferage of insecticides into formal markets were observed during unannounced visits from MINAGRI and MICOA. A few cases of attempts to steal insecticides were dealt with by expelling the spray operator and team leader.

In compliance with the DDT transfer evaluation study, two environmental scientists travelled to Mozambique in October 2009 to conduct field work for the first phase of the study. They worked with local support consultants to store food items in traditional containers in six houses in Mocuba district, the only district where DDT was used in the most recent spray campaign. Further, another two houses were selected from an adjacent district, Maganja da Costa, as controls. In each house, consent was obtained to store, periodically observe, and take food samples from the containers placed by the study team. Owners of the houses were given a small monthly incentive for maintaining food samples in compliance with the study design. The first set of samples taken in October 2009 was sent for analysis in Nairobi. Along with the study, evaporation tanks were also monitored for DDT contamination levels. These samples have been sent to Nairobi for analysis. The team consisted of Direcção Provincial de Saúde (DPS, Provincial Department of Health), RTI, and MICOA and MINAGRI officials. They received training by the RTI/HQ team.

Information, Education, and Communication (IEC) Development and Implementation

During the spray campaign, community mobilization was carried out by 152 mobilizing agents and supervisors in six districts aided by about 800 community leaders from various villages. Community leaders were compensated with equivalent daily wages of a mobilizing agent for their participation.

IEC material design and development

There were no activities in this area.

Training of IEC mobilizing agents

There were no activities in this area.

IEC campaign implementation

There were no activities in this area.

Coordination with spray operations

There were no activities in this area.

Spray Operations

Geographic reconnaissance and detailed planning

There were no activities in this area.

Recruitment and orientation for district administration

There were no activities during current period.

Environmental mitigation setup

Out of 23 evaporation tanks, 21 were in operation by the end of the spray season. These tanks evaporated insecticide waste water until the last weeks of November 2009 when the RTI team collected the remaining waste water into plastic tanks in anticipation of heavy rains that were forecasted for December 2009.

Recruitment and training for spray teams

There were no activities during this period.

Logistics support for spray operations

RTI and the Crown Agents teams provided logistical support for IRS implementation at 25 district operation centers. The main logistical activities included providing transportation and allowances for DPS and District Health officers who collected, sorted, and stored all IRS material from operational bases. A subsequent final inventory was completed and materials were returned to the central RTI warehouse.

IRS final coverage data

The IRS campaign was initiated on June 15, 2009, and lasted until October 2, 2009. A total of 12 weeks of field operations were completed, accounting for nearly 60 days of actual field work. Final data are shown in Table 1 below.

Table 1. IRS Coverage Data from Six Districts in Zambezia Province (June–October 2009)

District	Operational bases	Original planned target	Structures visited	Structures sprayed	Coverage	Children under five	Pregnant women	Population protected	No. of bed nets reported
Nicoadala	N.Sede	28,763	38,792	38,405	99.0%	24,328	8,870	164,621	31,912
	Namacata	17,090	18,902	17,156	90.8%	10,444	4,077	60,849	12,218
	Maquival	16,152	22,108	21,700	98.2%	14,509	5,471	93,030	19,824
	Madal	11,663	11,866	10,750	90.6%	5,527	2,165	45,922	11,035
District total		73,668	91,668	88,011	96.0%	54,808	20,583	364,422	74,989
Namacurra	N. Sede	15,654	22,109	21,315	96.4%	11,132	3,911	84,245	13,895
	Furquia	13,706	25,230	24,397	96.7%	10,163	3,134	75,401	12,309
	Mexixine	7,274	11,076	10,395	93.9%	5,617	1,567	37,737	8,235
	Macuse	17,059	26,863	26,506	98.7%	12,570	5,802	87,737	16,280
District total		53,693	85,278	82,613	96.9%	39,482	14,414	285,120	50,719
Mocuba	Sede	78,912	62,852	60,395	96.1%	59,600	15,016	284,256	67,701
	Munhiba-caive	18,804	19,710	19,669	99.8%	18,102	6,436	102,682	27,311
	Mugeba	27,637	29,067	28,555	98.2%	24,577	4,579	119,777	28,398
	Namanjavira	11,959	10,525	10,502	99.8%	10,963	2,755	47,700	11,633
District total		137,312	122,154	119,121	97.5%	113,242	28,786	554,415	135,043
Milange	M. Sede	69,197	86,877	83,066	95.6%	64,736	16,271	271,593	45,320
	Tengua	21,112	13,296	13,295	100.0%	13,525	2,923	53,652	6,991
	Coromana	17,167	25,856	24,666	95.4%	17,257	3,911	83,864	9,535
	Monguê	9,423	16,581	15,569	93.9%	9,823	2,460	51,582	4,980
District total		116,899	142,610	136,596	95.8%	105,341	25,565	460,691	66,826
Morrumbala	M. Sede	32,059	35,141	34,267	97.5%	28,310	5,721	113,370	26,077
	Muandua	14,099	13,788	13,677	99.2%	9,241	3,030	51,672	12,747
	Pinda	6,164	8,069	7,964	98.7%	5,055	1,480	29,970	5,975
	Megaza	6,819	7,363	7,251	98.5%	6,108	925	29,872	6,334
	Chire	19,613	20,686	20,368	98.5%	12,412	5,076	76,269	11,441

District	Operational bases	Original planned target	Structures visited	Structures sprayed	Coverage	Children under five	Pregnant women	Population protected	No. of bed nets reported
	Sabe	5,141	4,934	4,849	98.3%	2,592	895	15,169	2,236
	Guerissa	3,070	3,866	3,789	98.0%	4,822	978	14,917	3,481
	Derre	11,983	10,876	9,752	89.7%	11,417	3,174	39,438	6,652
District total		98,948	104,723	101,917	97.3%	79,957	21,279	370,677	74,943
Quelimane	Quelimane	43,253	43,598	42,936	98.5%	36,699	5,830	228,084	65,749
Total	Zambezia Province	523,773	590,031	571,194	96.8%	429,529	116,457	2,263,409	468,269

Post-Spray Operations

Post-spray operations focused mainly on demobilizing the spray teams, closing down temporary bases, collecting IRS materials and insecticide from operational bases to the district bases, and finalizing payments of IRS personnel at the district level. At the provincial level, all PPE and other IRS materials, including remaining insecticide, were also collected and stored in the provincial warehouse.

Demobilization of the IRS team coincided with the final payroll activities carried out by Crown Agents and RTI. All material had to be returned to the base supervisor and base storekeeper before workers could be paid. Spray operator identity cards were also retained by the district IRS team. All material from the peripheral operational bases were inventoried by the district base storekeeper, and then stored at the district base. These materials consisted of non-reusable PPE and spray pumps. Similarly, all the remaining stocks of insecticides and empty sachets from the peripheral bases were returned to the district bases. They were then transported to the provincial DPS warehouse in Quelimane.

Other Activities

Entomological Monitoring

The monthly mosquito window trap collection for entomological monitoring was carried out during the quarter. World Health Organization tests for insecticide resistance studies were also done, although very few mosquitoes were captured. LATH, who conducted the entomological monitoring, will prepare a third quarter report on these activities.

The refurbishment work on the molecular entomology laboratory at Instituto Nacional de Saúde (INS, National Institute of Health) premises in Maputo is almost finished. All materials are in place and the lab will be functioning from January 2010.

In Cabo Delgado, owing to the high cost of the original plan to retrofit a shipping container to house the entomology lab, the RTI team is reviewing quotes for several proposed mechanisms to refurbish a space to create a basic entomology lab. RTI is in discussions with PMI and the NMCP team to find the best and most efficient solution because the purchase of containers has been time consuming and is dependent on container availability in Nacala, the closest port to Cabo Delgado. A new proposal to put up a simple two-roomed building is now being studied.

Capacity Building of MOH

No specific capacity building activities were conducted during this period.

Baseline environmental monitoring

The second round of environmental sampling for DDT was completed during the last quarter. The samples were processed and stored in the Maputo office until the end of December 2009, when they were sent to Kenya for analysis. Results are expected within the next quarter.

Monitoring and Evaluation

Information collection plan

Before the post-IRS review meeting, IRS data records were rechecked and a final database was produced. However, a plan to recheck the data with the summaries available with the DPS/RTI office will be carried out within the next quarter.

Progress on key indicators

Progress on the key indicators including coverage and population protected is shown in Table 1.

Project Management and Administration

Staffing

There were two open positions during this period, one of which has been filled. The entomologist position was filled and the candidate began work in December 2009. The candidate for the provincial coordinator did not report for work on the date specified and was therefore considered to have abandoned post. New efforts to recruit for this position are underway. About 35 new applications were received and the selection process will begin next quarter.

Administrative support (includes summary of oversight and support from the Nairobi Regional Office)

IRS activities were implemented in the last quarter. Therefore, only a few monitoring visits to maintain the evaporation tanks and district warehouses were required during the current quarter.

All routine office management activities for the cooperating country national staff and local service requisitions are handled by both the Maputo and Quelimane offices, consisting of a 13-member team.

The RTI Nairobi regional office and the RTI home office supported the RTI Mozambique office on routine administrative issues, monthly financial reports, technical and environmental monitoring issues, and other reporting.

Office and warehouse space

A central office in Maputo and a field operations office in Quelimane were maintained during the current quarter.

Two warehouse buildings in Quelimane city (one to store PPE and pumps and the other to store insecticide waste and unused insecticide) were also maintained during this quarter.

The eight local buildings rented for the operational bases were demobilized by the end of October 2009. All material was transferred to the central warehouse in Quelimane.

Partnership and Collaboration

National partners

The memorandum of understanding with the NMCP/DPS was signed in October 2009.

USAID partners

Meetings were held on an ad hoc basis with USAID/PMI, NMCP, and INS to discuss IRS implementation, waste disposal, environmental compliance, capacity building for entomological research, and survey activities.

The RTI team continued to work closely with Crown Agents to complete evaporation tanks and district storage/office sites.

Outstanding Activities

- Procure four vehicles
- Establish the regional entomology lab in Cabo Delgado province
- Start construction of sanitary and washing facilities in 23 operational bases

Upcoming Activities for Next Quarter

- Construct toilet and bathing/changing facilities in district operation bases
- Conduct follow-on sampling for the DDT transfer evaluation study in January 2010
- Complete water supply to Milange main base center
- Rehabilitate the entomology lab in Pemba, Cabo Delgado
- Prepare PPE and pumps for the upcoming 2010 season
- Initiate the procurement process for PPE and pumps for the 2010 season
- Dispose of unusable PPE that have been contaminated by DDT in South Africa
- Recruit a provincial coordinator and warehouse keeper

Rwanda

Background

Rwanda was one of the second wave of countries to receive funding under the United States President's Malaria Initiative (PMI). In 2006, the United States Agency for International Development (USAID), the Rwanda Ministry of Health (MOH), and the National Malaria Control Program (PNILP in French) identified three epidemic-prone districts—Nyarugenge, Gasabo, and Kicukiro in Kigali Province—for implementing Indoor Residual Spraying (IRS) activities. In 2007, RTI International was tasked with providing strategic, technical, management, and operational support for the indoor residual spraying program in Rwanda, beginning with these three identified districts. In 2008, the IRS program expanded to cover two additional districts, Kirehe and Nyanza. In 2009, the IRS spray area added Bugesera and Nyagatare districts, for a total of seven districts with 54 sectors.

This quarter concentrated on concluding IRS round four preparations and conducting spray operations and related IRS activities. Specific activities included completing local and international procurements; recruiting and training of seasonal workers; establishing offices and operational sites; distributing spray materials in new districts; and implementing the spray round in the seven districts.

Current Activities and Accomplishments

Activities for this quarter focused on IRS mop-up and end-of-spray operations for the fourth IRS round. The spray campaign commenced on August 20, 2009, and ended on October 10, 2009. Highlights include the following:

All payments were made for spray operators; information, education, and communication (IEC) mobilizers; and seasonal workers from all 54 sectors. Vendors selected for IRS operational services and commodities were paid and closed out.

All commodities and equipment were moved to the central warehouse, and inventory was taken of all used and remaining stocks.

Internal evaluation meetings were conducted in seven districts and included staff from the district and sector MOH, PNILP, and RTI/IRS. These meetings were held to evaluate the IRS spray round and to discuss achievements and challenges. The meetings were also a forum to begin plans for spray round five.

On October 19, 2009, the national IRS evaluation meeting, organized by PNILP/NMCP, was held in Kigali organized by PNILP/NMCP. The meeting was attended by all stakeholders involved in malaria control in Rwanda, such as Rwanda Environmental Management Authority (REMA), Rwanda Bureau of Standards (RBS), Environmental Health Unit (MOH), District Health Directors, PMI/USAID, RTI/IRS, nongovernmental organizations (NGOs), and journalists.

Planning and Assessment Planning

During the quarter, planning for the fifth round began with discussions between PNILP/NMCP and PMI/USAID. At the center of the discussions was the issue of whether there would be a PMI-sponsored spray round in February 2010. A team of entomological monitoring personnel visited Rwanda in December 2009 to carry out wall bioassays in the sprayed areas to help inform the decision to have a February spray round. As of the end of December, the outcome had not been released.

Procurement and Logistics

Most of the equipment and commodities were procured in the previous quarter. However, in November and December 2009, items were purchased for the insectary, including cone assay and ELISA⁴ tests for entomological monitoring.

Upon completing the spray campaign in all 54 sectors, all pumps and personal protective equipment (PPE) were cleaned and repaired as needed. All equipment was collected and stored in the district storage facilities. A full inventory was carried out to identify any theft or missing items and to record the remaining PPE, equipment, and insecticide. Before the fourth spray round, a total of 1,398 spray pumps had been distributed in the seven districts; and at the end of the campaign, 1,297 pumps were collected in good condition, 100 needed repairs, and one was irreparable.

A total of 174,708 sachets of deltamethrin wettable granules (WG) 250g were used in the fourth spray round. At the end of the spray campaign, 58,068 sachets of insecticide remained, 49,068 sachets were stored in the IRS warehouse, and 9,000 sachets were borrowed by the MOH for emergency spraying.

Environmental Compliance

The mid-spray inspection took place during the previous quarter.

The IRS environmental manager from the regional office continued to follow up on the new medical waste incinerator provided by the MOH and located at Kanombe Military Hospital in Kigali City. The incinerator is under repair for use in incinerating medical and IRS wastes, but requires a specific part that was to be purchased during this quarter. Installation of the part should happen in the next quarter, and incineration should start in the first quarter of 2010.

Information, Education, and Communication

Community sensitization continued until the end of the campaign to ensure all mop-up areas were prepared for the spray operators and to try to encourage those who previously rejected IRS to accept it. IEC mobilizers used door-to-door communication and various radio stations to spread the IRS messages. Overall, 4,871 IEC mobilizers were trained and participated in the fourth round of IRS in the seven districts.

⁴ enzyme-linked immunosorbent assay

Spray Operations

When this quarter began, only seven spray days remained in the campaign. Table 1 shows the spray results from those seven days of spraying. Table 2 provides the full results.

Table 1. Round 4 Spray Coverage, October 1–10, 2009

• District	• No. House Structures Found	• No. House Structures Sprayed	• No. House Structures Not Sprayed	• Population in Structures Sprayed	• No. of Children <5yrs	• No. of Pregnant Women	• Sachets Used
Gasabo	10,220	9,179	1,041	36,953	4,015	452	4,875
Kicukiro	3,878	3,875	3	19,155	1,845	145	3,161
Kirehe	3,961	3,959	2	18,040	2,593	205	3,211
Nyanza	4,361	3,788	573	24,745	2,410	209	2,316
Nyarugenge	1,882	1,881	1	16,819	815	102	1,188
Nyagatare	8,262	8,255	7	38,416	6,726	578	4,012
Bugesera	3,541	3,531	10	17,979	2,247	241	2,366
Totals	36,105	34,468	1,637	172,107	20,651	1,932	21,129

Total Round Four Spray Coverage

• District	• Structures Found	• Structures Sprayed	• % Sprayed	• Population			• Insecticide Sachets Used
				• Total	• > 5 Years	• Pregnant Women	
Gasabo	56,901	55,860	98.2	260,648	37,439	3,544	36,654
Kicukiro	24,818	24,807	99.9	113,808	15,704	1,439	19,055
Nyarugenge	20,458	20,451	99.9	90,577	13,466	1,258	10,604
Nyanza	46,189	45,616	98.8	207,937	37,083	2,931	27,689
Kirehe	49,575	49,412	99.7	220,951	40,767	3,121	35,460
Nyagatare	58,498	58,273	99.6	262,777	50,794	4,476	24,765
Bugesera	41,201	40,755	98.9	172,642	32,874	2,441	20,581
Total	297,640	295,174	99.2	1,329,340	228,127	19,210	174,808

Other Activities

Dr. Jacob Williams and Phillip Downs from RTI visited Rwanda from November 30 to December 22, on invitation from PMI/USAID, to support PNILP/NMCP in developing the Integrated Vector Management (IVM) strategic plan. Williams and Downs were both supported by the IVM program and not under IRS.

The insectary rehabilitation was completed and equipped with necessary materials and lab equipment.

Human Resources

On July 12, 2009, a new finance manger, Ms. Joyeuse Mutambarungu, joined the IRS program in Rwanda.

Monitoring and Evaluation

The Rwanda IRS program continues to work in collaboration with the MOH and PNILP in ensuring all national reporting requirements are fulfilled and all IRS data are reported to the national partners in a timely manner.

Upcoming Activities (January 1, 2010–March 31, 2010)

- Entomological monitoring using CONE and ELISA tests in all seven spray districts
- PNILP/NCMP and PMI will finalize a decision on whether to conduct a PMI-supported spray round in February 2009.

Senegal

Background

The Indoor Residual Spraying (IRS) project in Senegal receives funding from the United States Agency for International Development (USAID) and the United States President's Malaria Initiative (PMI) to provide assistance to the *Programme National de Lutte contre le Paludisme* (PNLP, National Malaria Control Program) in implementing its IRS program. The program targets three districts: (1) Richard Toll in the north; (2) Nioro in the central area; and (3) Velingara in the south. Assistance includes the procurement of IRS equipment and supplies, establishment of storage facilities, IRS campaign planning, and training and management of spray operations and support personnel. In addition, the IRS project conducts pre- and post-spray campaign surveys to assess the effectiveness of information, education, and communication (IEC) activities and the satisfaction of the population.

IRS Senegal is led by RTI International in collaboration with the *l'Université Cheikh Anta Diop* (UCAD), Parasite Control Service, and Ministry of Agriculture, as well as the Hygiene Service, which leads training and supervision of IRS activities, and ChildFund International, which leads IEC activities.

This report presents the project's progress during the period of October 1, 2009, to December 31, 2009 and summarizes the project's current activities and achievements, outstanding issues, and upcoming activities for Senegal.

Current Activities and Accomplishments

During this quarter, the 2009 end-of-spray round report and Senegal's 2010 IRS work plan and budget were drafted and submitted. No spray activities occurred in this quarter.

Planning and Assessment

In October, the Chief of Party (COP) and Finance Manager attended the Pan Africa Malaria Vector Control Conference in Zanzibar, Tanzania.

Due to the unavailability of key participants, PNLN and RTI agreed to postpone the fiscal year (FY) 2009 IRS Planning Workshop, previously scheduled for December 2009, until January 2010.

RTI also conducted a geographical reconnaissance mission in the newly selected districts of Koumpentoum, Guinguineo, and Malem Hoddar from November 4 to November 24, 2009. The purpose of this mission was to collect data on available local health facilities and other information, and to meet with these districts' local administrative and health district authorities in preparation for IRS.

Procurement and Logistics

During this post-spray round period, the Dakar central warehouse that was recently rented was subject to fitting-out work. All the IRS material and property that were collected from field offices were arranged within the warehouse.

Environmental Compliance

As part of IRS wastes disposal, the contaminated solid wastes generated by the 2009 spray round were incinerated at the Louga Hospital Center. A total of 5,412 kg of contaminated solid wastes has been incinerated.

RTI's IRS team, in collaboration with the *Direction de l'Environnement et des Etablissements Classés* (DEEC, the Environment and Classified Factories Directorate) of the Ministry of Environment, will conduct an inspection mission to Louga to assess the incineration operations.

Information, Education, and Communication

There were no IEC activities during the reporting period.

Spray Operations

No IRS operations were undertaken during this period.

Other Activities

Entomological Monitoring

The entomological monitoring was undertaken in early November by UCAD and the Pasteur Institute in the three targeted districts. The results will be issued during the final IRS evaluation scheduled for January 26, 2010.

Capacity Building of Ministry of Health

There was no specific capacity building of the MOH during the reporting period.

Monitoring and Evaluation

The IRS district evaluation in Nioro District took place on December 29, 2009, under the chairmanship of the District Medical Officer. The meeting was attended by all District Health Officers, the Regional Health Officer's representative, the Regional Hygiene Officer, ChildFund International (IEC implementer), and RTI. Presentations were made by ChildFund and RTI on the IEC and IRS operations implementations and results, respectively. Discussions revolved around weak points to improve. Participants recommended to RTI to improve the quality of the gloves (the length), and to ChildFund to create the conditions for greater community ownership of the program (involving all the stakeholders and the population's representatives). They also thanked the district health office for its ownership of the program. In conclusion, they expressed their encouragement for the satisfactory results.

Project Management and Administration

A new logistics officer and a driver were recruited by RTI/IRS. Both staff were to take office in early January 2010. Interviews were conducted by the Nairobi Regional Office in conjunction with the Senegal IRS team.

Partnership and Collaboration

On November 4, 2009, the COP met with the IRS Contracting Officer's Technical Representative (COTR) to discuss the next round of IRS operations, which will include three additional health districts in 2010. As a result of this meeting, they agreed on the following:

- Strengthening capacity building in the new districts
- Implementing IRS steering committees in the new districts
- Increasing supervision in the new districts
- Preparing a new general guideline on IRS implementation

In early December, IRS partners including RTI attended a meeting held at the Hygiene Service office. The purpose of this meeting was to prepare IRS supervision activities for FY 2010 and to discuss the involvement of the Hygiene Service's agents in the management of warehouses used in the IRS program. RTI and Hygiene Service agreed on the following:

- Increase the number of trained Hygiene Service participants from the central, regional, and district levels.
- Appoint one agent from Hygiene Service to follow the district logistics management.
- Have in each IRS operations group one agent from Hygiene Service for supervision.
- Supervise the warehouse's management during the post-spray operations.

Outstanding Activities

- The process of registration of the RTI vehicle is still under way.
- The RTI request is awaiting signature at the President's office.

Upcoming Activities (January 2010–March 2010)

- Conduct the 2010 IRS Planning Workshop January 18–23, 2010. This workshop will involve the six regions with the six districts targeted for spraying in 2010.
- Conduct the 2009 IRS Assessment Workshop planned to occur on January 26, 2010.

Zambia

Background

This quarterly report presents the Indoor Residual Spraying (IRS) program's progress in Zambia from October 1 to December 31, 2009, and highlights the program's achievements in this review period. This report also highlights the IRS activities undertaken, outstanding issues, and upcoming activities. During this reporting period, the project focused on monitoring environmental compliance during spraying, procurement and distribution of IRS materials, and completing other outstanding activities.

The 2009 spray campaign faced two major challenges, namely a delay in disbursement of funds to districts by the central government and intensive rains during the planned spray period. Although the validated data on the 2009 campaign are not yet compiled, indications are that the campaign reached 85% coverage in nearly all 36 districts.

Current Activities and Accomplishments

During this reporting period, the project's activities were particularly focused on preparations and implementation of the IRS campaign. The following activities were also conducted: drafting the FY 2010 IRS work plan and budget, and preparing for and participating in the Pan African Malaria Vector Control Conference in Zanzibar, Tanzania, on October 25–29, 2009.

Planning and Assessment

During the quarter, the districts prepared plans for the upcoming spray round. The district IRS managers assigned teams to spray supervisors, who are health care workers. Throughout the spray campaign, the national IRS working group routinely held meetings to assess progress and discuss challenges, including delays in funding the districts.

Procurement and Logistics

The districts received the insecticides for the 2009 spray round on time and all the pumps and personal protective equipment were available before spraying started. RTI International worked with each individual district to ensure that all their commodity requirements were met before spraying began.

Although all the dichloro-diphenyl-trichloroethane (DDT) sachets issued were recorded, nearly all the storeroom clerks were not recording the DDT empty sachets that were received from spray operators. However, documentation of insecticide quantities in most of the warehouses visited was found to be in order.

Environmental Compliance

Strategic Environmental Assessment (SEA)

The SEA draft document is ready for review by the national core team. It will then be sent to the relevant districts for comments. The core team plans to review the SEA document next quarter. The SEA process has taken longer than planned because the Environmental Council of Zambia, who is facilitating the process, has other high-priority commitments.

Mid-spray Compliance Inspection

Autman Tembo, the RTI environmental compliance officer based in Nairobi, conducted the mid-spray compliance inspection from November 3 to 14, 2009, and visited Chililabombwe, Kabwe, Kalulushi, Kazungula, Kitwe, Livingstone, Luanshya, Mufulira, and Ndola districts. He observed that, in general, the districts were demonstrating best management practices in environmental compliance. During his trip, he made the following recommendations:

- Develop a system for stock verification by physical counting at the district level. This should be repeated every two weeks.
- Improve commodity tracking by developing a system of creating serial numbers for the stock. Although some of the stock had item numbers (e.g., the 2009 DDT stock), these numbers were not quoted anywhere in the warehouse commodity tracking documents.
- Follow up with officers in the field to ensure that the expiring stock is used first.
- Provide a budget for roofing with transparent sheets in the next round of IRS as some of the evaporation tanks are covered with tents.

Roofing of Evaporation Tanks

Roofs were built for the evaporation tanks in Chililabombwe and Mufulira during the period under review. During the midspray inspection, the inspector found that many of the evaporation tanks were not being used because storage, bathing, and toilet facilities were not available in close proximity to the tanks. In the future, the evaporation tanks should be constructed near storage and washing areas. For the evaporation tanks that have already been constructed, but are not being used, the program should consider constructing sanitary facilities close to the tanks. Until these facilities can be constructed, spray operators should be transported to the tanks and then to the sanitary facility location. In the following districts, bathing, toilet, and storage facilities are not within walking distance of evaporation tanks: Chililabombwe, Chingola, Chongwe, Kafue, Kalulushi, Kazungula, Livingstone, Luanshya, Lusaka (Matero site), Mufulira, and Solwezi. In Kabwe, Kitwe, Lusaka (one site only), Mazabuka, and Ndola, the evaporation tanks are located near sanitary facilities and storerooms. In Kitwe, the bathing, toilet, and storage facilities were recently constructed.



Evaporation tank monitoring

DDT Monitoring and Waste Disposal

During the period under review, the ZABS laboratory was not ready to run the DDT samples, which are stored at the RTI Lusaka offices. RTI continued to monitor the progress of the ZABS laboratory to analyze samples for DDT and DDT isomers.

RTI monitored the storage of empty DDT sachets and emphasized documenting empty sachets received from the field and collapsing empty unused carton boxes to create space in the storerooms.

The RTI IRS program also procured a 40-foot metal container to store DDT waste before it is repatriated to South Africa that is awaiting delivery to the Lusaka City Council Maintenance Yard. The container will allow the program to store all DDT waste in one central location.

Information, Education, and Communication

RTI is not involved in this aspect of the IRS campaign in Zambia; however, spray operators, together with their supervisors, conducted community sensitizations one day before the actually spraying.



Community mobilizers (left) and a house recently mobilized for IRS (right).

IRS Operations

This year's IRS launch occurred in September 2009; however, actual spraying began in October 2009. Because of the late start, IRS operations did not conclude until the end of December 2009, well into the rainy season. Spraying during the rainy season posed many challenges, including:

- People were reluctant to remove all their household effects from their houses in preparation for IRS
- People did not wait the recommended two hours to move back into their homes after spraying if it started raining during the waiting period
- Frequent postponements of spraying because of rain

Data from the National Malaria Control Centre (NMCC) on IRS coverage and the number of structures sprayed by district were not yet available at the time of the writing of this report.



Photos of 2009 Zambia spray operations.

Other Activities

Capacity Building of the Ministry of Health

Mr. Emmanuel Chanda, who was nominated to go in place of Dr. Elizabeth Chizema to the Pan-African Vector Control Conference in Zanzibar, did not attend the conference because of other commitments at the Ministry of Health.

Monitoring and Evaluation

Staffing challenges at the NMCC resulted in inadequate monitoring of the 2009 spray round. Further, the partner tasked with monitoring IRS could not do so because their project had come to an end when monitoring should have taken place. Thus, the districts were left to monitor IRS activities on their own, leading to challenges in compilation of the 2009 spray data.

Project Management and Administration

Autman Tembo visited Zambia from November 3 to 13, 2009, to conduct the midspray environmental compliance inspection. He visited 10 of the 15 PMI-supported districts, and made subsequent recommendations to enhance the IRS operations in the visited districts. His recommendations are summarized in the Environmental Compliance section above.

Partnership and Collaboration

RTI participated in the IRS working group meeting to review the 2009 spray campaign and address the operational challenges reported from the districts.

Outstanding Activities

- Review the SEA report with the core team and send it to the districts for comments.
- Inspect and deliver the 40-foot container to Lusaka City Council Maintenance Yard.
- Purchase pallets for the 40-foot metallic container. The pallets will be used to store DDT waste.

Upcoming Activities

- Conduct post-spray environmental compliance inspections
- Participate in the national post-spray review meeting
- Hold meetings with ZABS to discuss progress on preparation of their facilities to analyze samples for DDT residues