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# THE AMAZON MALARIA INITIATIVE:

Annual Achievement Report

October 2009 – September 2010



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## **THE ROLE OF THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT IN MALARIA CONTROL AND PREVENTION**

The U.S. Agency for International Development (USAID) supports malaria control and prevention programs in Africa, Asia, and South America through activities in 28 countries. Led by USAID and implemented jointly with the Centers for Disease Control and Prevention, the President's Malaria Initiative assists the national malaria control programs in 15 African countries in efforts to reduce malaria deaths by 50 percent. In Southeast Asia, the USAID-funded Mekong Malaria Programme initiates strategic projects for malaria control in the Greater Mekong subregion. Through the Amazon Malaria Initiative, USAID aims to reduce morbidity and mortality in the Amazon Basin subregion of South America by ensuring that national malaria control programs in participating countries substantially incorporate selected best practices.

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# ACRONYMS AND ABBREVIATIONS

<b>ACT</b>	Artemisinin-based combination therapy
<b>AMI</b>	Amazon Malaria Initiative
<b>CDC</b>	U.S. Centers for Disease Control and Prevention
<b>CNCC</b>	Centro Nacional de Control de Calidad (National Center for Quality Control, in Peru)
<b>DRA</b>	Drug regulatory agency
<b>ELISA</b>	Enzyme-linked immunosorbent assay
<b>EPRSP</b>	Editorial and Peer Review Support Process
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FDD</b>	Food and Drug Department (of Guyana's Ministry of Health)
<b>GLP</b>	Good laboratory practices
<b>INLASA</b>	Instituto Nacional de Laboratorios de Salud (National Institute of Health Laboratories, in Bolivia)
<b>INS</b>	Instituto Nacional de Salud (National Institute of Health, in Peru)
<b>INVIMA</b>	Instituto Nacional de Vigilancia de Medicamentos y Alimentos (National Institute of Drug and Food Surveillance, in Colombia)
<b>IRS</b>	Indoor residual spraying
<b>ISO</b>	International Organization for Standardization
<b>ITN</b>	Insecticide-treated bed net
<b>LAC</b>	Latin American and Caribbean Bureau
<b>MDG</b>	Millennium Development Goals
<b>M&amp;E</b>	Monitoring and evaluation
<b>MOH</b>	Ministry of Health
<b>MSH/SPS</b>	Management Sciences for Health/Strengthening Pharmaceutical Systems
<b>MSP</b>	Ministerio de Salud Pública (Ministry of Public Health, in Ecuador)
<b>MSyD</b>	Ministerio de Salud y Deportes (Ministry of Health and Sports, in Bolivia)
<b>MZ</b>	Medische Zending (Primary Health Care Suriname)
<b>NF</b>	National Formulary

<b>NHMT</b>	National Institute of Hygiene and Tropical Medicine
<b>OMCL</b>	Official medicine control laboratory
<b>PAHO</b>	Pan American Health Organization (also the World Health Organization Regional Office for the Americas)
<b>PAMAFRO</b>	Malaria Control in Border Areas of the Andean Countries: A Community Approach
<b>PMM</b>	Pharmaceutical Management for Malaria
<b>QA</b>	Quality assurance
<b>QC</b>	Quality control
<b>RAVREDA</b>	Red Amazónica para la Vigilancia de la Resistencia a los Antimaláricos (Amazon Network for the Surveillance of Antimalarial Drug Resistance)
<b>RBM</b>	Roll Back Malaria
<b>RDT</b>	Rapid diagnostic test
<b>SC</b>	AMI steering committee
<b>SNEM</b>	Servicio Nacional de Erradicación de la Malaria (National Malaria Eradication Service, in Ecuador)
<b>TA</b>	Technical assistance
<b>TET</b>	Therapeutic effectiveness trails
<b>UN</b>	United Nations
<b>USAID</b>	U.S. Agency for International Development
<b>USP/DQI</b>	U.S. Pharmacopeia/Drug Quality Information
<b>WHO</b>	World Health Organization
<b>WPRO</b>	WHO's Western Pacific Region



# GLOSSARY OF TERMS

**Artemisinin-based combination therapy:** A combination of artemisinin or one of its derivatives with one or more other antimalarials of a different class.

**Bioassay:** A test to determine the effects of a substance (such as an insecticide) on a living organism (such as a mosquito).

**Coartem®:** The commercial name of the drug combination artemether–lumefantrine.

**Compendial (or pharmacopeial):** Practices that follow the procedures described in the monographs used for the analysis of medicines.

**Endemic:** In epidemiology, an endemic disease is one that is maintained in a particular population or location without external inputs, and an endemic area is one in which such a disease is maintained.

**Hematozoon:** A parasite found in the blood (plural, hematozoa).

**In vivo (technique):** A technique used within a living organism.

**In vitro (technique):** A technique used outside of a living organism—generally in a controlled laboratory environment.

**Molecular marker:** A molecule within an organism that is indicative of a particular chemical or physical process or disease state.

**Monograph:** In the pharmacopeial field, a set of guidelines for a particular medicinal ingredient or preparation that includes the name of the ingredient or preparation; packaging, storage, and labeling requirements; and the specification. The specification consists of a series of tests, test procedures, and acceptance criteria.

**Monotherapy:** Treatment using a single medicine—either a single active compound or a synergistic combination of two compounds with related mechanisms of action.

**Morbidity:** The state of being unhealthy or affected by disease.

**Parasitemia:** A quantitative measure of the level of parasites in the blood.

**Plasmodium:** A genus of protozoan vertebrate blood parasites that includes the causal agents of malaria. *Plasmodium falciparum*, *P. malariae*, *P. ovale*, and *P. vivax* cause malaria in humans.

**Stock-out:** In the health sector, a temporary lack of medicines or other medical supplies at a health facility or pharmacy.

**Uncomplicated malaria:** Symptomatic infection with malaria parasitemia without signs of severity and/or evidence of vital organ dysfunction.

**Vector:** An organism that transmits a pathogen. In malaria, mosquitoes of the genus *Anopheles* (the vectors) transmit malaria-causing parasites of the genus *Plasmodium* (the pathogen) to humans (the hosts).

## AMI FOCUS COUNTRIES



# EXECUTIVE SUMMARY

This document describes the achievements of the Amazon Malaria Initiative (AMI) from October 2009-September 2010. AMI is administered by the United States Agency for International Development (USAID) Latin America and Caribbean Bureau (LAC), Office of Regional Sustainable Development. The goal is to improve the control and treatment of malaria in nations of the Amazon Basin subregion: Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, and Suriname with a smaller presence in Central America (Belize, Guatemala, Honduras, Nicaragua, and Panama)

The initiative's efforts fall into five lines of work: antimalarial medicine resistance; diagnostic quality assurance and access to diagnosis; antimalarial medicine access and use; vector surveillance and control; and communication and information dissemination. This year, improvements in the countries information management systems were also undertaken.

Some of the activities described include standardized studies on anti-malarial drug efficacy that led to the implementation of new lines of treatment and control guidelines. Monitoring anti-malarial drug resistance remained a priority for AMI. The low number of cases for *P. falciparum* reduced the potential for undertaking *in vivo* studies and creates new challenges in monitoring resistance in Amazon countries. Progress was made in the evaluation of the

Histidin-Rich Protein 2 (HRP2) gene deletion. A stock level problem with antimalarial medicines was identified at the beginning of the fiscal year. With discussions some of these problems were alleviated with donations or exchanges between the different AMI countries. Entomologists and epidemiologists took part in discussions to develop a plan for evaluating the use of insecticide-treated bed nets (ITNs) in the region. AMI partners, working in a collaborative way, were able to successfully standardize and train different countries in a reliable and comparable way to monitor insecticide resistance. Efforts now will be allocated in implementing systematic surveillance systems that use this methodology.

The broad range of AMI activities has resulted in partner countries:

- Treating *falciparum* malaria using artemisinin-based combination therapy (ACT) in Amazon Basin countries, reducing morbidity and mortality rates.
- Improving their capacity to ensure quality of available medications.
- Expanding access to higher quality diagnosis.
- Providing effective treatment with quality drugs in a more timely manner..

Responding to these changes, AMI put emphasis on the development, implementation, and institutionalization of a strategy for dealing with malaria prevention and control in a context of lower malaria transmission, while revising the strategy and interventions developed for a context of higher malaria transmission.

The communication component of the initiative targeted diverse audiences, including the general public, policymakers, health care providers, and technical and scientific audiences using traditional and new (social) media. Efforts were also directed to the preparation of manuscripts for international scientific publications. A list of technical documents published and under development is included.

## AMI TECHNICAL PARTNERS

Pan American Health Organization (PAHO)  
USAID/LAC and USAID/Peru  
U.S. Centers for Disease Control and Prevention (CDC)  
U.S. Pharmacopeia (USP/DQI)  
Management Sciences for Health (MSH/SPS)  
Links Media  
Research Triangle Institute (RTI)

# I. OVERVIEW: THE AMAZON MALARIA INITIATIVE

## AMI MISSION, PARTNERS, AND OBJECTIVES

In October 2001, the United States Agency for International Development (USAID) Latin America and Caribbean Bureau (LAC), Office of Regional Sustainable Development launched the Amazon Malaria Initiative (AMI) to improve the control and treatment of malaria in nations of the Amazon Basin subregion: Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, and Venezuela. (Venezuela was a participant in AMI from 2001-2007. The initiative is not currently supporting Venezuela. French Guiana is not a formal member of AMI, but participates in regular meetings.) A smaller proportion of effort is invested in expanding AMI achievements in Central America (Belize, Guatemala, Honduras, Nicaragua, and Panama).

The initiative is a partnership among countries and organizations (technical partners), each of which

brings specialized expertise and skills to bear on the problem of malaria control in the Amazon Basin (see Table 1). The technical partners are: Pan American Health Organization/World Health Organization (PAHO/WHO), U.S. Centers for Disease Control and Prevention (CDC), U.S. Pharmacopeia Drug Quality Information (USP/DQI), Management Sciences for Health's Strengthening Pharmaceutical Systems (MSH/SPS), Research Triangle Institute (RTI), and Links Media.

AMI complements ongoing USAID mission bilateral programs as well as other regional and global efforts to combat malaria. In particular, AMI is closely connected with the Red Amazónica para la Vigilancia de la Resistencia a los Antimaláricos (RAVREDA) (Amazon Network for the Surveillance of Antimalarial Drug Resistance), which was established by the countries of the Amazon Basin and PAHO in March 2001.

**TABLE 1. AMI'S OBJECTIVES AND OUTCOMES**

<b>Objective 1:</b> The evidence base for Amazon Basin malaria prevention and control priorities is increased.
<b>Outcome 1:</b> Antimalarial medicine resistance is assessed, medicine policies are defined, the use of efficacious antimalarials is promoted, and entomological information is available to guide control activities and to promote integrated vector management.
<b>Illustrative indicators:</b> (i) The number of participating countries that have evidence-based medicine policies in place and have institutionalized activities for monitoring the efficacy of antimalarials and (ii) the number of participating countries that routinely collect data for use in integrated vector management at selected sites in malaria transmission endemic areas.
<b>Objective 2:</b> The evidence base for Amazon Basin malaria prevention and control priorities is communicated and used.
<b>Outcome 2:</b> Healthcare workers, policymakers, professional societies, and vulnerable groups are informed of appropriate strategies and interventions to be implemented.
<b>Illustrative indicator:</b> The number of participating countries that collect, analyze, evaluate, and disseminate information.

**Objective 3: More inclusive and better informed policy processes are promoted.**

**Outcome 3:** Health policymakers and other stakeholders are using information to ensure the implementation of revised policy.

**Illustrative indicators:** (i) The number of participating countries defining and implementing policies with the participation of all sectors, including the community and (ii) the number of actions taken for sharing strategies, tools, achievements, and lessons learned with other participating countries, other countries in LAC, and other stakeholders in malaria control efforts in other regions (e.g., the President’s Malaria Initiative, the Mekong Regional Initiative, and PAMAFRO).

**TABLE 2. AMI TECHNICAL PARTNERS AND ROLES**

Partner	Role
<b>CDC</b>	Participates in the initiative’s planning process. Provides TA in areas such as entomology and vector control, malaria diagnosis, molecular epidemiology, and malaria treatment to support the implementation of regional and national-level activities. The emphasis is on specific technical areas, such as molecular epidemiology, vector surveillance and control, drug blood level determination, and general epidemiology.
<b>Links Media</b>	Participates in the initiative’s planning process. Assists USAID and other AMI partners in the design and implementation of AMI’s communication strategy. Develops dissemination plans, provides support for the identification of target audiences, and develops communication materials. Provides editorial support to the partners for the development of scientific and technical documents and articles. Disseminates AMI information to the media, and through multiple information channels, including the AMI website.
<b>MSH/SPS</b>	Participates in the initiative’s planning process. Provides TA in pharmaceutical management with a focus on (i) medicine availability, prescribing and dispensing practices, and patient adherence to treatment regimens and (ii) management of the supply chain, including quantifying needs and identifying and correcting weaknesses in the system for supplying malaria medicines and supplies.
<b>PAHO</b>	Participates in the initiative’s planning process and coordinates this process under USAID direction. Provides general technical assistance (TA) and oversight to countries. Provides TA in malaria surveillance and entomological surveillance and control. Coordinates planning, monitoring, and evaluating for PAHO regional and in-country activities financed through PAHO. Coordinates the development and dissemination of standard policies, strategies, interventions, guidelines, and protocols. Prepares an aggregated general report in coordination with other partners.
<b>RTI</b>	Participates in the Initiative’s planning process. Provides specialized TA in malaria eco-epidemiology, entomological surveillance, and control systems. Supports the development of training materials on entomology to facilitate national vector control capacity strengthening.
<b>USAID/LAC and USAID/Peru</b>	Participates in the initiative’s planning process. Provides specialized TA in malaria surveillance and entomological surveillance and control systems (e.g. design, monitoring, evaluation). Leads the initiative’s planning process. Provides general coordination and TA.
<b>USP/DQI</b>	Participates in the initiative’s planning process. Provides specialized TA in quality assurance (QA), of antimalarials and insecticides, with a focus on (i) implementation of proper quality control processes throughout the supply chain and (ii) strengthening of OMCL capabilities to analyze medicines and provide trustworthy and reliable results.

## MONITORING AMI'S PROGRESS

The AMI Steering Committee (SC), which consists of representatives from each AMI technical partner organization, directs the initiative and develops consensus on issues. PAHO, in coordination with USAID, organizes two annual SC meetings. In September, at the beginning of the initiative's fiscal year, the SC and two to three RAVREDA members from national malaria programs meet in Washington, DC, to discuss progress and difficulties in project implementation over the previous year and to review each country's work plan for the next 12-month period. The emphasis for this meeting is to refine lines of work and activities for the next period and to approve the budget for activities supported by the counterpart funds that complement the funding from USAID.

A second SC meeting, held in March, takes place as part of the RAVREDA Annual Meeting, which is held in a different partner country each year. The meeting includes representatives of the MOHs and AMI country coordinators, along with institutions and partners that support the initiative at the local and regional levels. In the days leading up to the SC meeting, the partner countries and the technical partners hold detailed discussions on the results of activities carried out during the preceding year. The SC formulates recommendations based on the results presented; revises the agenda for the current period; and defines the content, locations, and dates for the agenda of joint activities among the countries.

Each August, the RAVREDA team in each country, led by the MOH and with support from PAHO, prepares a work plan for the next period following the general guidelines developed during the RAVREDA Annual Meeting and the lines of work that were defined and agreed to, based on ongoing regional activities. PAHO's RAVREDA coordinating team and the other AMI partners also prepare work plans for the new period at this time. These plans are reviewed at the September SC meeting to facilitate the coordination of proposals for work by the technical partners with the interests of the countries and to identify opportunities for South–South collaboration. The AMI technical partners provide comments to each country on its activity plan to ensure that the proposals respond to regional priorities. Progress on the plans is reviewed with the countries at the March RAVREDA and SC meetings, which call attention to any deviations from protocols and work plans.

### FY 2010 MEETINGS

IX Technical Meeting of the Amazon Malaria Initiative, Santa Cruz, Bolivia, March 2-5, 2010

AMI Steering Committee, Santa Cruz, Bolivia, March 5, 2010

AMI Steering Committee, Washington, DC, September 8-9, 2010

## 2. SPECIFIC NEEDS AND PROBLEMS

Efforts to protect the people of the Americas against malaria are working. However, millions of people who live in or travel through malaria-endemic regions continue to be at risk. The malaria burden in the Amazon Basin subregion worsened in the 1990s with the increased prevalence of the parasite *Plasmodium falciparum*, which causes a more severe, potentially fatal, form of malaria than that caused by *P. vivax* (the predominant malaria parasite in the region). AMI international technical partners have collaborated with partner countries in adapting treatments and acquiring newer medicines, but continuing vigilance is needed.

Malaria transmission has declined in most countries, the number of cases reported in the region dropping by 56% since 2000 to 564,365 cases in 2009, 453,543 of them in the seven AMI focus countries, with *P. falciparum* being less predominant over *P. vivax* than in previous years. In comparison with the situation in 2000, 18 of the 21 malaria endemic countries in the Region indicate a decrease in cases in 2009: seven of these countries report > 75% case reduction, achieving both Roll Back Malaria (RBM) and UN Millennium Development Goals (MDGs); five with >50% to <75% decrease in cases which achieves the RBM goals; six others with <50% reduction in cases but are well on the way towards attaining the RBM goals of 2010. Unfortunately, three countries continue to report increases in total number of cases.<sup>1</sup>

With specific reference to the countries supported by AMI in South America since 2001, the reduction in morbidity to 2009 was -38.2% in Bolivia, -20.6 % in Brazil, -65.7 % in Colombia, -96.2% in Ecuador, -49.6 % Guyana, -53% Peru and -91.4% Suriname.<sup>2</sup>

Responding to these changes, AMI put emphasis on the development, implementation, and institutionalization of a strategy for dealing with malaria prevention and control in a context of lower malaria transmission, while revising the strategy and interventions developed for a context of higher malaria transmission.<sup>3</sup>

Some of the continuing challenges to malaria control in the Region are:

- Poverty, poor sanitation, and insufficient disease control strategies.
- Malaria-causing parasites resistant to commonly used drugs.
- Presence of highly competent malaria-transmitting mosquitoes.
- Vectors in inaccessible, or difficult to identify, breeding sites
- Limited commitment of local health services; insufficient cooperation between sectors.
- Minimal control over disease migration between countries.
- Low levels of funds; lack of supplies and medicine.
- Lack of prevention and control outreach, education, and technical capabilities.
- Diversion of focus to deal with other disease outbreaks.
- Low quality medicines.
- Nonadherence to treatment; incorrect self medication.

1 PAHO, 2011. Grant Between USAID and PAHO/WHO Amazon Malaria Initiative (AMI) Annual Report. October 2009 – September 2010. p. 3.

2 Ibid.

3 Ibid.

## ANTIMALARIAL DRUG RESISTANCE AND EFFICACY

In Fiscal Year (FY) 2010, AMI continued to address the specific needs and problems surrounding antimalarial medicine resistance. With increasing malaria control efforts during the 1960s, much of the Amazon Basin had seen drastic decreases in malaria-related morbidity and mortality. However, by the late 1980s, the number of cases of malaria increased and *falciparum* malaria was noted in parts of the Amazon by the early 1990s. These cases were constantly increasing due to the spread and intensification of chloroquine resistance. With malaria prevention and control efforts, the number of *P. falciparum* malaria cases decreased and now the measurement of antimalarial resistance by the gold standard (*in vivo* studies) is much compromised and there is a need to adapt available tools and strategies. Appropriate alternatives include the use of molecular markers for resistance and *in vitro* techniques.

## DIAGNOSTIC QUALITY ASSURANCE AND ACCESS TO DIAGNOSIS

In the region, timely access to treatment is dependent on access to parasitological diagnosis, in accord with national policies on diagnosis and treatment. In keeping with recommendations of WHO (WPRO), as of 2006 PAHO and AMI have promoted changes to access and quality of diagnosis in two aspects:

- i) the inclusion of standardized components of certification and evaluation of competences, and
- ii) correction of deficiencies in the methodology for slide reviews (performance monitoring); along the lines of precise WHO recommendations.

## ANTIMALARIAL MEDICINE ACCESS AND USE

Regarding the implementation of a system to monitor access and use of antimalarial drugs in routine health services, three outcomes were expected from the SC meeting: i) adaptation of the supervision instrument to countries and selected areas of study; ii) generation of situational diagnosis on the status of supervision before the introduction of the document; and iii) consolidation of information on the tool's usefulness and acceptability by the population.

## VECTOR SURVEILLANCE AND CONTROL

AMI addressed other factors contributing to the spread of *P. falciparum*, including the introduction of a competent vector, shifting weather patterns, and the opening of vast areas of the rainforest by loggers.

## COMMUNICATION AND INFORMATION DISSEMINATION

Links Media identified these specific needs and problems for this fiscal year:

- Developing tools and materials for region-wide use proved to be challenging. Countries within one region, even if the same language is spoken, can use different terminology and have different styles of learning and working.
- A standardized editorial review process was needed following these steps (i) define the adhoc editorial review committee, (ii) establish roles and responsibilities of its members, (iii) develop a calendar of activities for the editorial review process, and (iv) successfully implement the editorial review process as an effective mechanism to ensure quality and timely production of materials and technical documents developed by AMI partners.
- How to keep progressing when multiple needs and priorities competed for limited resources in AMI countries and from the international partners.



## 3. ACTIVITIES AND ACCOMPLISHMENTS

### ANTIMALARIAL MEDICINE RESISTANCE

With AMI financial and technical support from previous years, the Amazon countries, conducted standardized studies on antimalarial drug efficacy and the results led to the implementation of new lines of treatment and control guidelines.

- Support provided for the implementation of an early warning system based on molecular-based surveillance for early detection of resistance of *P. falciparum* to antimalarial drugs, in coordination with CDC.
- Drug efficacy studies conducted under RAVREDA and supported by AMI in some Central American countries (**Honduras and Nicaragua**) initiated and concluded, have replicated the AMI example and led to an adoption of malaria treatment protocols, with evidence-based information. Results demonstrated *P. falciparum* sensitivity to chloroquine, which continues being used as first-line treatment in these countries.
- During FY 2010 period, monitoring antimalarial drug resistance remained a priority for AMI, with emphasis on the following:
  - Evaluate therapeutic response to Artemisinin-based combination used in the region (ASU+MQ; ATM+LUM; ASU+SP).
  - Support new evaluations in countries where the studies that guided the policy changes are more than three years old (following updated regional guideline for efficacy and resistance studies).
  - Include in AMI work plans recommendations from last September's meeting, such as activities emphasizing surveillance through therapeutic effectiveness trials (TET) with a regional approach and if necessary, conduct

multicenter studies including genotyping and other recent WHO recommendations.

- Establish a strategy that incorporates and integrates all available tools (TET studies, molecular markers and *in vitro* tests) towards routine long-term surveillance by the control programs.

### COUNTRY ACTIVITIES

- **Bolivia** concluded *in vitro* tests to monitor drug resistance in *P. falciparum* malaria using ELISA kit for detection of malaria antibodies (same principle as Rapid Diagnostic Tests - RDT). This methodology significantly simplifies laboratory procedures, introduces greater objectivity to results, and makes it possible to work with fresh samples, avoiding changes in the populations that prolonged cultures can cause. A team from **Bolivia** was trained in the “*Centro internacional de entrenamiento e investigaciones médicas*” (CIDEIM) of **Colombia** (an example of South-South cooperation). Samples from Riberalta (Bolivia) were collected and sent for analysis to the Research Institute of Pharmacy and Biochemical IIFB of the San Andres University. Results showed an adequate application of methods, since the values of IC50 obtained for almost all drugs tested coincide with existing bibliographies / literature registries. Out of 25 samples collected, 17 were processed and evaluated. Among the findings is the registry of 3 strains with high IC50 values, pointing out the usefulness of this tool to monitor temporal and spatial variations and providing a system for early detection of changes in susceptibility before it becomes therapeutic failure in efficacy studies. A new protocol to implement an *in vivo* monitoring of CQ for *P. vivax* has been developed and concurrence from ethical committee has been received.

- **Brazil and Colombia** updated the TET protocols incorporating changes recommended by WHO (mandatory genotyping). Low number of patients in the area selected for **Colombia** limited the TET study on Coartem® coordinated with the University of Antioquia.
- As **Brazil and Colombia** have greater numbers of malaria cases, possibilities of conducting TET studies are better in these countries. For this reason, meetings were held in these countries among ministries of health, reference laboratories and institutions involved in previous studies, to define a curriculum for coming years (surveillance strategy), review last WHO recommendations and reactivate the network activities. The monitoring strategy in **Brazil** is more advanced and can already serve as model to other countries: it defines the surveillance objectives, RAVREDA background, tools, institutions involved in the Network and their roles, a surveillance strategy integrating the three available tools, studies, budget, protocols and others. Also Brazil is in process for the second round of *in vivo* monitoring of first-line treatment Coartem® (Manaus) and is adopting a strategy for early detection of ACT failure.
- **Guyana** concluded the second efficacy study (TET) for the Artemether + lumefantrine combination and results are important contributions to the malaria programs that uses Coartem® as first line. The study lasted 14 months; enrolled 90 patients; 63 completed the study; and five patients showed therapeutic failure (8%), which is high compared to the study done two years ago in the same city of Georgetown when there was 100% of therapeutic effectiveness during the 28 days of monitoring. The study also showed patients with persistent parasitemia in day 3, while the previous study in 2004 100% of patients eliminated all parasites by day 3. This is similar to findings in Southeastern Asian (2008), where prevalence of parasites in day 3 has been demonstrated as a useful marker of loss of susceptibility and could be part of the tools for surveillance in the Region, particularly now that there are so many difficulties in getting samples for efficacy studies. This forces to compare new results with results from previous studies carried out by RAVREDA in the last seven years and make analysis by specific variables (such as the parasitemia prevalence in day 3) and by specific strata (to include for example, if deficiencies in Coartem® are limited to cases of upper limits of weight). Also **Guyana** is undertaken therapeutic efficacy trial on use of ACT+PQ for *P. vivax* (multicenter) Georgetown, Port Kaituma and Mahdia, up to September 2010, 73 patients recruited, ACR 55, TF 3, Withdrawl 4, loss 9 total 60, in Georgetown, study will finish in September 2011. A representative from the reference lab was trained on August – September 2010 in Belem, Brazil for early detection of resistance to ACT components based on *in vitro* assays.
- **Brazil** began the automation of data from RAVREDA studies in a database using the WHO forms in Excel (**Guyana**, used automated data since the beginning of the study). Other countries will also automate the information.
- Use of molecular markers is another important development and is coordinated by CDC and PAHO with participation of institutions that are part of RAVREDA in the countries. During the past years, technical personnel from **Colombia, Ecuador, Peru** and **Suriname** were trained at CDC Atlanta on molecular biology techniques.
- **Peru** and **Suriname** concluded efficacy studies on primaquine for *P. vivax* with schemes of 7 versus 14 days. The **Suriname** study showed better therapeutic response with the 14 day than with the 7 day scheme, while the **Peru** study did not show significant differences. The problem with relapses in *P. vivax* is one of the major technical and operational challenges of the control programs and these studies contribute new elements to the analysis that countries should make to define policies on treatment.
- CDC, in coordination with technical personnel from countries, concluded the processing of sample parasites for pattern determination of molecular markers for antimalarial resistance. Activities carried out either in this period or last year, include: i) **Peru**: analysis of temporary variations in genotypes of Pfcr1 (‘chloroquine’), Pfdhfr, Pfdhps, analysis with microsatellites and Pfmdr1, ii) **Brazil**: microsatellite sequences for Pfcr1 dhfr dhps with

samples from Amapá, Pará, and Rondonia States. At the AMI Annual meeting this year, CDC and countries agreed to use molecular markers as part of the surveillance strategy along with *in vivo* studies and *in vitro* tests. A protocol was designed to collect *P. falciparum* samples from different areas of the region, with three purposes: i) monitoring temporal and spatial variations in patterns of molecular markers of resistance to mefloquine, chloroquine (Central America) and sulfadoxine - pyrimethamine; ii) study variability in parasite populations; and iii) characterize in strains from different areas the presence of protein HRP2. Some of those preliminary results were planned to be presented at the AMI/RAVREDA meeting March 2011. Visit of Dr. Noedl to Colombia during April 26-30 was supported; also a HPR2 workshop was implemented with national participants in Tumaco, Nariño.

## DIAGNOSTIC QUALITY ASSURANCE AND ACCESS TO DIAGNOSIS

### RAPID DIAGNOSTIC TESTS (RDT)

AMI activities are concentrated in two areas: i) support countries to develop capacity for quality control of RDTs and ii) adopt guidelines and standards on RDT management at different points of the supply chain.

Most of the countries in collaboration with AMI/RAVREDA developed standards for the diagnosis and treatment of malaria, including the quality assurance of diagnosis. Following previous external program supported by a laboratory in France, a technical document was developed in coordination with two laboratories from the region (INS, Peru and National Reference Laboratory, Honduras) for the coordination and implementation of the *External Evaluation Program on the microscopic diagnosis of malaria*. The objective of the program is to establish the technical procedure for the organization, design and evaluation of the national reference laboratories of the countries of the Region for microscopic malaria diagnosis, with a view to maintaining management efficiency quality, and contribute to the strengthening of the monitoring of malaria diagnosis in the Region. The document and program was to be presented to countries during the AMI/RAVREDA meeting, March 2011.

- There was limited advance with respect to the proposed lines of work on rapid diagnostic tests. Work plans on development of technical guides on the transportation, storage, and management of the tests have been included in work plans and this activity remained pending finalization of the guidelines being developed/ translated by PAHO. Those guidelines were in the process of being edited into Spanish to be delivered during first semester 2011.

### LOT QUALITY CONTROL

The AMI work proposal has been based on complementing and expanding the work being developed by a project supported by WPRO, TDR, and FIND. The idea is to try to develop the capacity for this control to be carried out in the Region. While the recombinant antigens are developed, in the interim activities will consist of creating a mechanism for laboratories trained in this project to support countries in carrying out control of lots purchased during 2010 and 2011 and will involve the national reference laboratories in these activities. In recent months there was only progress in establishing contacts, disseminating ideas in the countries and clarifying the panorama with support of WPRO.

### MOLECULAR EPIDEMIOLOGY

Progress was made in the evaluation of the Histidin-Rich Protein 2 (HRP2) gene deletion. CDC was able to start sample collection in Bolivia, Colombia, Brazil, and Guyana. They expected to have samples being sent to CDC in Atlanta shortly after. This was a collaborative effort of CDC and different partners in countries. In this fiscal year, CDC hosted two scientists from Brazil, two from Guatemala, and one from Colombia for training in molecular epidemiology in anticipation of future activities.

With regard to the study of the deletion of the gene responsible for the HRP2 protein, given the immediate implications that this has in the purchases that the countries should make of rapid diagnostic tests in 2010-2011, this is a priority activity of AMI that would yield, in the short term, very useful results for the Programs (see activities under monitoring the antimalarial drug resistance). CDC and country

results will show the magnitude of this specific problem, preliminary results were to be presented at the AMI/RAVREDA meeting March 2011.

## ANTIMALARIAL MEDICINE ACCESS AND USE

### CORRECTION OF DEFICIENCIES IN THE SUPPLY SYSTEMS

- According to recommendations given during the workshop coordinated by MSH and PAHO, functions of supply systems were reviewed and guidelines prepared with technical cooperation of MSH.
- Studies supported, in coordination with MSH and PAHO Strategic Fund, to analyze availability and quality of antimalarial drugs.
- PAHO essential medicines colleagues were working with MSH to develop a tool for logistics, quality control and quality assurance. A report was developed: *Informe Técnico: Selección, programación de necesidades y adquisición de medicamentos antimaláricos en los países que comparten la Cuenca del Amazonas.*
- Report on antimalarial access reviewed by PAHO. Countries national norms were to be shared with partners, and were to be launched on Nov. 6, 2010, in Honduras.

## ANTIMALARIAL MEDICINE QUALITY

### MINILABS

During this time period, several Amazon countries carried out rounds of studies using minilabs and confirmed results in reference laboratories.

- USP was requested to prepare a strategic document establishing the role and importance of minilabs in order to support the use of minilabs as part of the official quality control process and not only as an AMI activity.
- Participating countries incorporated an approach for drug quality assurance and control systems with USP/PAHO collaboration.
- USP presented a three level strategy for antimalarial quality control at the technical meeting in

Colombia which included the use of minilabs. Countries will discuss this strategy with the corresponding regulatory authorities, the malaria programs and reference laboratories to decide upon its inclusion or not in quality control systems.

Specific studies are under implementation in **Suriname** and **Guyana** to determine the quality of antimalarial drugs in the private and informal sectors of those two countries, also in **Colombia** a similar study has been implemented in Tierralta (Córdoba), Turbo (Antioquia), and Quibdó (Chocó).

There was collaboration on communication between countries and USP for quality standards and other supplies requested by countries in this reporting period.

A partner from USP participated in the 7th Meeting of the Pan American Network for Drug Regulatory Harmonization Good Laboratory Practices Working Group, held in Lima, Peru, in July 2010.

### STANDARD OPERATING PROCEDURES (SOPS)

MSH facilitated countries as they wrote their SOPs for **malaria pharmaceutical management**. **Bolivia**, **Brazil**, **Guyana**, and **Colombia** all made progress in finalizing their respective SOPs. They were in the approval or publishing stage.

- **Bolivia** completed and published the final version of their SOP.
- **Brazil** was awaiting the final revision of the SOPs.
- No activities were planned in **Ecuador** or **Suriname**.
- **Guyana** and **Colombia** completed all revisions of the SOP's and were awaiting final approval.
- In **Peru**, MSH's involvement included developing a rough draft of procedures and monitoring the progress of the review and implementation of drafts of SOPs. MSH also provided TA to Peru to write SOPs for primary care personnel.

### SUPERVISION SYSTEMS

MSH supported the scale up of supervision instruments. At the end of the fiscal year, four AMI countries had implemented supervision procedures.

Two of the countries had assessed the implementation of the supervision tool.

- Supported the scale up of supervision instruments in **Bolivia, Brazil, and Colombia**.
- **Bolivia, Brazil, Colombia, and Guyana** had fully implemented and functional supervision systems by mid 2010. The final draft version in **Peru** was revised and validated during this quarter.
- **Bolivia, Brazil, Colombia, and Guyana** have fully implemented supervision systems. Monitoring studies were carried out in two countries. The tool applied to monitor the supervision tool in **Guyana** and results of **Colombia** study were reviewed.
- In **Peru**, MSH supported the writing of a draft supervision procedure for two regions.

### STUDIES AND PUBLICATIONS

MSH presented and disseminated two studies:

- *The Implications of Low Incidence of Malaria on Pharmaceutical Management*  
This study was presented to AMI partners.
- *The Situation of the Supply Chain of Laboratory Regents and Commodities*  
This study was completed and was scheduled to be distributed in early 2010.

MSH also conducted two regional studies.

- *Implications of the Introduction of ACT's in AMI Countries*  
This study evaluated the adequacy of implementation of malaria interventions including ACT's. This study collected the level of implementation of ACTs, IRS, ITNs and method of malaria diagnosis. MSH began and completed data collection. Preliminary results were presented at the AMI Steering Committee. Publication was awaiting Brazilian clearance and expected for the 1<sup>st</sup> quarter 2011.
- *Commercialization of Malaria Medicines in AMI Countries*  
This study began, data was collected, and it was finalized in this fiscal year. MSH/SPS analyzed the availability of malaria

medicines in the private market, through information provided by regulatory authorities, the malarial control programs, and private laboratories. The results were presented during AMI technical meetings.

### STOCK LEVEL MONITORING

MSH helped identify a stock level problem at the beginning of the fiscal year. With discussions some of these problems were alleviated with donations or exchanges between the different AMI countries. MSH collected quarterly information on stock availability for AMI countries and distributed it so transfers could be completed between countries. Three of the AMI countries were using regional data to redistribute medications within their own countries.

Some of these activities were:

- Stock levels of antimalarials were collected. Significant stock outs and oversupply were seen in many countries. MSH helped identify and solve some of the oversupply and stock out problems at the national level.
- MSH collected data on the stock levels in some AMI countries which led to the donation of medications within the region.
- Analyzed problems in stock level and collected regional data illustrating stock level of antimalarials. Report written and disseminated between the countries so stock levels could be evaluated within the region
- MSH collected information on stock levels in the central and regional levels. Report written and disseminated between countries. Peru and Bolivia were visited to provide technical assistance to improve supply performance.

Other activities in medicine access and use included:

- MSH helped **Bolivia** update its guidelines for malaria diagnosis and treatment
- MSH and the **Bolivian** government agreed to work on the integration of vertical programs such as malaria programs into the national pharmaceutical system.

- MSH worked with the **Brazilian** government to implement a plan to improve adherence to malaria treatment. This involves having a checklist for the dispenser to complete when filling antimalarial prescriptions.
- **Colombia** completed a needs assessment for the next annual procurement with MSH technical assistance.
- **Ecuador** improved warehouse conditions after a MSH workshop.
- MSH facilitated the organization and training materials on good storage practices in **Ecuador** and **Peru**.
- MSH worked with **Peru** to evaluate and certify their warehouse at Callao, Peru. The certification procedure was extended to other warehouses with the development of an internship program.
- MSH consultants participated in the AMI technical meeting in Santa Cruz, Bolivia.

## VECTOR SURVEILLANCE AND CONTROL

- The **Bottle Bioassay Insecticide Resistance Testing** guideline in Portuguese and Spanish was in production and anticipated to be ready for dissemination in late 2011.
- CDC hosted a meeting on entomology in August 2010 to discuss the vision and needs of entomology work in the region. This was a chance to streamline activities and work collectively.
- CDC continued to discuss the use of a simple colorimetric method to evaluate insecticide content on the surface of the ITNs. CDC staff traveled to Paramaribo, Toekoenari Island, Suriname, August 23-27, 2010, to conduct a workshop on the use of a colorimetric field technique to measure insecticide levels on long-lasting insecticide-impregnated mosquito nets. Participants attending were from Belize, Brazil, Guatemala, Jamaica, and Suriname.
- A vector control workshop was implemented in Catacamas, Olancho, Honduras, August 2-8, 2010, with participation of Honduras and Nicaragua. Technical assistance for this workshop was provided by Colombia under PAHO coordination.
- Support was provided for the workshop organized in coordination with CDC during Aug 23-27 in Suriname, with participation of Belize, Brazil, and Guyana on the CDC bottle bioassay for assessing mosquito resistance and colorimetric testing for insecticide levels on bed nets.
- Coordination of training and support on integrated vector management with South-South participation implemented.

## INTRODUCTION OF THE USE OF LONG-LASTING INSECTICIDE-TREATED NETS (LLINs)

CDC entomologists and epidemiologists took part in discussions to develop a plan for evaluating the use of insecticide-treated bed nets (ITNs) in the region. CDC staff performed a technical assistance trip to Brazil in February 2010 to finalize a protocol to evaluate a pilot distribution of ITNs in Acre state. The protocol for this activity was recently finalized and submitted for ethical approval in Brazil. It was expected that this activity would be conducted in late 2010 or early 2011.

The Amazon Malaria Initiative (AMI) began to carry out these activities in 2007, with the purchase of LLINs for almost all Amazon countries. PAHO designed a strategy to guarantee guided implementation, achieve the greatest epidemiological impact, and allow for evaluation. The strategy followed a set of operational requirements that included:

1. Select malaria high risk localities and seek 100% of population coverage.
2. Distribute and install door-to-door free mosquito nets.
3. Disseminate educational materials along with mosquito nets, with emphasis on limiting the washing.
4. Offer adequate diagnosis and treatment as part of a joint intervention.
5. Have an information system in place with the capacity to carry out local-level analysis.
6. Perform entomologic and epidemiologic monitoring using indicators established in AMI.
7. Carry out surveys on bed net use, etc.

Countries distributed the LLINs donated by AMI, following the strategy with greater or lesser rigor. Some countries made changes to the strategy due to the special characteristics and epidemiological situation of the target population. Since the results don't follow a generic protocol in order for countries to evaluate implementation, USAID suggested standing by those activities until a regional manual/guideline was developed for the use of interventions based on LLINs use.

- A seminar will be implemented in order to develop a specific regional strategy, among the AMI/ RAVREDA guidelines, for the interventions based on LLINs use.

Progress made:

- **Brazil** shared its experience in implementation in Acre state at the meeting in Santa Cruz, pointing out the care taken by the malaria program in applying the methodology, closely observing the epidemiological impact and monitoring the use of the mosquito nets. As a result, agreement was reached for the CDC to visit **Brazil** to see the results first-hand and help with its systematization in Acre.
- Countries continued with its intervention in accordance with the operational requirements established by AMI. **Bolivia** distributed 5,000 mosquito nets in three localities located within three municipalities in the departments of Beni and Pando. Educational material was also distributed, which included a washing calendar. Surveys on the use of mosquito netting were conducted.
- In **Brazil**, the Ministry of Health and the National Malaria Program monitored the local-level epidemiological analyses carried out in Acre state, as well as the survey conducted on the use LLINs following 12 months of implementation. Special attention should be paid to their impact on the reduction of the number of cases of *P. falciparum* and *P. vivax* malaria. Unfortunately, it has not been possible to carry out entomological monitoring in these localities due to problems related to people capturing the mosquitoes. A good technical report on the intervention was written. Field visits were also carried out with CDC technical personnel during this period to evaluate the methodology. The CDC prepared a report on this activity.
- **Colombia** continued its intervention activities in 56 localities located in three municipalities in Choco department, with a total distribution of 11,605 LLINs. During this period, surveys on their use revealed that a high proportion of people were using the mosquito nets. Also during this period, another evaluation on residuality and data collection was carried out to analyze epidemiological impact.
- In **Ecuador**, the National Malaria Eradication Service (*Servicio Nacional de Erradicación de la Malaria* / SNEM) continued monitoring intervention in six localities, conducted surveys of the use of LLINs, and tested the residuality of insecticides. The survey results were automated in databases and then analyzed.
- In **Guyana**, the LLINs acquired were distributed, with emphasis on vulnerable groups in high-risk regions, such as pregnant women, children under five years of age, miners, and loggers Regions 1 (Mabaruma) and 2. In addition, the hammock-netting included mining camps in Regions 7, 8, 9, and 10. Surveys on their use are planned for next semester. **Suriname** collected some mosquito nets donated by the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM, or simply the 'Global Fund') in previous years (as part of a large-scale intervention) and sent them to the CDC for analysis of the residuality of insecticides.
- The CDC in **Peru** continued to monitor the experimental houses and collect data. Preliminary results were presented by the CDC at the AMI annual meeting and showed the usefulness of this approach to back the use of mosquito nets in localities with *A. darlingi* transmission. This is a collaborative effort between the DIRESA Loreto, National Malaria Program Peru, DIGESA Peru, CDC, CDC/UVG and others.
- At the Santa Cruz and Bogotá meetings, agreement was reached to monitor the residuality of the insecticides used in LLINs as part of the AMI activities coordinated by the CDC, which will involve training countries on colorimetric methods to monitor the presence of insecticides in the

mosquito nets. Training is scheduled for the second semester and will include a standardized method based on findings from biological tests carried out in the Region. All countries expressed interest in this activity especially because large-scale donations from the Global Fund, to increase the use of LLINs, are expected to become a reality in coming years.

## INFORMATION MANAGEMENT

In previous years, the countries expressed the need to work on malaria information management and stratification. AMI proposed:

- i. Promoting information management based on individual data entry.
- ii. Adopting relational database systems.
- iii. Adopting routine analysis based on principal parameters and indicators for local-level decisionmaking and monitoring management.

### MALARIA INFORMATION SYSTEMS:

- From 2007 onwards, AMI began to promote the preparation of routine analysis with the goal of achieving maximum utilization of the information contained in databases. During that year, AMI introduced the use of a visualization and data tabulation tool available on the market, but that up to that moment had undergone relatively little use in public health. During this period, within the AMI framework, PAHO has developed the use of this tool in its malaria programs. Since September 2008, automated analysis routines had already been developed for use in **Bolivia, Brazil, Colombia, Ecuador, and Suriname**. Also after last meeting in Santa Cruz, Bolivia, Central American countries were working to implement a better routine analysis at different country levels. Today **Honduras, Nicaragua, and Panama** had incorporated the tool available and routine analyses had been initiated.
- Since some countries needed specific training on information management, including data analyses, a workshop was developed to train local personnel, in Lima, Peru, on August 23-27 with participation of **Bolivia, Colombia, Ecuador, Guyana, Peru, and Suriname**.
- **Peru** after this training organized one for local malaria personnel, in order to modify malaria databases suggested during the training and work on routine analyses.
- Since December 2008, **Bolivia** implemented a database to set up the analysis routine developed with the data tabulation tool, with individual entries in Guayaremarin department; and in 2009, in Riberalta, Pando, and three other regions. Staff responsible for epidemiological analysis in these regions was trained in the use of the tools.
- **Brazil** enhanced its SIVEP malaria analysis routine at state level and developed an analysis routine for use at national level. By January 2009, both the national level and the states of Amapá, Amazonas, and Matto Grosso had already set up the routine. In the state of Rondônia, a routine was also promoted at municipal level, which disaggregates data at local level. Today the malaria program based their analyses using this routine analyses promoted by AMI/RAVREDA.
- **Colombia** implemented SIVIGILA in individual data entries. Although this is an initiative of the Ministry of Social Protection and the National Institute of Health, AMI supported with the malaria component. By March 2009, the SIVIGILA (*Sistema Nacional de Vigilancia en Salud Pública*, or National System for Public Health Surveillance) was implemented in priority malaria departments in Nariño, Chocó, and Antioquia. Today SIVIGILA it is implemented in all the country. The analysis routine was enhanced and draft reports were shared with the authorities.
- In **Ecuador**, improvements to the SIVEMAE software were finalized. Training in the updated software and in the use of data tabulation tool for database management was carried out. The routine was reviewed, including maps and API calculation by cantons.
- **Guyana** strengthened its surveillance system and rapid-response capacity at both regional and district level. The country also utilized stratification data in weekly reports to aid in decisionmaking on the delivery of LLINs and on monitoring trends. Implementation and decentralization of the malaria



information system improved at regional level and in Regions 1, 2, 7, 8, 9, 10. The new information system allows the Ministry of Health (MoH) to review and investigate “case duplication.”

- Data collection and analysis strengthened at national and local levels, annual reports published (PAHO Web), printed and distributed to all the countries and AMI partners, with information based on ADM level 2, results of an increased use and quality of data managed by the National Malaria Programs.
- Lines of action supported by AMI utilized by PAHO technical cooperation in development of successful country proposals to the Global Fund.

## **COMMUNICATION AND INFORMATION DISSEMINATION**

During this reporting period the Links Media team developed, supported, and implemented a myriad of communication and knowledge dissemination activities to strengthen malaria control and prevention strategies in the Amazon Basin.

Most of these activities conducted in support of AMI fell under the four outlined objectives and occurred for the duration of the project year. These included:

- Objective 1: Develop and produce messages and materials (including fully interactive multimedia for multiple platforms) for current activities and new sub-projects.
- Objective 2: Support the revision and copyediting of partners’ publications and provide graphic services.

- Objective 3: Disseminate information.
- Objective 4: Provide TA to AMI partners in dissemination and communication activities.

Links Media activities and accomplishments are summarized in Table 3 and resulted in:

- Creation and enactment of an Editorial and Peer Review Support Process.
- Engagement with leaders at the national, regional and municipal levels.
- Development of audience segmentation maps as part of the message and materials development process.
- Building of key messages maps as part of the message and materials development process.
- Design of flow of information protocols as part of the message and materials development process.
- Writing and editing of an AMI Annotated Bibliography.
- Design and launching of official AMI project Website (with linked resources)([www.usaidami.org](http://www.usaidami.org))
- Planning, coordinating and implementing several capacity- building sessions (workshops/trainings) both onsite and virtual (e.g., spokesperson training, event planning, building media and public relations skills).
- Media monitoring and analysis.
- Creation and launching of a social media campaign in support of information dissemination and communication.

**TABLE 3: AMI COMMUNICATION AND INFORMATION DISSEMINATION ACTIVITIES IN FY 2010**

Activity/Objective	Achievement	Outputs
Develop and produce messages and materials for current activities and new sub-projects. (Publications development)	Increased information and communication resources available for knowledge dissemination and outreach about AMI's role in the prevention and control of malaria in the Amazon Basin.	<p>Developed a set of strategic materials to support and promote AMI targeted to key audiences (e.g., multiyear report, brochures, fact sheets, among others).</p> <p>Developed and maintained a project Website in English and Spanish.</p>
Support the development, revision, and copyediting of partner publications and provide graphics services. (Editorial support)	Improved quality of AMI generated literature about prevention and control of malaria in the Amazon Basin.	<p>Developed and conducted an editorial and peer review support process (EPRSP) for AMI.</p> <p>Provided editorial and peer review support to country and international partners for the development of technical documents and other materials.</p> <p>Submitted three abstracts to malaria and public health-related conferences and meetings. All three abstracts were accepted.</p> <p>Submitted two manuscripts to accredited publications. Submitted abstracts are pending decisions.</p>
Dissemination of information. (Distribution, publication, exhibit, conferences, presentations, and outreach meetings)	Increased contribution to literature and knowledge of prevention and control of malaria in the Amazon Basin region.	<p>Developed and implemented an information dissemination plan which included the publication of technical documents, presentations at technical and scientific meetings and conferences, and Web-based presentations.</p> <p>Developed and implemented a communication outreach plan in support of the publication of technical documents, presentations at technical and scientific meetings and conferences, Web-based presentations, and special events and activities (e.g., Malaria Day in the Americas) targeted to partners, stakeholders, media, and policymakers.</p> <p>Successfully attained media placements and coverage in promotion of published technical documents, presentations at technical and scientific meetings and conferences, Web-based presentations, special events and activities, and achievements made by country partners (e.g. accreditations) targeted to partners, stakeholders, media, and policymakers.</p>

<p>Provide TA to AMI partners in dissemination and communication activities.</p>	<p>Increased knowledge dissemination and outreach capacity about AMI's role in the prevention and control of malaria in the Amazon Basin region.</p>	<p>Provided targeted media and spokesperson training to country and international partners, including Web-based capacity building sessions, one-on-one media training, and development of materials such as press releases, fact sheets, media advisories, backgrounders, pitch letters, talking points, among others.</p> <p>Following are examples of the capacity-building sessions that have been conducted:</p> <ol style="list-style-type: none"> <li>1. International Accreditation ISO / IEC 17925 from the National Center for Quality Control of Peru (CNCC) Press Conference</li> <li>2. Elements for Communicating as a Spokesperson for the Amazon Malaria Initiative (AMI)/Amazon Network for the Surveillance of Antimalarial Drug Resistance (RAVREDA) (English and Spanish)</li> <li>3. Conectándose a los países: Planificación un evento de la AMI/RAVREDA para el Día de la Malaria en las Américas (English and Spanish)</li> <li>4. Provided media and outreach virtual technical support to malaria control programs and MOH's communication programs to countries requesting assistance, such as the Web-based capacity-building sessions in support of Malaria Day in the Americas.</li> </ol>
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## 4. IMPACT

### ANTIMALARIAL DRUG RESISTANCE AND EFFICACY

Through the efforts of the AMI partnership,

- All countries have collected reliable information related to the efficacy of the national first-line antimalarial drugs.
- All seven countries in the Amazon region have already changed their national treatment guidelines to highly efficacious artemisinin-based combination therapy.
- Under the leadership of the CDC, personnel have been trained in molecular epidemiology for determination of molecular markers of resistance. This is in preparation for the implementation of the recommendation that countries use molecular markers in the monitoring of antimalarial resistance.
- Countries have also been able to process samples collected from different studies and are in the process of preparing the results for scientific publication.

### DIAGNOSTIC QUALITY ASSURANCE AND ACCESS TO DIAGNOSIS

The recent progress in the field of molecular epidemiology is an example on how effective collaboration among partners can be. CDC collaborated with partner countries scientists to develop a common protocol to evaluate the deletion of a gene associated with the performance of rapid diagnostic tests for malaria. CDC and AMI also worked with in-country PAHO and university staff to implement data collection, which has already been successful in four countries. This, together with the recent advances in training scientists at CDC laboratories will contribute to development of a portfolio of activities in the region.

### ANTIMALARIAL MEDICINE ACCESS AND USE

With MSH technical support in coordination with PAHO, countries reported important advances which are detailed in MSH documents. Among these advances are the following:

- All AMI countries have disseminated new standardized operational procedures for malaria pharmaceutical management, including Honduras and Nicaragua in Central America.
- A meeting was carried out in Cartagena, Colombia, April 12 to 16, 2010, in order to analyze countries data, problems and possible solutions regarding operational procedures for malaria pharmaceutical management. Collaborative work between MSH and PAHO resulted in agreement on purchase of antimalarial drugs for all the countries through the PAHO Strategic Fund for Year 2011. Also, a donation was coordinated to deliver antimalarial drugs for complicated/severe malaria cases in some countries.

### VECTOR SURVEILLANCE AND CONTROL

The role of vector control in the Amazon sub-region through coordination among the AMI partners is taking an increasingly prominent role. CDC staff have met with various partners to assist AMI in planning for future activities, such as a more comprehensive approach in vector surveillance and control. They were able to successfully standardize and train different countries in a reliable and comparable way to monitor insecticide resistance. Efforts now will be allocated in implementing systematic surveillance systems that use this methodology. CDC believes that the conclusion of efforts to have standard and complete protocols in different languages in the region will serve to further facilitate the de facto implementation of this method in the region.

CDC staff took 15 trips to different countries in the region and in the United States to support the initiative, including the AMI Steering Committee in Santa Cruz, Bolivia, in March 2010. CDC staff also took part in different regional trainings and workshops, e.g. bed net evaluation and insecticide resistance testing in Suriname. They provided assistance in the design and implementation of studies and a bed net evaluation in Brazil.

## **COMMUNICATION AND INFORMATION DISSEMINATION**

During this fiscal year, Links Media was successful in leading communication and advocacy efforts and providing technical expertise to country and international partners in support of AMI, ultimately strengthening the region's capacity to effectively communicate and disseminate information about malaria, principally in the Amazon Basin. Some of the many achievements included:

- Providing editorial and peer review support process (EPRSP) in developing technical, promotional, and collateral documents for publication; (see Annex 1)
- Providing an arena for discussing advances made in the prevention and control of malaria in the Americas as a result AMI, and increasing the awareness and knowledge of the initiative as a result;
- Strengthening the capacity of the national, regional, and municipal authorities and decision makers to be more effective communicators by training them on key aspects of communications and providing them with tangible tools for use; and,
- Rapidly expanded AMI's perception footprint without considerable additional investments as a result of a social media campaign.

## 5. FUTURE DIRECTIONS

In the next fiscal year and beyond, AMI partners plan to:

- Assist countries to perform *in vivo* testing (using many centers or with mobile teams).
- Continue to support the use of molecular markers for resistance by training lab staff and also by assisting in the implementation of methods to collect samples.) This is especially important in Central America where the number of *P. falciparum* cases is very low (making *in vivo* difficult) but there is sensitivity to chloroquine, a drug for which there are good molecular markers.
- Finish the HRP2 gene deletion evaluation.

AMI partners will continue to work intensively in the area of vector surveillance and control. CDC plans to promote the incorporation of the bottle test bioassay and the establishment of an insecticide resistance surveillance system in the different countries. The bottle bioassay has been adopted by many countries and future plans include continuing to strengthen the countries surveillance systems and consolidate a regional network of insecticide resistance network.

Other activities include:

- Assist in the implementation a vector surveillance system tailored to low to moderate malaria transmission settings.
- Improve capacities for the monitoring and evaluation of vector control operations.
- Assist in the development of innovative ways to monitor vector behavior such as through the use of experimental huts.

Each of AMI's lines of work includes communication and information dissemination as a cross-cutting component. In particular, AMI seeks to share its

success stories and lessons learned throughout the subregion and with a wider audience. The communication component targets diverse audiences, including the general public, policymakers, health care providers, and technical and scientific audiences.

Future communication activities will follow these objectives:

Objective 1. Develop and produce messages and materials

- Continue to maintain and promote the English and Spanish versions of the AMI Website to further increase national and international awareness about AMI and malaria in the LAC region.
- Continue to develop electronic alert messages and other promotional items to promote the AMI, including the Website, publications, etc.
- Continue to develop, translate, and adapt materials to support the TA and training activities conducted.

Objective 2. Support the revision and copyediting of partner publications and provide graphics services.

- Continue to implement and promote AMI's EPRSP to AMI partners to provide support in the development and submission of publications related to AMI, ultimately promoting project achievements. (See Appendix 1 for a full list and status)
- Continue to identify publications, storylines, and news materials from the field. Specifically, work with specialized communicators and NMCPs in the region to acquire and disseminate country- and regional-level success stories, lessons learned, best practices, main activities conducted at the country and regional levels, achievements, and testimonies from populations who have benefited from AMI.

Objective 3. Dissemination of information.

- Update and continue to implement the AMI Dissemination Plan for fiscal year 2010–2010 and its supplementary plans, with the overall goal of promoting the work conducted and key results accomplished through AMI in the Amazon Basin.
- Continue to disseminate information about AMI to strategic donors and stakeholders through electronic alerts with information about the initiative and personal meeting to increase awareness about AMI.
- Continue to place key information about AMI, specifically results and achievements, in the media.
- Continue to regularly share an updated list of conferences, meetings, and forums where AMI could potentially be promoted and presented.
- Organize Malaria Day in the Americas events in Washington, DC, and in several AMI countries in 2011; generate significant media coverage of the

events; disseminate informational materials to target audiences; and arrange for speaking opportunities for AMI partners.

- Developing an activity proposal for the AMI+RAVREDA 10th Anniversary.

Objective 4. Provide TA to AMI partners in dissemination and communication activities.

- Follow up with AMI partners regarding future Web-based capacity building sessions geared toward providing partners with tools and skills to promote their AMI-related efforts.
- Start the development of TA tools, materials, and TA Web-based sessions in communication-related topics, such as best communication practices for developing effective presentations.
- Assist AMI Partners during the activities for the AMI+RAVREDA 10th Anniversary.

## APPENDIX I: AMI MANUSCRIPTS COMPLETED AND UNDER DEVELOPMENT IN FY 2010

Manuscripts	AMI Partner and Corresponding Author (CA)	Status
<b>Manuscript 1:</b> AMI/RAVREDA: Development of an Operational System for Antimalarial Medicine Resistance Surveillance to Improve the Treatment of Malaria in the Amazon Region	Pan American Health Organization (PAHO-DC) (Keith Carter)	Revised version #2 and an Editorial Appraisal were sent to CA on May 18. Currently awaiting CA's revised version in order to proceed.
<b>Manuscript 2:</b> (AMI/RAVREDA) Antimalarial Drug Resistance Surveillance Using Standardized Protocols in the Amazon Region	PAHO-DC (Keith Carter)	Revised version #1 and an Editorial Appraisal were sent to the CA on March 18. Currently awaiting CA's revised version in order to proceed.
<b>Manuscript 3:</b> Intermittent rice irrigation (IRI) for malaria control in Peru: A win-win intervention based on a multi-sector and transdisciplinary approach	USAID (Jaime Chang)	Received revised version #1 from CA on August 8. Will be reviewed and finalized in the order received (after Manuscript 4, 5, 6).
<b>Manuscript 4:</b> Rapid Assessment of Glucose-6-Phosphate Dehydrogenase Deficiency in Males at Risk for Malaria in Suriname	Suriname (Stephen Vreden)	In collaboration with the CA, preparing manuscript for publication submission.
<b>Manuscript 5:</b> Antimalarial Efficacy in Suriname: 2001-2006: Implications of Evidence-based Therapy Change	Suriname (Stephen Vreden)	Submitted to the Pan American Journal of Public Health / Revista Panamericana de Salud Publica on August 27.
<b>Manuscript 6:</b> Measured Adherence to Artemether-Lumefantrine Treatment for <i>Falciparum</i> Malaria in Urban Suriname	Suriname (Ingrid Krishnadath)	In collaboration with the CA, preparing manuscript for publication submission.
<b>Manuscript 7:</b> Triptico de Mosquiteros (Bed net Pamphlet)	PAHO-Bolivia	COMPLETED



<b>Manuscript 8:</b> Study on the adherence to treatment for <i>P. vivax</i> malaria with 25 mg/kg of chloroquine for 3 days and 0.50 mg/kg of primaquine per day for 7 days for malaria patients in the cities of Goianésia, State of Pará, and Manaus, State of Amazonas, Brasil	Management Sciences for Health (MSH) (Paola Barbosa Marchesini)	Revised version # 1 and an Editorial Appraisal were sent to the CA on April 27. Currently awaiting CA's revised version in order to proceed.
<b>Manuscript 9:</b> Rethinking pharmaceutical management in low incidence settings (Success Story)	MSH (Angélica Pérez)	COMPLETED
<b>Manuscript 10:</b> Promoting adherence to malaria treatment (Success Story)	MSH (Angélica Pérez)	COMPLETED
<b>Manuscript 11:</b> Better conditions of storage of antimalarials in Ecuador (Success Story)	MSH (Angélica Pérez)	COMPLETED
<b>Manuscript 12:</b> Advancements in Colombia: Strengthening the prevention and control of malaria in Chocó, Colombian Pacific Coast, 2006– 2009 (Success Story)	PAHO-Colombia (José Escobar and Links Media)	Version # 1 was sent to the CA on August 19. Currently awaiting CA's revised version in order to proceed
<b>Manuscript 13:</b> Collaborations between Official Medicines Control Laboratories: A sustainable approach to strengthen regional capabilities to ensure the quality of medicines (Success Story)	United States Pharmacopeia (USP) (Victor Pribluda)	Version # 2 being reviewed, edited, and graphically designed by Links Media. Will be sent to CA for final review.
<b>Manuscript 14:</b> Evaluación del inicio del diagnóstico y tratamiento de la malaria después de iniciado los síntomas en el municipio de Riberalta-Bolivia	PAHO-Bolivia	Currently being translated in order to begin first review and edit.
<b>Manuscript 15:</b> Towards Best Storage Practices: Piura works to improve medicine storage conditions (Success Story)	MSH-Peru	Currently being translated in order to begin first review and edit.
<b>Manuscript 16:</b> Buenas prácticas de almacenamiento de medicamentos y dispositivos médicos (Best storage practices for medicines and medical devices)	MSH-Peru	Currently being edited in Spanish.

<b>Manuscript 17:</b> Strategic Orientation Document 1 (Strategy for monitoring efficacy and resistance in high/low and a protocol for multicenter in-vivo studies, based on recommendations from experts gathered in Washington, DC in 2008)	CDC and PAHO-DC	To be shared with all international partners on September 15, 2011. To be submitted to Links Media and to be determined (TBD).
<b>Manuscript 18:</b> Strategic Orientation Document 2 (Strategy for access to quality diagnosis, which will include all types of diagnostic tests)	CDC and PAHO-DC	To be shared with all international partners on September 15, 2011. To be submitted to Links Media TBD.
<b>Manuscript 19:</b> Strategic Orientation Document 3 (Malaria Vector Surveillance and Control in Latin America)	PAHO-DC	To be shared with all international partners on September 15, 2011. To be submitted to Links Media TBD.
<b>Manuscript 20:</b> Strategic Orientation Document 4 (Strategy for logistics, quality assurance, and quality control)	PAHO-DC, MSH, USP	To be shared with all international partners on September 15, 2011. To be submitted to Links Media TBD.
<b>Manuscript 21:</b> Strategic Orientation Document 5 (Strategy for access, prescription, and adherence/compliance)	MSH	To be shared with all international partners on September 15, 2011. To be submitted to Links Media TBD.
<b>Manuscript 22:</b> Strategic Orientation Document 6 Malaria Vector Surveillance and Control in Latin America) (Strategy for vector surveillance and control, including monitoring vector susceptibility to insecticides)	CDC, PAHO-DC, RTI	To be shared with all international partners on September 15, 2011 To be submitted to Links Media TBD.



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