

State of Malaria Pharmaceutical Management in the Amazon Basin Countries

Edgar Barillas
Claudia Valdez
Silas Holland

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SPS 
Strengthening
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Strengthening Pharmaceutical Systems
Center for Pharmaceutical Management
Management Sciences for Health
4301 North Fairfax Drive, Suite 400
Arlington, VA 22203 USA
Phone: 703.524.6575
Fax: 703.524.7898
E-mail: sps@msh.org

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About SPS

The Strengthening Pharmaceutical Systems (SPS) Program strives to build capacity within developing countries to effectively manage all aspects of pharmaceutical systems and services. SPS focuses on improving governance in the pharmaceutical sector, strengthening pharmaceutical management systems and financing mechanisms, containing antimicrobial resistance, and enhancing access to and appropriate use of medicines.

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Strengthening Pharmaceutical Systems
Center for Pharmaceutical Management
Management Sciences for Health
4301 North Fairfax Drive, Suite 400
Arlington, VA 22203 USA
Telephone: 703.524.6575
Fax: 703.524.7898
E-mail: sps@msh.org
Web: www.msh.org/sps

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ABBREVIATIONS

ACT	artemisinin-based combination therapy
AMI	Amazon Malaria Initiative
BGVS	<i>Bedrijf Geneesmiddelen Voorziening Suriname</i>
BOG	<i>Bureau voor Openbare Gezondheidsorg</i> (Bureau of Public Health) [Suriname]
CRIV	Combined Requisition Issue Voucher
DIGEMID	<i>Dirección General de Medicamentos, Insumos y Drogas</i> (General Directorate of Drugs and Medical Supplies) [Peru]
DIRESA	<i>Dirección Regional de Salud</i> (Regional Health Office) [Peru]
GFATM	Global Fund to Fights AIDS, Tuberculosis and Malaria
MB	Malaria Board [Suriname]
MMU	Materials Management Unit [Guyana]
MoH	Ministry of Health
MPS	<i>Ministerio de la Protección Social</i> (Ministry of Social Protection) [Colombia]
MSD	Medicine Service Deliverer
MSH	Management Sciences for Health
MZ	<i>Medische Zending</i> (Medical Mission)
NGO	nongovernmental organization
NMCP	National Malaria Control Program
PAHO	Pan American Health Organization
PAMAFRO	“Malaria Control in Border Areas of the Andean Countries: A Community Approach”
RAVREDA	Amazon Network for the Surveillance of Antimalarial Drug Resistance
RPM Plus	Rational Pharmaceutical Management Plus Program
SCMS	Supply Chain Management Systems
SIVEP	<i>sistema de vigilancia epidemiológica</i> (Epidemiological Surveillance System)
SNEM	<i>Servicio Nacional de Erradicación de la Malaria</i> (National Malaria Eradication Service) [Ecuador]
SPS	Strengthening Pharmaceutical Systems Program
USAID	U.S. Agency for International Development
USD	U.S. dollar
WHO	World Health Organization

INTRODUCTION

The Amazon region began to experience a reemergence of malaria in the early 1990s, including the appearance of *Plasmodium falciparum* resistant to first-line antimalarials. In response to the increased incidence and therapeutic failures, the U.S. Agency for International Development (USAID) launched the Amazon Malaria Initiative (AMI) in 2001. Its objective is to improve the control and treatment of malaria in the countries comprising the Amazon Basin: Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, and Venezuela. Since then, with the support of the AMI, these countries have changed their treatment policies to include more-effective therapeutic combinations. Strengthening the management of medicine supply is essential to effective implementation of the new policies.

Rational Pharmaceutical Management Plus (RPM Plus), a Management Sciences for Health (MSH) program, has been AMI's technical partner since 2002 to support medicine supply management. Along with other partners and counterparts of the initiative—the Pan American Health Organization (PAHO), the U.S. Centers for Disease Control and Prevention, the U.S. Pharmacopoeia Drug Quality and Information Program, managers of the National Malaria Control Programs (NMCPs), and local USAID Missions—RPM Plus has helped strengthen the capacity of the NMCPs to develop strategies to improve the management of medicines and supplies. This work continues within the Strengthening Pharmaceutical Systems (SPS) framework, the new program that USAID assigned to MSH to strengthen the pharmaceutical systems in the countries where USAID provides technical assistance.

Through this framework, the countries that comprise the Amazon Basin have undertaken various activities to improve the supply of medicines. However, no document consolidates information on the state of medicine supply management or summarizes the achievements made to date. From October 2007 to July 2008, SPS conducted short visits to Brazil (October 2007), Bolivia and Ecuador (January 2008), Guyana (March 2008), Peru (April 2008), Colombia (May 2008), and Suriname (July 2008) to learn about the state of antimalarial supply management, the improvements introduced in the system as a result of the technical assistance of AMI, and the problems that must still be addressed in the next few years.

This document collects the principal findings of those visits. The profile of the medicine supply situation in the countries was completed with a bibliographic review, data collected during the workshop conducted by AMI in Bogota (May 2008), and interviews with the participants in this workshop. The document was checked by technical staff from the malaria programs of each of the countries.

METHODOLOGY

The following methodology was used to establish the profile of the state of antimalarial supply:

1. **Establish guides for document review and interviews:** A guide was established for document review and interviews conducted during the country visits.
2. **Document review:** The country visits were preceded by a review of documents produced previously in the AMI framework. Any studies on the availability and use of medicines that were conducted by national teams at the beginning of the initiative were considered particularly relevant.
3. **Conduct in-country rapid evaluations:** From October 2007 to July 2008, SPS visited six of the seven countries that received support from USAID: Brazil (October 2007), Bolivia and Ecuador (January 2008), Guyana (March 2008), Peru (April 2008), Colombia (May 2008), and Suriname (July 2008). During the visits, officials and technical staff associated with the malaria program were interviewed, additional documentary information was reviewed, and visits were made to medicine warehouses. Trip reports were prepared for each visit that included recommendations for addressing the problems encountered.
4. **Compile additional information:** During the “Regional Workshop to Improve the Management of Supply and Quality Assurance Systems for Malaria” additional information was collected and various participants were interviewed to complete the profiles included in this document.
5. **Review and validate the report:** The consolidated report was reviewed by officials and technicians of the malaria program. Their comments and suggestions were incorporated in the final report.

FINDINGS

Bolivia

The selection of antimalarials is based on the National Essential Medicines List. In 2005, artesunate was included prior to its introduction as a first-line therapy in mid-2006.

Presently, antimalarials are procured through PAHO. The lead time from placing the order with PAHO until arrival at customs of the medicines is eight months on average.

At the time of the visit, medicines and other supplies were stored in Ministry of Health (MoH) warehouse adjacent to the NMCP. The storage conditions are inadequate. The warehouse is small and does not present the minimum conditions for adequately storing the medicines. The warehouse inflows and outflows are recorded on computerized forms. There are up-to-date reports on the inventory. Medicine availability is estimated with this information (according to months of consumption) in the central warehouse (table 1).

Table 1. Bolivia: Estimate of Medicine Availability in the Central Medicine Warehouse (January 2008)

Medicines	2007 Average Monthly Consumption (units)	Inventory on December 31, 2007	Months Available According to Consumption	May 2008 Inventory*
Mefloquine chlorhydrate, 250 mg	1,250	2,800	2.24	13,560
Artesunate, 50 mg	2,296	18,788	8.18	24,000
Chloroquine, 250 mg	8,260	54,900	6.65	399,000
Primaquine, 15 mg	16,763	24,242	1.45	600,000
Primaquine, 5 mg	12,500	2,000	0.16	15,000
Quinine, 600 mg or 300 mg	10	3,780	378	20,000

* Data contributed during the workshop held in Bogota (May 2008).

A medicine availability study conducted in 2006 with technical assistance from MSH showed stock-outs of some medicines in the health facilities. This still recurring problem is attributed to deficiencies in quantification arising from the lack of precise and timely information on supplies and inventories. Recognizing this deficiency, the NMCP decided to implement the standards established by the *Sistema Nacional Único de Suministros* (Sole National Supply System), including a computerized system that has inventory modules (Kardex including prices/value of inventory) and monthly stock movement reports, consolidated with quarterly orders. This intervention is still in the initial implementation stages.

With contributions from the Japan International Cooperation Agency, a national warehouse was built that has a comprehensive infrastructure, including an area for dividing blister pack

medicines and a fleet of distribution vehicles that maintains the cold chain. At the time of the visit in May 2008, regional warehouses were being built and adapted throughout the country.

To guarantee the proper use of antimalarials, the NMCP has a Malaria Treatment Guide that was updated in 2005.

During the visit, no problems were reported with regard to the quality of antimalarials. Upon arrival in the country, products undergo quality control at the *Laboratorio de Control de Calidad de Medicamentos y Toxicología* (Medicine Quality Control and Toxicology Laboratory). A visit to this facility showed excellent equipment and work processes, which have received international certifications (ISO 9001). Antimalarials are also subject to postdelivery quality control using rapid tests with Minilab[®] and confirmatory tests in the national laboratory. The mechanism for disseminating quality test results, established in the *Sistema Nacional de Vigilancia y Control* (National Oversight and Control System), has not yet been implemented.

There is still little coordination between the MoH's Medicines and Technology Unit and the NMCP. Coordination of supervision visits to health facilities is particularly weak. In this context, a standardized form is being developed with the technical assistance of AMI/SPS to systematize supervision of the availability and use of medicines in health facilities. It is hoped that the information generated by this monitoring and supervision system will be incorporated in the previously mentioned computerized system.

The medicine availability study conducted in 2006 with the technical support of MSH showed stock-outs of some medicines at the health facilities. At the time of the visit, no stock-outs were reported at the facilities, but the safety stock was virtually exhausted. In May 2008, the most recent PAHO purchase had been received, replenishing the working and safety stock (see table 1).

Problems identified: At the time of the visit, the most pressing issue was the poor storage conditions of the products in the NMCP warehouse. During the workshop held in Bogota (May 2008), it was reported that this problem was being resolved and that the medicines were going to be moved to the recently built MoH warehouse (CEASS). Similarly, it is hoped that in the framework for the integration of the health supply system and the implementation of a logistics administration and information system will improve the procedures for planning the needs and distribution chain.

Brazil

The Brazilian *Cámara Técnica de Terapéutica* (MoH Technical Treatment Unit) is the authority responsible for selecting antimalarials and formulating national malaria therapy guidelines. This organization supported the introduction of artemether + lumefantrine (Coartem[®]) to treat *P. falciparum* in 2005. The NMCP began a progressive introduction plan in 2006, which was completed in January 2008. Although the country's regulations establish that the labeling and inserts of medicines must be in Portuguese, those materials for the Coartem procured recently have been in English. The vendor claimed that changing the language would delay the delivery

by 10 months. For the next purchase, the vendor has been asked to change the labeling language. The artesunate + mefloquine fixed-dose combination is the result of a research and development alliance between Farmanguinhos; the Oswaldo Cruz Foundation, a research institute linked to the Brazilian Ministry of Health; and the nonprofit organization Drugs for Neglected Diseases Initiative. This product was introduced on the national market in May 2008.

Quantification is carried out in a decentralized manner. The role of the federal level is to consolidate the requests and make the purchase. The quantification includes the methods and tools tested in the competitive tendering organized by AMI/MSH. The consumption method is used at the central level to estimate the needs for all products with the exception of Coartem. For this medicine, the morbidity method is being used since it has been recently introduced into therapeutic regimens and no prior consumption records exist. Brazil has an online system that records supplies and inventories in the state warehouses (SIES), but not on the municipal level. This system provides information for estimating needs but needs improvement in some areas: at this time, it is difficult to consolidate the requests from endemic and nonendemic areas, there are problems recording supplies and inventories of all weight/age groups, and because it operates on an Internet platform, it is difficult to use in some Amazonian areas.

The epidemiological surveillance system (SIVEP) provides useful information for estimates based on morbidity. To improve purchase planning and distribution, the current system must consolidate inventories in the entire network with greater accuracy and timeliness.

Coartem is procured through PAHO's Strategic Fund, using the low prices that Novartis offers the World Health Organization (WHO). The last procurement process (from request until delivery) took 10 months. The price of one regimen for adults is 2.00 U.S. dollars (USD) and USD 0.50 for children (excluding shipping and customs expenses). The rest of the medicines are procured by the MoH at official laboratories. There have been delivery problems with official vendors, which have caused supply interruptions.

The distribution chain begins at the central medicines warehouse in Rio de Janeiro. This warehouse does not have adequate storage conditions (according to malaria program technicians). A new warehouse is being built in Brasilia to replace it. Medicines and supplies are distributed every three months to the states. In some states, such as Rondônia, deliveries are more frequent because of limited storage capacity. Each state is then responsible for distributing the medicines to the municipalities on a monthly or quarterly basis, depending on local circumstances and storage capacity. In Amazonas, for example, medicine shipping was contracted to a private company that establishes the frequency of the deliveries to each municipality. The state level is also responsible for ensuring medicines arrive at the health posts. Data from the epidemiological information system are used to identify whether the requests from the states and municipalities correspond to the morbidity rates for each age group.

A reserve stock equal to 20 percent of the cases expected is usually considered in the requests. Deliveries are made every six months to sites that are difficult to access; estimating the safety stock for all weight ranges is frequently difficult. No official procedures exist for establishing the safety stock on the basis of consumption, storage capacity, and multiple means of access, particularly in the Amazon region.

Antimalarial use has improved recently. In 2007, the new treatment regimens adopted by the malaria program were reviewed. In March 2008, distribution and training on the use of this new material began.

The MoH's *Serviço de Almoarifado de Medicamento* (Medicine Storage Service) is responsible for collecting samples of all lots of antimalarials stored on the national level and sending them to the reference laboratory for quality analysis. Additional quality controls are performed at the municipal level by the municipal departments of health.

The SIVEP provides information on cases that occur in endemic areas. It does not include specific information on management of the medicines. With the support of AMI/MSH, the NMCP developed a surveillance tool that was being revised at the time of the visit (October 2007). The tool will be implemented in two pilot areas of Amazonas and Acre. The antimalarial medicines management information system (SIES) covers only the distribution and stock from the central to the state level and from the state to the municipal level. SIES is not yet an official tool of the MoH, which makes its mandatory use problematic. The delivery of medicines from the municipalities to the facilities and final consumption data are not systematically recorded and consolidated. Only some states, like Mato Grosso, have complete records on availability and consumption in the whole supply chain.

The NMCP is not currently facing stock-out problems. In fact, the introduction of artemisinin-based combination therapy (ACT) has resulted in an overstock of some medicines, in particular mefloquine (approximately 50,000 treatments) and artesunate. At the time of the visit, donating these medicines to the army for prophylactic purposes in endemic areas or to other countries was being considered. Additionally, a systematic plan was not being put into practice to manage the mefloquine stocks that were going to go unused because of the introduction of Coartem.

Problems identified: At the time of the visit (October 2007), one of the areas that showed the greatest weaknesses was the implementation of the form to supervise the availability and use of antimalarials. It was concluded that the form developed by RPM Plus/PAHO was not being adequately implemented in a pilot test that would permit an evaluation of the positives and negatives prior to its introduction to the entire country. During the Bogota workshop (May 2008), Brazil was in the midst of implementation of the pilot test and indicators useful for decision making were also gathered. The challenges related to implementing a national information system on consumption and medicine stocks in the entire supply chain can be resolved by creating a sound surveillance system at the facility level to provide regular information on inventories to the state and federal levels.

Colombia

The NMCP is responsible for selecting the medicines to be included in the therapeutic regimens. On the basis of studies on resistance, adherence, use, and antimalarial availability conducted with the support of AMI and research institutions, Colombia piloted the introduction of two ACTs during the second half of 2006. The recently introduced medicines are on the national essential medicines list.

In response to an implementation plan established by the *Ministerio de la Protección Social* (Ministry of Social Protection; MPS) in consultation with PAHO/WHO, it was decided to introduce Coartem in the four Pacific coast departments. In addition, preparations were made to use mefloquine + artesunate in the Antioquia and Córdoba departments to consume large stocks of mefloquine that were available. In 2007, with the support of the “Malaria Control in Border Areas of the Andean Countries: A Community Approach” (PAMAFRO) project of the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM), the use of this last combination was gradually extended to another nine departments bordering Ecuador, Peru, and Venezuela. The purpose of this plan was to compare the benefits of these two combinations for two years to determine the combination(s) suitable as first-line treatment for uncomplicated *P. falciparum* infections in the entire country.

Thus, at the time of the visit, three first-line therapeutic regimens coexisted for treatment uncomplicated *P. falciparum* malaria: Coartem on the Pacific coast; mefloquine + artesunate in Antioquia, Córdoba, and nine departments in the PAMAFRO project; and amodiaquine + sulfapyrimethamine + primaquine in the rest of the country. At the time of the visit, the MoH intended to generalize the use of Coartem as the first-line and sole treatment for uncomplicated *P. falciparum* malaria beginning in 2009. The treatment of *P. vivax*, which represents approximately 70 percent of the cases in the country, continues to be chloroquine + primaquine. In some departments, a shortened double-dose regimen is used for seven days.

The use of new therapeutic regimens has been disseminated through guidelines and training documents. The official malaria treatment guide (Resolution 412 of 2000) has been undergoing update for close to two years but has not yet been completed, validated, and distributed. Antimalarials are dispensed free of charge to the entire population within the benefits plans of the general health social security system.

Annual medicine requirements are estimated based on morbidity data. The malaria diagnosis and treatment posts (approximately 500 in the country) periodically report the number of cases by parasite type and age group. These epidemiological data are the basis for quantifying medicine requirements. The information on malaria collected by SIVEP suffers from reporting delays. Underreporting of the disease also occurs because of the population’s lack of access to diagnosis and treatment in some regions. Moreover, the data that the official Epidemiological Surveillance System provides do not correspond to data generated by the information system of the national program for control of malaria and other vector-transmitted diseases. No reliable data are available on the consumption and stock of medicines in departmental warehouses and facilities, which prevents cross-checking the needs estimate generated through the morbidity method against consumption analyses.

The national program for control of malaria and other vector-transmitted diseases is responsible for consolidating the national medicine requests, establishing the technical sheets for each of the products that they request, and conducting a “market study” to ensure that the budget allocated financially covers the requests. The market study involves requesting quotations (two per product) from vendors. This step consumes a large quantity of time of the program’s limited staff.

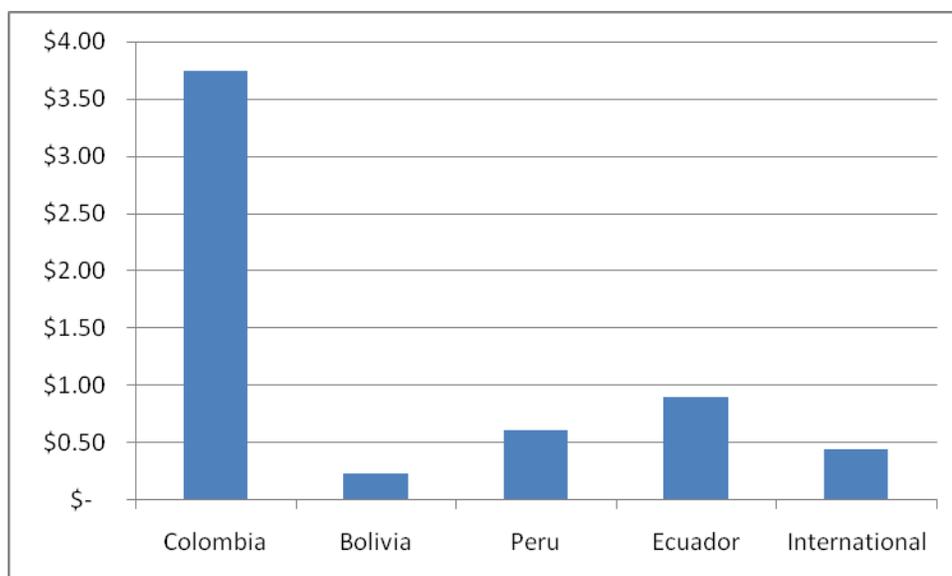
The absence of a supply information system and the recurring stock-out crises (see the next section) bring about frequent emergency purchases. During 2007, in a period of three months, three Coartem procurement requests were made to PAHO to treat 45,000 cases of *P. falciparum* malaria.

Documentation for the national tender is first transferred to the pre-contract management group of the MPS. There, the documentation is reviewed; if it is incomplete or inadequate, it is returned to the NMCP, and if it is accepted, there is a call for bids, technical and financial offers are received, and a contract is awarded to the vendors. The employees of this department reported that if the paperwork is correct, the process usually takes about two months.

The documentation, which includes details of the tender, the successful bidder, and a draft of the contract, is sent to the contracting group for its review and for execution of the contract with the vendor. If the documentation is complete and correct, the process usually takes two weeks, as reported by the technicians in this department.

Direct procurement through an international agency only requires that the contracting group draw up a contract or agreement between the MPS and the international agency. Technical staff in this department report that the process is usually long because many of the clauses included in the agreement are not compatible with Colombian law, which entails consultations, revisions, and modifications. PAHO, for example, is the current Coartem vendor that allows the country to benefit from the low prices that Novartis offers through WHO/PAHO. PAHO requires payment in advance (before delivery of the product) and use of the United Nations currency exchange rate rather than that of the Banco Central de Colombia. Reaching agreements on these and other clauses of the contract/agreement can be very time consuming.

During the regional workshop held in Bogota (May 2008), the price of a full regimen of *P. vivax* treatment was analyzed. As shown in figure 1, the purchase prices in Colombia are significantly higher than other countries in the region. The causal factors must be investigated, but the referenced “emergency” purchases surely contribute to this situation.



Note: International price based on the MSH *International Price Guide* (2007).

Figure1. Price of *P. vivax* malaria treatment (USD)

Vendors deliver their products to the MPS central warehouse. The Physical Resources area is responsible for managing the warehouse and medical and nonmedical supply logistics of the MPS departments of health and labor. For medicines to enter the warehouse, an inspector assigned by the MPS verifies that the medicines meet the terms stipulated in the contract. If no problems are identified, samples are taken for quality analysis, which are sent to the National Institute for Drugs and Food. Medicines enter the warehouse as public property until satisfactory results of the quality analysis are received.

The central warehouse provides appropriate conditions for storing the medicines and meets good storage practices. The average temperature in Bogota makes air conditioning unnecessary. A computerized (at the Ministry's central offices) and physical (at the warehouse) record is kept on the inflows and outflows. Both records usually match according to the technical staff interviewed, unless the inflows on the central level of the MPS have not been recorded by those concerned at the central warehouse. The medicine warehouse periodically informs the NMCP (and other programs) of the stock levels in the warehouse.

At the time of the visit (May 2008), an analysis of the availability of medicines at the central warehouse was carried out according to the expected monthly volume of deliveries. The results are presented in table 2.

Table 2. Availability of Medicines at the Central Warehouse

Medicines	Average Monthly Central Warehouse Inflows (May 07–April 08)	Inventory on April 30, 2008	Estimated Availability (in Months of Consumption)
Coartem blister pack x 24	4,970	3,509	0.7
Coartem blister pack x 12	926	1,487	1.6
Coartem blister pack x 18	576	228	0.4
Mefloquine + artesunate	58	17,946	312.1
Mefloquine 250 mg	49,082	67,522	1.4
Quinine chlorhydrate	5,092	23,350	4.6
Primaquine 7.5 mg	3,208	173,300	54.0
Chloroquine 150 mg	110,537	—	—
Amodiaquine 150 mg	86,383	549,100*	6.4
Quinine sulfate	34,428	359,120	10.4
Primaquine 15 mg	14,135	287,178	20.3

* All the amodiaquine in the warehouse had expired in March 2008.

The following items in table 2 merit attention:

- Coartem in all presentations noted in the table is at a critical supply level. Unless there are inflows at the warehouse in the next few weeks, there will be a stock-out if the facilities do not have a large safety stock.
- Mefloquine + artesunate is available for 312 months. This figure will have to be reviewed because only one outflow of 690 tablets was reported in the months prior to the visit (hence the estimated availability appears quite abundant).
- Also for mefloquine 250 mg, only one outflow in the 12 months prior to the visit was reported, but this was over 58,000 tablets; therefore, the monthly average is still high, which makes the warehouse inventory low (less than two months).
- There is an overstock of primaquine 7.5 mg (54 months' availability).
- There is a stock-out of chloroquine 150 mg (existence zero).
- The amodiaquine has been expired since March 2008.

The decentralized malaria control units in the departments make periodic requests to the central level, basing the requisitions on the expected morbidity and balances available at the departmental warehouse. The NMCP authorizes—or refuses to authorize—the requests depending on the appropriateness of the application and the balances available at the central warehouse. The medicines are transported in central warehouse vehicles or collected by vehicles of the departmental warehouses. No procedures explicitly define the frequency of the deliveries or the working or safety stock that must be maintained on the different levels of the supply network. As a result, the low supply levels of various products necessitate emergency deliveries;

however these deliveries are usually of small quantities that do not cover the expected demand over a reasonable period of time, leading to future emergency deliveries.

The use of new therapeutic regimens has been disseminated through guidelines and training documents, but the official malaria treatment guide has yet to be completed, validated, and disseminated. The introduction of a standardized therapy faces additional challenges: derivatives of artemisinin must be introduced into the social security benefits plan and the beneficiary population must be made aware that the medicines are available free of charge.

Problems identified: The stock-out of various products has been cyclic in the last few months. Causal factors include the lack of a clear plan to gradually introduce Coartem, lack of a specific and timely information system that provides morbidity and consumption data for planning purchases, delays in purchases whether direct from the PAHO or through tenders, lack of a scheduling system that makes it possible to consider foreseeable factors (extended purchasing periods, for example), and the lack of standardized criteria in the administration of the supply chain (safety stock that must be maintained, frequency of the inflows, and so on). The Health Services Administration is aware of these problems and has contracted the Antioquia Hospitals Cooperative to carry out a complete analysis of the public goods supply problems and a proposal for addressing the problems identified.

Ecuador

The NMCP selects medicines on the basis of resistance tests and availability on the market. All the medicines used by the NMCP are included on the national medicines list and in the treatment guides. Artemisinin derivatives were introduced in 2004.

Medicines are currently procured through national public tenders coordinated by the *Servicio Nacional de Erradicación de la Malaria* (National Malaria Eradication Service; SNEM), which has recently been assigned procurement responsibilities. There are no decentralized purchases. Products are procured through international agencies only as an exception. In the medicine supply study conducted in 2006, the purchase prices were over 100 percent higher than the median international prices. This overpricing can be explained by the lack of access to international markets and the legal obstacles to procurement through international agencies.

Antimalarials are stored in the Department of Health central warehouse in Guayaquil prior to their distribution to the health facilities. The central medicine warehouse does not provide the minimum adequate storage conditions: it is small, dark, damp, and it has no shelving. The NMCP recently established regulations to improve storage conditions,¹ but they are not observed because of the lack of equipment necessary for compliance. Shipments to health facilities are scheduled based on reports of cases treated. There is no systematic flow of information regarding consumption and local stock to the provinces or from the provinces to the central level. This lack of information prevents accurate quantification.

¹ Ministerio de Salud Pública de Ecuador. *Manual para la Aplicación de Buenas Prácticas de Almacenamiento en las Bodegas del SNEM [Manual for applying good storage practices in SNEM warehouses]*. Published with the technical and financial support of AMI/USAID.

The NMCP recently established a *Política Nacional de Medicamentos para el Tratamiento y Control de la Malaria en Ecuador* (National Policy on Medicines to Control and Treat Malaria in Ecuador; 2006). In this context, it has promoted the use of requisition forms that include information on stock inventory; however, use of these forms is still quite limited. Three deliveries are made to the facilities during the year. Medicines are transported by the central warehouse in its own vehicles. The central warehouse inflows and outflows are recorded on computerized forms. There are up-to-date inventory reports. With this information, the availability of medicines (based on months of consumption) in the central warehouse is estimated (table 3).

Table 3. Ecuador: Estimate of Medicine Availability in the Central Medicine Warehouse in Guayaquil, Ecuador (January 2008)

Medicine	Average Monthly Consumption 2007	Inventory on December 31, 2007	Available Months Based on Consumption
Chloroquine	21,975	227,351	10.35
Primaquine (children)	9,267	30,400	3.28
Primaquine (adults)	6,178	317,373	51.37
Sulfadoxine-pyrimethamine	3,110	2,800	0.90
Artesunate	2,838	2,252	0.79
Quinine	45	1,490	33.11

The same laboratory technicians dispense medicines after confirming the diagnosis. The use of written instructions (or illustrated prescriptions) for the patients has been established (figure 2). This appears to have increased adherence to the treatment, but impact assessments still have not been carried out.

Antimalarials undergo quality controls upon their entry into the country and following distribution using the Minilab[®]. Up to the time of the visit, no significant problems with the quality of the medicines had been reported.

The NMCP is developing procedures for microscopic diagnosis that will include a module for the supervision of medicine supply management that has already been tested in health facilities. The supervision tool will be reviewed in the next few weeks prior to its implementation in all the country's health departments.

Ministerio de Salud Pública
Servicio Nacional Control de Enfermedades Transmitidas por Vectores Artrópodos

Nombre : _____ Sexo: _____ Fecha: _____
 Edad: _____ Sexo: _____ Peso: _____

DIA	PASTILLAS				NOMBRE PASTILLAS
1	⊕	⊕	⊕	⊕	CLOROQUINA PRIMAQUINA
2	⊕	⊕	⊕		CLOROQUINA PRIMAQUINA
3	⊕	⊕	⊕		CLOROQUINA PRIMAQUINA
DIAS	⊕ ⊕ 04	⊕ ⊕ 05	⊕ ⊕ 06	⊕ ⊕ 07	PRIMAQUINA

TRATAMIENTO VIVAX

Figure 2. Example of patient instructions

During the last year, there have been no significant interruptions in the availability of medicines for the groups that present the largest number of cases diagnosed and treated. There are, however, periodic stock-outs of medicines for special groups (severe cases, mothers, and those with resistance to the primary treatment regimens).

Although private trade of antimalarials exists (including artemisinin derivatives for monotherapy), virtually all patients are treated in the public sector where they receive free treatment. Only a small percentage (approximately 1 percent) receives treatment without diagnostic confirmation, particularly in Amazonian areas with no access to testing.

Problems identified: The biggest problem at this time is the poor conditions of the central medicines warehouse. The MoH should consider alternative options to improve storage, including the possibility of subcontracting storage and inventory control services to private entities. There is still room to improve the planning of these needs. For this, reliable and timely information on the consumption and availability of medicines is necessary.

Guyana

The NMCP is responsible for selecting medicines. As a result of susceptibility studies conducted by AMI/Amazon Network for the Surveillance of Antimalarial Drug Resistance (RAVREDA), in 2004 the NMCP introduced artemether/lumefantrine (Coartem) to treat *P. falciparum* malaria. Malaria cases have dramatically decreased in the last two years: from 21,064 in 2006 to 11,657 in 2007. According to the Chief Malaria Inspector, the introduction of Coartem and mosquito bednets was one of the main contributors to this achievement.

Needs estimates are currently a responsibility of the Materials Management Unit (MMU), with the technical assistance of the Supply Chain Management Systems (SCMS) project. The MSH electronic application Quantimed has been used for the latest estimates. Medicines to treat malaria are funded through two sources: the MoH through its regular budget and subsidies from the GFATM. The MoH covers most of the funding; only USD 21,000 was budgeted for medicines (of a total USD 1.8 million) for the first two years of the budget submitted to the GFATM Round 7. The MoH budgeted USD 103,000 for “other health products and basic supplies,” which includes the purchase of insecticide-impregnated mosquito nets. The mass distribution of mosquito nets is a new logistical challenge for the NMCP.

The MMU is responsible for purchases following public procurement mechanisms. The MMU, in its capacity as chair of the Procurement of Pharmaceutical Goods and Services Committee, convenes and presides over the Selection Committee. It also procures goods and services financed through the GFATM. Most of the medicines for malaria are procured through local tendering. Coartem is procured through PAHO to take advantage of the low prices offered by Novartis.

All medicines and basic products are stored in the MMU central warehouse. The SCMS project has provided technical assistance to improve storage and inventory control practices. The MMU central warehouse was visited on March 13, 2008. The infrastructure is excellent (figure 3); the

staff is following best storage practices and has committed to improving the system following a predetermined plan. The inventory system ensures optimal use of the space and up-to-date information on inventory available.

The MMU is using the Combined Requisition Issue Voucher (CRIV). It is a form that records information on the consumption and inventory available to support the needs estimate. The introduction of the CRIV is the cornerstone of what will be a broad pharmaceutical management information system. The MMU is trying to make use of the CRIV a requirement for the delivery of medicines, but some regions or facilities are not complying with this condition. The MMU still accepts partially completed CRIVs to prevent delays from causing stock-outs in facilities that are difficult to access.

The MMU is responsible for distributing medicines to the outlying areas. A pull system is used: health facilities submit periodic requests (CRIV) to the MMU. The request is reviewed and authorized by the MMU prior to delivery. After approval, the MMU transports the products to the outlying areas using its own trucks. Some orders are sent by boat to facilities situated on rivers. Requests are supposed to be submitted quarterly, but the orders are not always complete because of stock-outs in the warehouse or inaccurate estimates by the health facilities. Emergency requests are made frequently to meet these unforeseen events. For emergency orders, the health centers or regions usually collect the medicines at the MMU central warehouse.



Figure 3. MMU central warehouse

The recently implemented inventory system enables updated information on the availability of medicines at the central warehouse. This information is shared with the NMCP prior to requests and not as part of a regular reporting system.

Some pharmacists in the health facilities have established written instructions to improve the use of medicines and adherence to the treatment (figure 4). This is not, however, a widespread practice. There is no reliable information regarding adherence to the treatment, but according to the pharmacists consulted, poor adherence is suspected, in particular with regard to *P. vivax* treatment.

The Food and Drug Department is responsible for quality control. Imported medicines and those procured from local vendors undergo laboratory analysis. Rapid laboratory analysis (Minilabs[®]) has been used at two surveillance sites for postmarketing control in public facilities and private pharmacies. Minilabs were also introduced for



Figure 4. Written instructions for medicine use

quality control of medicines upon their arrival at the MMU warehouse. Medicines are not released for distribution until a satisfactory report on the quality of the medicine has been received.

The NMCP is responsible for coordinating the national efforts to control malaria. It has a central unit with 30 employees who work exclusively on malaria control as well as decentralized operations units in each region. In 2005, the entire MoH was reorganized on a decentralized plan. The supervision, financing, monitoring and assessment, and various other functions have been progressively decentralized since then. Each decentralized unit still reports to the central level, which is responsible for general coordination of the program.

The central functions in pharmaceutical management are shared by various departments within the MoH. The NMCP is responsible for selecting medicines. The MMU quantifies the medicines with the technical assistance of SCMS. The MMU is responsible for procurement; in procurements with GFATM resources, the MMU coordinates with the Health Sector Development Unit. The MMU is responsible for distributing medicines to the outlying areas.

Experience with the Malaria Rapid Assessment Tool contributed to the creation of a form to supervise the diagnosis and treatment of malaria at the health posts. At the time of the visit, this form was undergoing pilot testing in Regions 1, 9, and 10. The chief pharmacist carried out the first training of the supervisors in March 2008.

At the time of the visit, there was a stock-out of the Coartem presentation for adults. Treatments were not discontinued, but adult patients received treatment using the presentation for children. According to the professionals consulted at the MMU and SCMS, this situation was caused by errors in the distribution to the regions and imprecise quantification.

Problems identified: Various players participate in the management of antimalarials. There is not always close coordination between these authorities. The need to coordinate efforts to estimate needs and plan the distribution is particularly important.

Peru

Sensitivity studies conducted by the MoH in 1997–1998 revealed the high resistance of *P. falciparum* to the former therapeutic regimens. These results brought about the selection of new medicines. The NMCP updated the policies on antimalarials in 1999 with the introduction of ACTs to treat *P. falciparum* malaria. The medicines considered in the policies and technical regulations for handling malaria cases were included on the Essential Medicines List. Currently, a mefloquine + artesunate combination is used to treat this parasite. A seven-day course of chloroquine + primaquine continues to be used to treat *P. vivax*. The change in the medicine policy has been a determining factor in reducing cases of malaria. They have been reduced from 100,000 cases in 2000 to approximately 60,000 in 2007.

Quantification is carried out by each health region based on technical criteria established by the NMCP in conjunction with the *Dirección General de Medicamentos, Insumos y Drogas* (General

Directorate of Drugs and Medical Supplies; DIGEMID). DIGEMID has an automated medicine management information system (SISMED) that records inventory and medicine consumption at the health facilities and in the departmental/regional stores. This information is consolidated in a national database that makes it possible to have figures updated monthly on the supplies and inventory throughout the entire country. A planning module was recently developed in SISMED that allows these data to be used to estimate needs. The annual planning exercise performed by the Regional Health Offices is based on the number of cases expected, inventory, and existing consumption.

Medicines are procured by the MoH. The procurement process is carried out on the central level through public tender. The technical specifications for the procurement process are established by DIGEMID. The antimalarial procurement process on the national market takes three months from the notice of tender until the first delivery.

Since the introduction of the GFATM-financed PAMAFRO project (“Malaria Control in Border Areas of the Andean Countries: A Community Approach”), medicines are also procured through direct purchases from PAHO. According to GFATM requirements, the projects financed with these resources can only procure from WHO-prequalified vendors, which is why PAHO is the natural purchasing agent for the region. In Peru, malaria is concentrated in the Amazonian regions, primarily Loreto, which comprises over 60 percent of the cases in the country. This area is subject to a PAMAFRO intervention that finances medicines for patients diagnosed and treated there.

According to the contract terms with vendors, medicines are distributed directly to the Regional Health Office (DIRESA/DISA) medicine stores. Only a small quantity is stored in Lima as reserve stock for special situations or contingencies. DIGEMID establishes the quantity of the product to be distributed at each delivery point (34 regional stores, twice yearly). The storage conditions at the DIRESAs and in the facilities are not optimal. In 2007, PAMAFRO sponsored structural improvements to the regional and intermediate warehouses in the Andean border areas.

Under normal conditions, the facilities make requests to the DIRESAs every three months. There are, however, emergency requests to cover unforeseen contingencies or problems with quantification. Transport to outlying areas occurs with the same frequency, whether for “delivery” or “collection,” depending on the local conditions. There are exceptions to this rule because accessibility problems in some locations require making larger deliveries twice a year.

The Peruvian MoH approved the National Essential Medicines List, which is a list of the medicines considered essential to meeting the majority of the medical care needs of the population. This list seeks the rational prescription and dispensation of these products, as well as maximum efficiency in the quality of services and the use of resources allocated for medicines. The NMCP has established daily supervision of treatment for most patients. In some towns where geographic access limits supervised treatment, a health technician, community health agent, or responsible adult family member, as applicable, is responsible for monitoring the case. No studies have been done on the effect that supervised treatment—compared with unsupervised treatment—has on adherence to the treatment.

According to the requirements included in the contracting specifications, all medicines undergo quality controls before their delivery at the established locations or distribution points. Random postdistribution controls are also carried out in the regional stores. Rapid tests (using Minilab) have recently been incorporated to analyze products in remote communities; however, their implementation has been limited because of national regulations on the use of controlled products (such as the reagents included in the rapid test kit).

Monitoring is conducted on the different levels through the information generated by SISMED. However, direct supervision at the facilities is not performed systematically.

No stock-outs of medicines to treat regular cases of malaria have been recorded. In the last few months, there have been occasional stock-outs of products to treat severe cases. For example, a lack of vendors in the market led to stock-outs of quinine in ampoules. The significant reduction in the number of malaria cases has resulted in smaller antimalarial orders that are less attractive to vendors. Also, the NMCP has overstocks of some medicines. Recently, for example, there was an overstock and possible expiration of quinine in tablet form attributed to the rapid reduction in the number of malaria cases.

Problems identified: DIGEMID provides strong support to all special programs, including the malaria program. It has an effective information system related to the management of the medicine supply that enables accurate planning. The weakness that it must address in the next few years is the lack of a supervision system that complements the control activities. It is also necessary to document whether the efforts made to supervise the treatment of all patients have effectively improved adherence.

Suriname

Since 2004, Suriname has experienced a dramatic drop in malaria cases—from 8,000 to 10,000 cases per year to approximately 600 in 2007—due in large part to the introduction of ACTs (Coartem) for treatment of *P. falciparum* malaria. Currently, *P. falciparum* represents approximately 50 percent of all malaria cases in the country; *P. vivax* represents 45 percent; and *P. malariae* represents 5 percent. *P. falciparum* is treated with Coartem for 3 days; *P. vivax* is treated with chloroquine (3 days) and primaquine (14 days); *P. malariae* is treated with chloroquine (3 days). Although Suriname has a well-developed network of primary health care clinics in the interior, and most stable populations have good access to malaria testing and treatment, reaching the itinerant gold-mining camps in the country's interior (where malaria is most prevalent) with malaria medicines and supplies has proved to be a tremendous challenge.

All responsibilities related to antimalarial selection, treatment protocols, quantification and procurement, and coordinating external proposals (such as to the GFATM) are managed by the Malaria Board (MB). The MB meets every two months and is composed of government agencies (MoH, Bureau of Public Health, Ministry of the Interior, Ministry of Defense), PAHO, nongovernmental organization (NGO) partners (GFATM recipients for interior and coastal regions), and technical experts. Within the MoH, the *Bureau voor Openbare Gezondheidszorg* (Bureau of Public Health; BOG) coordinates all government primary health care programs,

including malaria, and is directly responsible for a large malaria clinic in Paramaribo. *Medische Zending* (Medical Mission; MZ), an NGO with more than 50 years' experience providing primary health care to the population of Suriname living in the difficult-to-access interior regions (about 55,000 people) through 56 clinics, is the primary recipient of Suriname's first GFATM project; MZ procures, stores, distributes, and monitors use of malaria medicines in the interior and one clinic targeting the mining population in Paramaribo (Tourtonne Clinic).

Theoretically, all medicines (for both the private and public sectors) in Suriname should be procured by *Bedrijf Geneesmiddelen Voorziening Suriname* (BGVS), a private parastatal drug-supply company associated with the MoH. However, chronic mismanagement and a lack of technical capacity have led to frequent delays, stock-outs, and very high prices for BGVS-procured medicines. As a result, many hospitals and clinics (both public and private), pharmacies, and NGOs "semi-legally" procure directly from suppliers outside the BGVS system. An Inter-American Development Bank-financed project is currently working to strengthen BGVS's ability to accurately quantify, procure, store, and distribute medicines, and the MoH is interested in developing its own procurement unit to support these improvements. Because of the challenges of working with BGVS (high prices, slow delivery, stock-outs) and the small quantities of medicines involved, the malaria program has received a waiver from the MoH to procure antimalarials outside BGVS. Coartem is procured directly from PAHO/WHO to take advantage of the reduced prices negotiated with Novartis. MZ occasionally procures other malaria medicines through BGVS or, if BGVS has no stock, directly from the International Dispensary Association or another WHO-prequalified medicine supplier; however, these purchases must always be approved by the MB. Hospitals and clinics do not carry out procurement for malaria independently.

The MB is responsible for using the data provided by the BOG and MZ to quantify antimalarial needs and place and order with the relevant suppliers. Because of the low incidence of malaria and the relatively good records kept by both BOG and MZ, malaria medicine quantification is consumption based. At the national level, Suriname has not experienced stock-outs or made any emergency purchases of medicines within the last two years. Funding for malaria medicines has come from the GFATM since 2004; prior to this project, the MoH purchased all malaria medicines directly from its own budget. Because the total cost of antimalarials for Suriname is so low (about USD 25,000 per year), securing sufficient funding for malaria treatment has never been a problem. Also, the amount of antimalarials procured is so small that not enough commercial interest exists to generate a competitive tendering process, and medicines are directly procured from suppliers. There were no problems reported for the procurement of treatment for special cases (severe, treatment failure, for pregnant women, and the like).

Currently, three different reporting systems are used for malaria in the country, and each has slightly different language and nomenclature for different regions in Suriname; these forms will be standardized in the near future. An official record form from BOG is filled out for each patient who tests positive for malaria. This form is then submitted to the BOG Epidemiology Department for official records. In the coastal areas, these forms are submitted regularly (weekly or monthly). In the interior, MZ submits its own encounter forms to the BOG; these forms can take one to three months to arrive at BOG. MZ clinics also submit a weekly (oral) report via radio to MZ headquarters on malaria cases, and these weekly numbers are used to monitor

incidence and medicine consumption. If a clinic reports an unusual number of cases in a week (usually between two and four cases per week), MZ and/or the GFATM coordinator will visit the community to determine the cause of this spike and carry out a testing campaign. In a pilot GFATM project to reach gold miners in the interior, Medicine Service Deliverers (MSDs) use yet another different reporting form; this form is currently being tested and will eventually become the standardized form used by all dispensers (BOG, MZ, MSD). Despite these challenges (that is, delay in reporting, differences in nomenclature, and communication problems), the data submitted are generally reliable and of high quality.



Figure 5. BOG malaria clinic

Coartem is delivered to MZ and BOG approximately twice a year. Products procured through other agents are delivered as part of orders placed for other essential medicines. All MZ medicines are stored at the MZ central warehouse in Paramaribo. Medicines are received in a specially designated room separate from the general warehouse. Upon receipt, MZ compares the delivery slip with the contents of the package and adds the medicine to its inventory. Since the medicines are procured from prequalified suppliers, MZ does not carry out any quality control testing upon receipt. Overall, MZ maintains an accurate inventory using Kardex and implements good storage

practices at its central warehouse: the warehouse is air conditioned and protected from sunlight; all work areas are clean and ordered; medicines are organized by drug category on shelves and pallets; and there is a separate area for dividing medicines sent to the clinics in the interior. The MZ warehouse and BOG-run malaria clinic submit monthly inventory lists to the MB and GFATM project, who are responsible for quantifying and procuring medicines.

MZ clinics in the field submit inventory levels to MZ headquarters each month. Based on these reported levels and specific requests from the clinics, the MZ headquarters decides what medicines/amounts to send into the interior (a push system). There are no standard procedures for requesting medicines or safety stock—it was not clear how consumption is taken into account when restocking clinics. MZ reported no stock-outs in the last two years; however, when MSH reviewed one of these monthly clinic inventory sheets, the clinic had no Coartem in stock. MZ clinics in the interior are restocked once every few months. If an emergency stock-out occurs, MZ will schedule an emergency visit or, via radio, arrange for an exchange with a nearby clinic. MZ is responsible for delivering medicines to clinics in the interior and it can take up to one week in travel to reach the clinics farthest from Paramaribo. Each of the 56 MZ clinics is supposed to receive at least one supervision visit once per year; however, no formal supervision process exists, and not all clinics are visited each year. Table 4 summarizes the inventory in the MZ warehouse taken in July 2008.

Table 4. MZ Warehouse Inventory, July 2008

Medicine	Expiration	Average Monthly Consumption	Availability	Number of Months of Treatment Available at the Time of the Visit
Artemether 80 mg amp	Jun-11	16	725	45
Coartem x 6	Mar-09	51	14	0
Coartem x 12	Mar-09	58	64	1
Coartem x 18	Mar-09	57	437	8
Coartem x 24	Jan-09	198	616	3
Artesunate 100 mg	Apr-10	0	100	>999
Chloroquine 150 mg	Sep-10	2	98	65
Quinine 300 mg	Apr-09	583	24,000	41
Quinine 300 mg/ml amp	Oct-09	7	82	12
Primaquine 5 mg tab	Jul-08	0	700	>999
Primaquine 15 mg tab	Oct-10	1,333	4,000	3
Mefloquine 250 mg	Mar-10	500	9,000	18

Because of the dramatic decline in malaria cases in Suriname and changes in treatment protocols, the country has been left with sizable overstocks of medicines that cannot be used before their expiration (these medicines have been shaded in table 4). Some of these medicines have already been donated to neighboring countries; however, the majority will be wasted. At the same time, the stock of Coartem x 6 and Coartem x 12 was dangerously low—risking stock-outs. Although MZ did not offer an explanation for these low stock levels (for example, delivery delays, quantification errors), the NGO did state that an order for Coartem was on the way and all medicines had recently been sent to restock the clinics in the interior; if a clinic requested Coartem in one of these presentations, MZ would advise the clinic to divide larger presentations. The situation was similar at the BOG-run malaria clinic where a great deal of expired medicines were set apart and waiting to be taken away and destroyed.

A new manual of malaria treatment protocols is currently being reviewed and finalized; this manual will be disseminated to prescribers through trainings and symposia organized by the MoH and PAHO. Malaria is diagnosed using rapid tests and microscopy, where available. Malaria rapid testing and treatment are provided free of charge in Suriname. After being diagnosed with malaria, patients are given written and oral instructions and instructed to return to the clinic after one week if symptoms persist; there is no routine retesting in Suriname. In addition to written instructions, the Coartem presentation used in Suriname comes with drawings illustrating when and how to take treatment (see figure 6).



Figure 6. Coartem presentation with illustrated instructions

Although malaria testing and treatment are provided free of charge and, by law, malaria medicines should only be dispensed through official outlets, illegal trade of medicines still exists in Suriname—predominantly among the Brazilian mining community in the interior of the country. Most of the medicines brought into the country come

from Brazil and China through a single distributor in Paramaribo. PAHO has contracted a consultant to determine where malaria medicines are being sold in Paramaribo and provide samples for quality testing. The MB is interested in carrying out a larger study on the quality of these unauthorized medicines in the interior; however, many challenges must be addressed (discussed below).



Figure 7. Testing medicine quality with Minilabs

In 2006, AMI/RAVREDA and the University of Suriname carried out a pilot test of a random convenience sample of available medicines (illegal/legal, coast/interior) using the MiniLabs and other tests available at the University of Public Health. Most medicines were found to be of good quality except for one primaquine tablet; this primaquine is unlikely to have dramatically affected treatment outcomes.

The majority of the Surinamese population (in both the coastal and interior regions) has good access to malaria treatment; however, this is not the case for the gold-mining population. Miners are typically undocumented workers from Brazil who do not

access malaria treatment through the formal health sector (MZ clinics) and are difficult to reach because of cultural and linguistic differences, illegal working status, and the challenges and expense in finding and traveling to their constantly shifting camps in the dense interior of the country. In an effort to reach this population, the GFATM has trained local shopkeepers in the mining areas to be MSDs to use rapid tests for malaria and dispense antimalarials free of charge to gold miners in the interior. These MSDs then report back to the GFATM and receive new supplies. So far, 40 MSDs have been trained and 15 are currently active; this program will be expanded under the upcoming GFATM project.

Problems identified: The introduction of ACT and widespread bednet distribution combined with Suriname's well-established formal health system to provide rapid diagnosis and treatment have led to a dramatic drop in malaria in Suriname; nevertheless, to truly contain malaria, the country must find a way to improve access to quality-assured antimalarial testing and treatment in the gold-mining communities. Several weaknesses related to logistics and distribution of antimalarials were noted, and no standard operating procedures exist for managing inventory at the facility level (storage, requisitions, safety stock) for MZ clinics. The low levels of Coartem at the central MZ warehouse could lead to stock-outs in the next few weeks (if the order placed does not arrive in time). Moreover, procurement technical capacity within the MoH must be strengthened to make up for problems with BGVS.

DISCUSSION OF RESULTS

One of the most significant challenges of the AMI has been the introduction of artemisinin derivatives in all the countries, following susceptibility tests that showed the inefficacy of the traditional therapy to treat *P. falciparum* malaria. Along with the introduction ACTs, AMI has strengthened countries' medicine supply systems to address the challenges presented by the introduction of these therapies, including quantification, procurement methods, distribution mechanisms, and adherence to the treatment.

Through this framework, MSH organized workshops to promote standardized methods for evaluating the supply system, supported national medicine use and supply studies, and provided training in procurement methods and strategies to strengthen the supply chain.

From October 2007 to July 2008, MSH/SPS visited seven of the countries that are part of the initiative to carry out a rapid assessment of the state of antimalarial supply management. These assessments established the basis for future technical assistance interventions in the "Access and Use of Medicines" component of the AMI. The results of these rapid assessment evaluations are summarized in this document.

All the countries evaluated have improved the availability of medicines in health facilities. With the exception of one country, no stock-outs of the most-consumed products have occurred in the 12 months prior to this round of evaluation visits. AMI interventions have improved the quantification procedures, procurement methods, and distribution practices.

However, the situation is dissimilar in all countries. Some countries have strengths in quantification and planning (Peru), others in storage systems and inventory management (Guyana), and some in practices to improve adherence to treatment (Ecuador, Peru). Nevertheless, there are similar and cross-border situations in other countries; for example, the difficulty improving the access to and use of antimalarials among itinerant groups of miners is similar among Guyana, Suriname, and Brazil. For these countries to truly control malaria, international collaboration will be required to implement strategies that are new and integrated in this population. Table 5 attempts to present graphically the state of the countries in relevant areas of antimalarial supply management.

The absence of equal progress in all the areas is essentially caused by local conditions that are difficult to standardize: the level of complexity of the organization of health services, decentralization of the public administration, the legal framework governing the procurement of social goods, and the high turnover of civil servants in some countries. This last factor has brought about a lack of continuity of some practices promoted within the AMI framework.

Table 5. State of the Countries in Relevant Areas of Antimalarial Supply Management (October 2007–May 2008)

Indicator	Bolivia			Brazil			Colombia			Ecuador			Guyana			Peru			Suriname		
Introduction of artemisinin derivatives	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Implementation of efficient quantification mechanisms	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Purchases made x combination of mechanisms (national and international)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Quality control carried out for all purchases	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Adequate storage conditions on the central level	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Adequate reserve stock in the supply chain	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Supply information system (consumption and inventory)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Timely system of transport to facilities	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
No stock at risk of expiring	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Continuous supply during the last 12 months	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Implementation of interventions to improve adherence to treatment	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Standards/procedures for managing medicines and supplies	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Medicine use and availability surveillance system	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Note: Gray boxes signify compliance with the challenges.

Despite this varied situation, some areas can be identified that present weaknesses in most of the countries: quantification methods, shortage of medicines for “special” cases, and lack of standardized procedures for managing the supply of medicines and supplies.

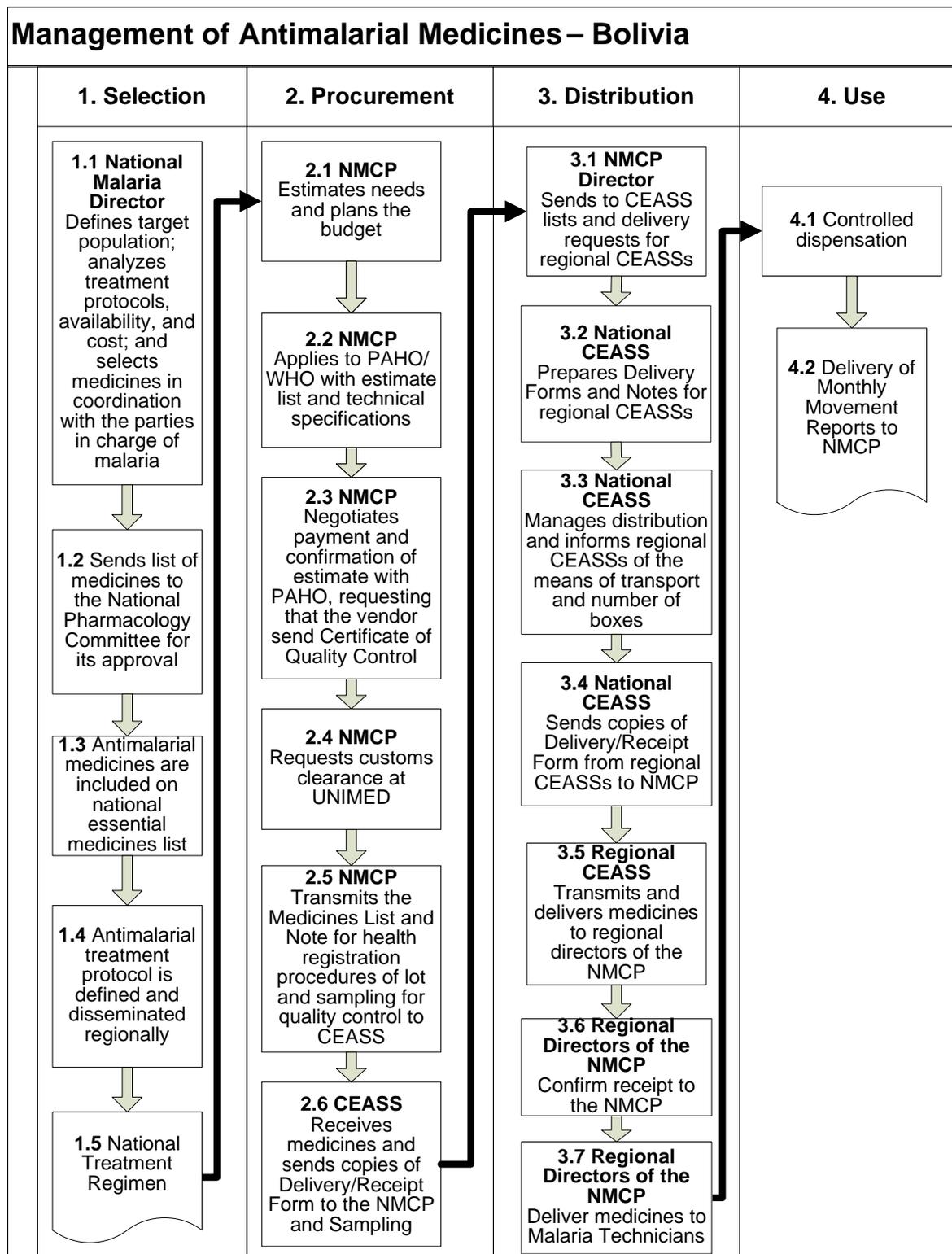
The countries evaluated suffer, to a greater or lesser extent, from weaknesses in quantification. The causal factors differ from country to country, but in almost all countries fail to consider the lead times (from the request to the delivery by a vendor). This chronic problem has been intensified with the introduction of ACTs, which are usually purchased through technical cooperation agencies, adding complexities (and consequently time) to the procurement process. In addition, the requests usually do not consider an adequate safety stock, which permits planning the next purchase with the necessary lead time and using the best technical criteria. The previous sections document minimum, or virtually nonexistent, safety stock in most of the countries. In these circumstances, procurement processes are carried out in the context of potential supply crises, which requires requesting donations or turning to local markets to avoid stock-outs.

In several countries, the shortage of some “special” medicines to treat severe cases or pregnant women was documented. The reduction of malaria cases in nearly all the countries has equivalently reduced the MoHs’ demand for these medicines. In the absence of an attractive market, vendors have discontinued bidding on these products. If this epidemiological trend continues as expected, the countries should consider organizing joint purchases through an international agency. In the future, this may be a special area for AMI support.

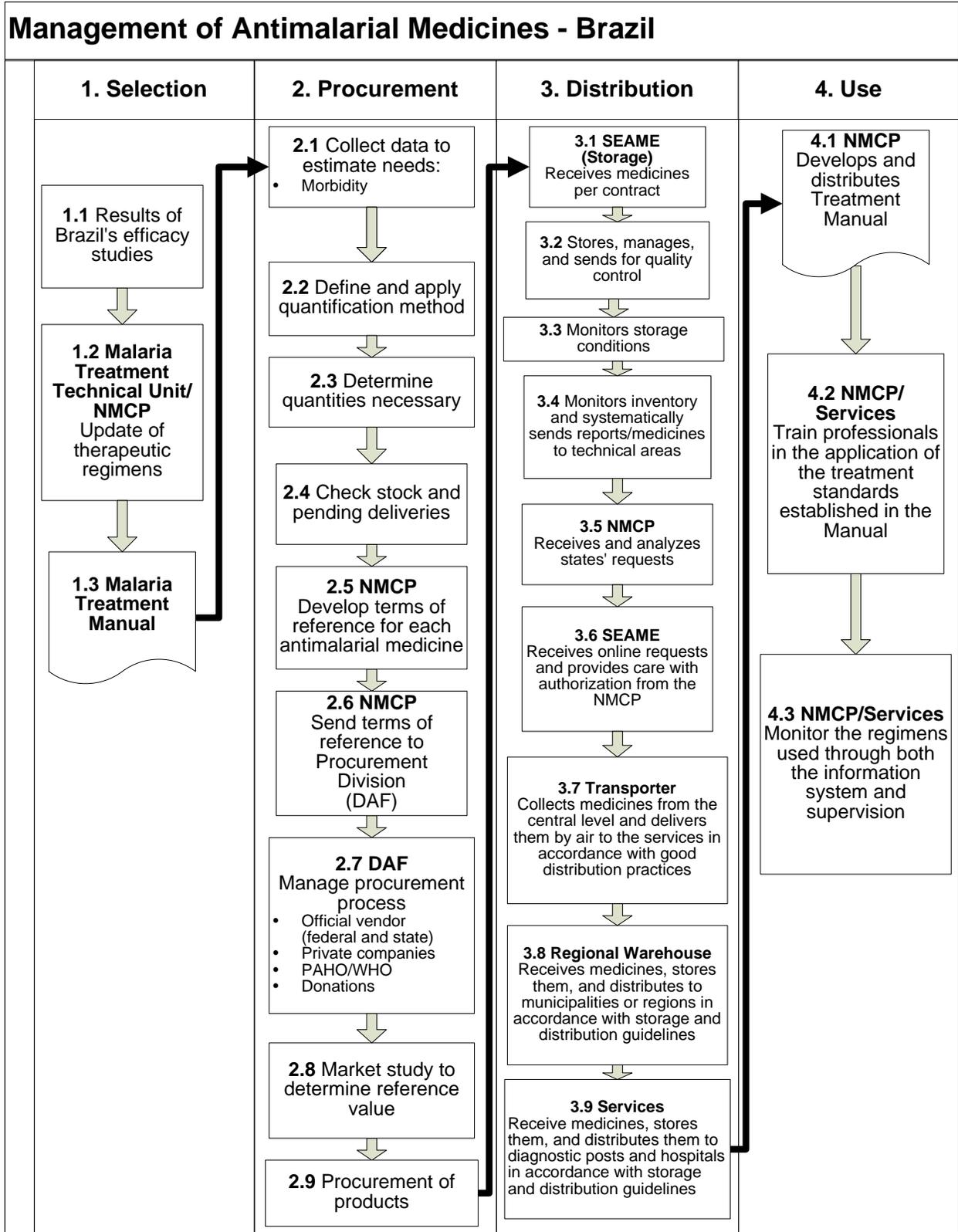
Finally, no country has standardized procedures for managing the medicine and consumables supply for diagnosis and treatment of malaria. This has consequently led to a lack of replication and extension of successful practices when filling technical and management positions. In addition, the lack of standardized procedures prevents monitoring activities (such as supervision of facilities) from having references against which to evaluate the medicine supply management in the facilities and other points in the supply chain.

The workshop held in Bogota in May 2008 established the basis for developing standardized procedures in all AMI countries. Each country has committed to validating the procedures within one year with technical staff and officials from the respective countries. The procedures will regulate the supply of medicines and consumables for the diagnosis and treatment of malaria.

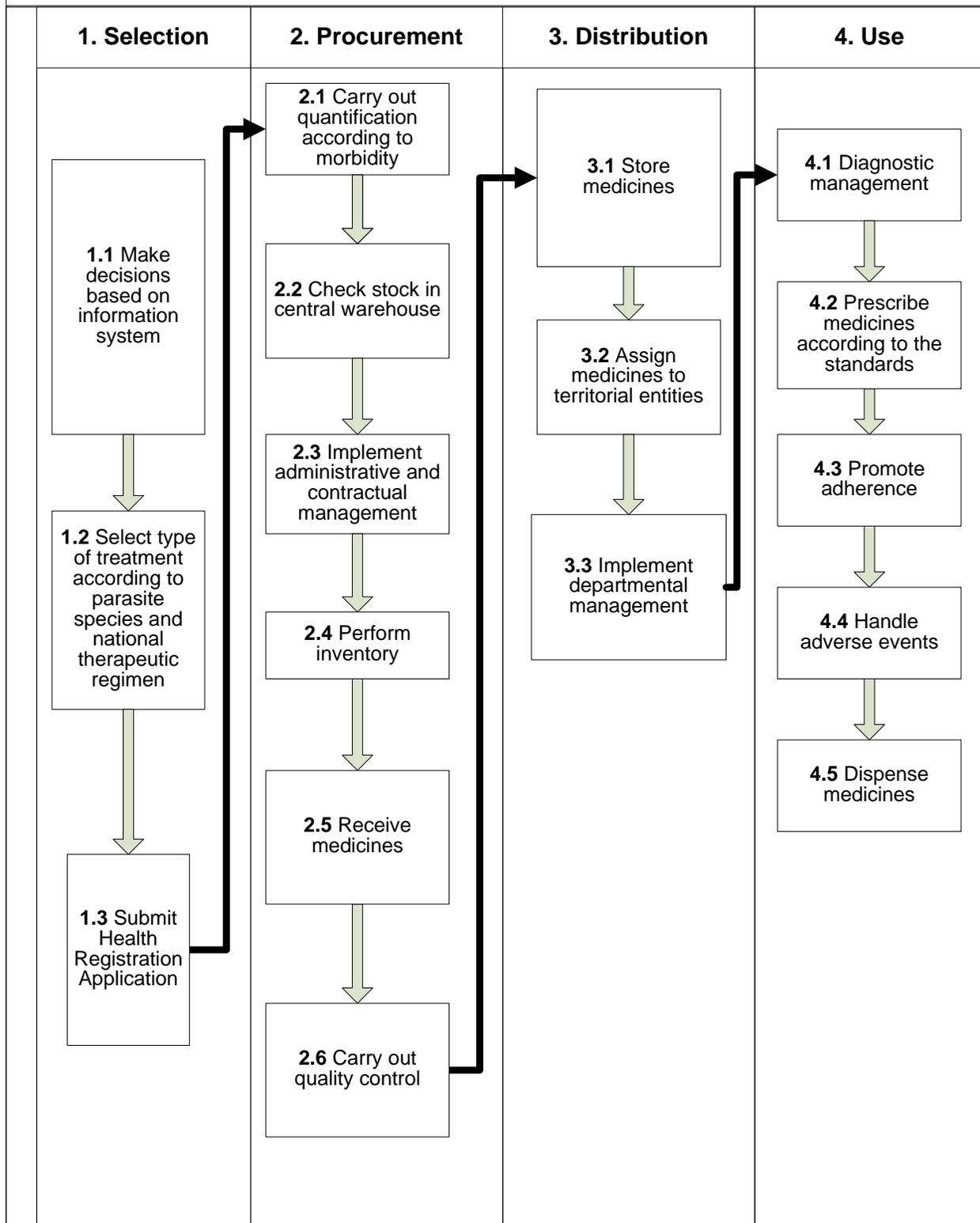
ANNEX 1: PROCESS FLOWS OF THE ANTIMALARIAL SUPPLY MANAGEMENT²



² According to the presentations made by the representatives of each country at the meeting in Bogota in May 2007.



Management of Antimalarial Medicines – Colombia



Management of Antimalarial Medicines – Ecuador

