Changing Malaria Treatment Policy to Artemisinin-Based Combinations

An Implementation Guide

Developed by the Rational Pharmaceutical Management Plus Program in collaboration with the Roll Back Malaria Partnership and the Global Fund to Fight AIDS, Tuberculosis and Malaria, with support from the U.S. Agency for International Development

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About RPM Plus

RPM Plus works in more than 20 developing countries to provide technical assistance to strengthen medicine and health commodity management systems. The program offers technical guidance and assists in strategy development and program implementation both in improving the availability of health commodities—pharmaceuticals, vaccines, supplies, and basic medical equipment—of assured quality for maternal and child health, HIV/AIDS, infectious diseases, and family planning, and in promoting the appropriate use of health commodities in the public and private sectors.

About the RBM Partnership and Malaria Medicines and Supplies Service

To provide a coordinated global approach to fighting malaria, the RBM Partnership was launched in 1998 by the World Health Organization (WHO), the United Nations Children's Fund (UNICEF), the United National Development Programme (UNDP), and the World Bank. The RBM Partnership's goal is to halve the global malaria burden by 2010. MMSS is a unit of the RBM Partnership's Secretariat created to facilitate access to quality affordable antimalarial medicines and other essential supplies.

About the Global Fund

The Global Fund was created to finance a dramatic turnaround in the fight against AIDS, tuberculosis, and malaria, which together kill six million people each year. The Global Fund is committing significant funds in 128 countries to support aggressive interventions against all three diseases.

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CONTENTS

ACRONYMS

ACT	artemisinin-based combination treatment
BCC	behavior change communication
DHS	Demographic and Health Surveys
EML	Essential Medicines List
GF, GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
HMIS	health management information system
IEC	information, education, and communication
IMCI	Integrated Management of Childhood Illnesses
ITN	insecticide-treated nets
LLITN	long-lasting insecticide-treated net
M&E	monitoring and evaluation
MMSS	Malaria Medicines Supply Service
MOH	Ministry of Health
MSH	Management Sciences for Health
NGO	nongovernmental organization
PSM	Procurement and Supply Management [GFATM]
RBM	Roll Back Malaria [Partnership]
RDT	rapid diagnostic tests
RPM Plus	Rational Pharmaceutical Management Plus Program
STGs	standard treatment guidelines
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
WHO	World Health Organization

BACKGROUND

The decision to change the antimalarial treatment policy and the subsequent implementation of the policy brings with it challenges and complexities at every level and involves a variety of stakeholders ranging from departments within the Ministry of Health (MOH) to manufacturers and private providers.

The World Health Organization (WHO 2004) recommends that in revising malarial treatment policies, all countries opt for a combination treatment, preferably an artemisinin-based combination therapy (ACT). In accordance with this recommendation, the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) has given countries that have in place signed grants covering proposals for malaria treatment during rounds 1, 2, and 3, the option to consider reprogramming their requests for funds for treatment to be directed for ACTs. For this purpose, the GFATM has made additional funds available for the procurement of ACTs.[1] Countries submitting proposals for reprogramming of existing grants or for new grants must ensure that the procurement and programmatic costs of implementing the change are considered. For countries that have unacceptable levels of resistance to their current antimalarial therapies, covering such costs is critical, so developing a sound plan for reprogramming that takes into account procedural, regulatory, procurement, and other pharmaceutical management elements will be essential.

Although there are some guidelines and documents on the elements that need to be considered when changing first-line treatment (including the levels of drug resistance considered acceptable before countries should begin the process of review) (WHO/AFRO 2003), little guidance exists on the steps required when rolling out a new treatment policy for national-level implementation. While each step for formulation and rolling out a new treatment policy is described here in some detail, further details on implementing a change are available from other sources (MSH and WHO 1997); technical assistance from Roll Back Malaria (RBM) partners is also available.

Objective

This document provides guidance to countries on what actions need to be taken when countries consider changing their national policy for the first-line treatment for malaria to an ACT consistent with WHO recommendations. It addresses operational and technical considerations for both the public and private sectors, and it may be used as a planning tool to identify technical assistance and resource needs.

This document focuses on the implementation process after a decision is made to change the treatment policies. Some documents providing guidance on achieving the policy change are listed in Annex 4.

[1] The criteria for eligibility for reprogramming will be provided elsewhere.

INTRODUCTION

The change in treatment policy occurs in three phases—

- The policy review and change process: the processes and procedures leading up to the selection of the new treatment policy, including finance discussions
- The transition phase: the period when the decision on the new treatment policy has been made but the policy has not been implemented yet
- The full implementation of the new policy: national rollout of the new policy[2]

This document focuses on the transition phase, and in developing this document, the following assumptions have been made concerning the policy change process—

1. An effective first-line treatment for malaria consistent with the WHO recommendations was selected in consultation with all the RBM partners in the country, MOH departments (including Integrated Management for Childhood Illness [IMCI], reproductive health, and regulatory authorities), as well as other stakeholders that would be involved in the implementation of the new policy.

2. The decision on the diagnostic criteria for malaria—that is, whether to use clinical diagnosis or biological diagnosis (microscopy, rapid diagnostic tests [RDTs])—has been made as part of the policy change process. This is important to determine what medicines and other commodities to purchase and their quantities.

3. An existing mechanism or structure incorporates all stakeholders involved in the new policy implementation. This mechanism will plan and coordinate the implementation process. Forming a transition committee responsible for piloting the process can be useful. Although the "ownership" of policy change and implementation lies with the MOH, other stakeholders are involved in this process. An illustrative list of stakeholders is shown in Box 1.

[2] The implementation of the new policy can be done either through a phased implementation or through an immediate nationwide rollout.

Box 1: Illustrative List of Stakeholders

This list should be tailored to the specific context in each country.

Ministry of Health
- National Malaria Control Program
- Pharmacy and Essential Drugs Department
- Health Education Department
- Provincial and District Health Officers
- Director of Reproductive Health
- Director of the IMCI Program

Ministry of Finance
- Director of Health Budgets

Private Sector
- Manufacturers of antimalarials and diagnostic products
- Importers and wholesalers
- Private hospitals and pharmacies
- Drug shops
- Traditional healers

Research Departments and Institutions
- Department of epidemiology
- Pharmacy department

Professional Organizations

Nongovernmental Organizations (NGOs) including mission hospitals

Before beginning the process of policy implementation, it is critical to ensure that the financing issues have been addressed.

Financing

Effective transition and implementation of the new policy is likely to require a time-limited investment of additional resources—including resources for developing and printing clinical guidelines and behavior change communication (BCC) materials, plus costs for training and for the other activities described below—in addition to the recurrent incremental cost for the procurement of the new antimalarial treatment. These costs should be budgeted for at the planning stage. Financial commitments by the country and from donors need to be sought before beginning the implementation process. Although the incremental cost for the purchase of the antimalarials is simple to define, the costs for the transition process will vary significantly with country context. Goodman and colleagues (2001) calculated the transition process in Tanzania to cost U.S. dollars (USD) 450,000.

Box 2: Key Questions about Financing Strategies

- What are the financial requirements for transitioning to the new policy, and what resources are available?
- Has a financing strategy been developed?
- Do the financing strategies protect the most vulnerable?
- Are mechanisms for financial accountability and transparency in place, and how well do they work?

Financial resources that may be used for national-level procurements include funds from national government budgets (including district grant funds), multilateral and bilateral institutions such as the World Bank and GFATM, NGOs, and other foundations. These funds should be coordinated to cover the comprehensive plan and used not only for the direct purchase of antimalarials but also to improve the diagnosis of malaria and to strengthen health systems to deliver treatment effectively and efficiently. This implementation guide will help identify some of the technical assistance and resource needs.

In countries where cost-recovery systems already exist, these systems are based on a cost structure that depends on the cheaper antimalarials currently in use. Switching to the more expensive ACTs means that these cost structures may need to be reviewed in light of the anticipated increase in costs. Countries may also need to explore alternatives for reducing the increased cost burden on the most vulnerable populations to ensure that ACTs are available and affordable for even the poorest population groups.

In addition, mechanisms used to ensure financial accountability must be put into place through the development of an appropriate financial management system.

FRAMEWORK FOR IMPLEMENTATION OF ACT POLICY

This framework focuses on the key components needed during the transition phase of the new policy, as illustrated in Box 3. The framework addresses these components as they might affect the implementation of the policy in the public and private sector. The private sector includes the not-for-profit institutions (i.e., faith-based and secular NGOs) as well as commercial or for-profit shops and organizations.

The key components in the implementation of the new policy can be divided into the technical components and the operational components. The technical components incorporate the activities related to selecting the medicines and the required regulatory changes, and the appropriate use of the new medicines. As this guidance document assumes that decisions related to the medicine selection have been discussed during the policy change process, it focuses on ensuring that the new treatment is used appropriately by developing and disseminating new guidelines consistent with the new policy, and developing and using proper training and BCC strategies. The operational components incorporate the activities related to procurement and supply chain management, which ensure that the new medicines are available at the points-of-service delivery.

Box 3. Key Components in Framework for Implementation of the ACT Policy

1. **Technical considerations**
   - Revision of drug regulation/registration of ACTs
   - Development/review of the essential medicines list (EML), the standard treatment guidelines (STGs), and other relevant guideline documents and BCC materials for malaria
     - Dissemination of the revised STGs and other relevant guideline documents and BCC materials
     - Training and supervision of health workers consistent with the new guidelines
     - Information, education, and communication (IEC) targeting the community
2. **Operational considerations**
   - Management of stock of antimalarials currently in use
     - Development of a phase-out plan
   - Management of ACT supply
     - Availability of a reliable source of good quality antimalarial drugs
     - Forecasting of demand and quantification
     - Procurement
     - Distribution
     - Inventory management
   - Review of quality assurance mechanisms
     - Pharmacovigilance
     - Product quality surveillance
     - Quality control at registration and receipt of purchase
3. **Monitoring and evaluation**

The following sections of this document outline and briefly discuss the technical and operational issues.

Technical Considerations

Revision of Drug Regulation

Three key questions must be addressed during the policy change process for implementation to be successful; these are outlined in Box 4.

Box 4. Key Drug Regulation Questions

- Have issues regarding the registration of ACTs in the country been addressed?
- Are the regulations pertaining to the prescribing and dispensing of ACTs in the country consistent with the adopted policy?
- Are the regulations regarding the distribution and sale of ACTs consistent with the policy?

The new therapies selected must be authorized for sale on the market. In most countries, authorization involves a medicine registration process that includes the submission of a dossier of information on efficacy, safety, and other properties. For combination therapies, information on the different registration requirements for fixed-dose combinations and co-packaged combinations must be obtained early enough to allow an adequate lead time in the transition process. For example, in Kenya, new fixed-dose combinations and new prepackaged products must be registered even if the individual components of the combination are already registered (Shretta 2002).

The registration process can take three months or more depending on how often the registration committee in the country meets. If the new therapy is not registered, most countries have mechanisms to waive or fast-track the registration process for public sector programs.

If donations of ACT in kind are accepted, they should comply with the country's medicine donation guidelines. If these guidelines do not exist in the country, WHO Drug Donation guidelines should be followed. This is particularly important given the variation among different formulations of ACT and their short shelf-life.

Regulatory changes to be implemented by MOH authorities, such as the Drug Transition Committee or other body in conjunction with the National Formulary Committee and Drug Regulatory Authority, include changes in medication scheduling[3] to ensure the availability of the new first- and second-line treatment at public and private health facilities, such as pharmacies, clinics, and dispensaries (in the public sector) and over-the-counter shops, *dépôts*

[3] This is the legal status of a drug (e.g., prescription-only medicine, over-the-counter medicine).

pharmaceutiques, *duka la dawa*, or chemical sellers (in the private sector), where this will be consistent with the new policy.

There should also be a plan to phase out and remove the previous antimalarial medicines from the system. Legislation for removing or "banning" previous antimalarials raises several complexities and it may be necessary to explore alternative strategies, such as rescheduling of this antimalarial to a prescription-only medicine, which may reduce the demand for the previous medicine over time. Such legislative changes can take up to six months or more, depending on the country context and the process required for instituting such a change.

Revision of the STGs and EML

Revision of the STGs and EML must be coordinated with the development of the BCC to ensure that the same messages are communicated to health care workers and the public. The key questions to ask when developing the communication components of the implementation plan are listed in Box 5.

Box 5. Key Questions on the Communication Components in Implementing the New Policy

- Are there existing STGs and EMLs that need to be updated? Who will be responsible for updating the STGs and EMLs or developing new ones?
- How will the revised STGs and EMLs be disseminated within the public sector and the private sector?
- What training will be provided to health workers to familiarize them with the new policy? Who will develop the training materials and carry out the training for both the public and private sectors?
- Who is responsible for development of the BCC strategies, and how will this be coordinated with the development, dissemination, and training of the revised STGs?
- Who is responsible for development of the IEC materials and strategies, and how will this be coordinated with the BCC strategies?

The malaria sections of the STGs and EML, integrated technical guidelines such as IMCI modules, any guides for health workers, curricula or handbooks, and any other guidelines or documents recommending treatments for malaria will need to be revised.[4] For all these materials, it may not be possible to publish new documents as soon as guidelines are revised. In this case, countries may choose to publish an addendum to replace the relevant section in the original guidelines. In all the above documents, it can take between three and six months to complete the documents and print and publish them so time to do so must be planned for before development of an action plan.

[4] Guidelines for antenatal care for the treatment of malaria during pregnancy also need to be revised to include intermittent preventive therapy for malaria prevention if this policy is adopted.

Dissemination of STGs and Training of Health Workers

A plan must be developed for the dissemination of the revised STGs to both the public and private sectors as well as the sensitization, training, or both of the health workers on these new guidelines. Work will need to be done with pre-service training institutions to incorporate revisions to antimalarial treatment in their curricula. Similar changes need to be made to IMCI and other in-service training curricula used in the country. In addition to training on STGs and IMCI, health workers should have some minimal training in medicine quality assurance. An example of this training could be visual inspection guidelines such as those developed by USP Drug Quality and Information Program in collaboration with the International Council of Nurses. Training/sensitization activities of health workers must be done shortly before the new first-line antimalarial is available at the health facility level. Carrying out the training too early could have negative effects—providers may begin recommending the new treatment before it is available for purchase, which in turn could confuse or frustrate patients, or they may forget the key messages emphasized during the training when the medicines finally are available. Carrying out the training too late, after the antimalarials are available at the health facilities, may lead to inappropriate or irrational use of ACTs.

BCC/IEC Strategies

Implementing a medicine change, particularly one with which providers and patients have little experience, requires considerable planning for behavior change strategies and capacity building at all levels. Activities must be undertaken to raise public awareness about the change in the first-line antimalarial treatment using multiple approaches, including print, mass media, and drama. These activities can also be used to convey other key malaria messages. It is crucial to ensure that these BCC/IEC campaigns are coordinated with the sensitization/training of health workers on the new policy to ensure that the same messages are being communicated to all.

Operational Considerations

Management of Stocks of Antimalarials Medicines Currently in Use: Developing a Phase-Out Plan

This area is critical because countries are often reluctant to change treatments when they have large pipelines of “old” medicines in the system. For this reason, provisions for phasing out of the previous medicine must be made during the transition phase to avoid wastage when the new policy is implemented. Some key questions that must be asked in developing a plan for phasing out the current antimalarial from the system are listed in Box 6.

Box 6. Key Questions in Developing a Phase-Out Plan for Removing the Current Antimalarials from the Health System

- What system will be established to remove the current antimalarial supplies from the public sector facilities once the new ACT products are available?
- What, if anything, will be done about the existing pipelines of the current antimalarial products in the private sector?

As part of the phase-out plan, accurate estimates of the current first-line treatments in stock and in the pipeline must be compiled, and future procurements should be adjusted to ensure that when the switch to the new medicine is made, there is not a large stock of the previous medicine in the system. Data on pipelines can be obtained from the central medical stores, district stores, and health facilities though a request by letter from a recognized authority. The procurement agency will often be aware of any medicines in the pipeline that have not arrived in the central stores yet.

A decision must be made on what should be done with the stocks of older-generation antimalarials in the public health stores when the new ACTs become available. For example, the phase-out plan may require that the health facilities give any remaining stocks of the current antimalarial to the central stores when they receive the stocks of ACTs. The central stores would then be responsible for the disposal of the old medicine stocks.

Phasing out the current antimalarials from the nonprofit private sector facilities may be done in the same way as in the public sector. As mentioned earlier, phasing out the current antimalarial from the for-profit private sector is more complex; it may be prudent to focus on the public and nonprofit sectors initially while developing long-term strategies for managing the for-profit sector.

Management of Artemisinin-Based Combinations Supply: Developing a Phase-In or Rollout Plan

Development of a Phased or Nationwide Implementation Program

The new policy can be implemented either through a phased implementation or through an immediate nationwide rollout. The decision on which method to use has implications for the technical and operational components listed in this framework.

1. Phased implementation plan, which can be done in two ways—

    a. Geographically—by selecting some areas for earlier implementation than others

    b. System-based—by selecting some parts of the health system for earlier implementation (i.e., first public health services or first public health and community based services)

Advantages of a phased implementation include—

- Lower start-up costs for the implementation
- The dissemination of the STGs, the training of the health workers, and the BCC strategies can be tested and any problems with the materials or methods identified and corrected
- The ability to monitor and model the uptake of the new policy in the health facilities—including getting a better idea of whether the availability of effective antimalarial treatment in the public sector health facilities increases use of the public health facilities—thus allowing for better forecasting of the demand for ACTs

2. Nationwide implementation plan, which is the rollout of the new policy in the entire country at the same time. It requires greater start-up costs and better coordination of guidelines dissemination, health worker training, and availability of antimalarials at the health facilities to ensure that the implementation is successful.

Forecasting Demand and Quantification

For the immediate future, the GFATM is likely to be the major source of external funding for countries for the purchase of ACTs. Proposals to the GFATM must include accurate demand forecasts for antimalarials. Annex 3 provides tables that can be used to develop forecasts for ACT needs. Table 1 contains information on the current procurement for all antimalarials using GF funds, and Table 2 contains estimated numbers of ACT requirements for the first and second 12-month-periods, respectively.

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Box 7. Key Questions to Be Considered When Making Forecasts of the Potential Demand for ACTs

- What method is currently used for forecasting antimalarial demands?
- How are forecasts validated and how is the data managed?
- Are adequate buffer stocks planned at relevant levels?
- Are parallel procurement efforts for national procurements as well as grants appropriately harmonized?
- What method of quantification will be used to determine the estimates and what are the limitations of the available data?
- What will be the diagnostic criteria for malaria under the new policy—is there a need to estimate the requirements of rapid diagnostic tests and/or commodities for microscopy as well?
- Will the implementation be piloted in a few districts then scaled up gradually throughout the country, or will there be a nationwide rollout?
- What is the expected uptake of the new policy over time within each health facility or district?

Several different methods can be used to compile a needs forecast, including consumption-based methods and morbidity-based methods. When a new pharmaceutical policy is implemented, data on past consumption are not available. In this case, morbidity is the appropriate method of forecasting. This method may be compared using adjusted consumptions based on consumption of previously used first- and second-line treatments. Getting adequate morbidity data can be a challenge because of the potential inaccuracies of the data in the health management information systems (HMISs), and often reasonable estimates must be made from whatever data do exist. In using morbidity data to develop forecasts for malaria, there must be a clear understanding of the source of the morbidity data and the treatment-seeking behaviors with respect to malaria in the country.

HMISs usually collect data from the public health facilities only, possibly resulting in an under-representation of the morbidity burden of malaria in the country. There is some anecdotal data to suggest that the availability of an effective antimalarial at the public health facilities, at a lower cost than would be available in private health facilities, may increase utilization of the public health facilities; some provision may need to be made to prepare for this possibility. A phased implementation has the advantage of allowing data to be collected that would enable better estimates to be made of the uptake of the new policy at the health facilities, thus improving the estimates of the potential demand before the nationwide implementation.

A decision to change the diagnostic criteria for malaria from a reliance on clinical diagnosis to the use of biological diagnostic criteria (RDTs or microscopy) also affects the different forecast methods. The use of morbidity data collected on the basis of a clinical diagnosis of malaria may lead to overestimating the demand for ACTs because clinical diagnosis results in more false positives than a biological diagnosis; allowances would need to be made for this potential

overestimation when forecasting. The planned use of biological diagnosis also means that needs forecasting of the RDTs and other commodities for microscopy would need to be done.

The complexities associated with forecasting demand mean that there may be a need to develop preliminary estimates of future demand of ACTs for submission to suppliers, but these estimates need to be reviewed and adjusted on an ongoing basis when new information becomes available. Various tools and methodologies can be used in developing forecasts for antimalarials (MSH and WHO 1997; WHO 1995). Technical assistance with compiling these forecasts should be sought before applications are made to the GFATM or other funding organizations. The process of getting the data on morbidity or past consumption as well as quantification can take about three months.

The forecasts can then be used to cost out the requirements and quantification can be carried out based on available budget.

Procurement

"An effective procurement process ensures the availability of the right drugs, in the right quantities, at reasonable prices, and at recognized standards of quality." (MSH and WHO 1997) The key questions that need to be asked in developing a procurement plan for ACTs are listed in Box 8. The quantification of ACTs needs has been discussed in the preceding section, and the distribution of ACTs is discussed in the next section. This section focuses on the steps involved in purchasing ACTs.

For procurement using GF funds, it is important to adhere to GF policies on procurement and supply management, which can be downloaded from the GF web site (www.theglobalfund.org). Among other points, the policy emphasizes the purchase of products that have been prequalified by WHO (of which have been produced according to Good Manufacturing Practices [GMP]).

Often, actual procurement and financing of the procurement occur in different departments or ministries. There is a need to coordinate activities to ensure synchronization between the financing activities and the requirements of the procurement cycle.

Box 8. Key Questions on Procurement of ACTs

- What procedures or systems exist for managing the procurement process?
- Is the system transparent and efficient?
- What is the anticipated duration of the procurement cycle from product selection to the arrival of goods?
- Are there systems in place for monitoring supplier performance and enforcing the procurement contracts?
- What will be the diagnostic criteria for malaria under the new policy; that is, is there a need to procure RDTs and/or commodities for microscopy as well as the medicines?
- Is there a need to prepackage the product, and if so, who will do this?
- What systems are in place for pharmaceutical quality control?

A procurement plan must be developed that considers the distribution strategy.[5] This procurement plan should include information on the procurement method to be used, that is, whether to use open tender, restricted tender, competitive negotiation, or direct procurement. A detailed discussion on the advantages and disadvantages of these methods can be found in other resource texts (see MSH and WHO 1997). To obtain the best prices, however, competitive procurement is generally recommended (the limited number of suppliers of ACTs at this time may mean that the cost benefits of competitive procurement may not always be achieved). Irrespective of the procurement method selected, systems need to be put in place to ensure that the products procured are of appropriate quality. This may be achieved either through prequalification[6] or postqualification of suppliers as part of the competitive bidding process. Additionally, there must be a system in place for monitoring supplier performance and for resolving any problems identified as a result of this monitoring. Countries may require technical assistance to prepare the tender documents for procurement and to manage the procurement process. WHO and the United Nations Children's Fund (UNICEF) have negotiated prices with one prequalified supplier and will make time-limited agreements with quality-assessed suppliers to allow supply of quality-assessed formulations to the programs. This method of procuring ACTs may be the easiest. In addition, the GF is coordinating with grantees to establish an ear-marked pool of funds for procurement of ACTs.

[5] For both public and private sectors.

[6] WHO has prequalified one supplier of ACTs—Novartis®, has quality assessed the products of IPCA and CIPLA, and is developing a pool of other prequalified suppliers to assist countries in this process. (See www.rollbackmalaria.org/mmss)

Malaria Medicines Supply Service (MMSS)

MMSS was created by the RBM Partnership to facilitate access to affordable, effective, and quality medicines and supplies for malaria prevention and control. The main roles of MMSS are to—

- Facilitate the search for reliable and effective products
- Assist in market forecasting
- Coordinate procurement activities and provide technical assistance with the difficulties that are unique to malaria-related procurement
- Publish guides to facilitate procurement by countries
- Assist countries to find the technical assistance necessary to manage procurement and supply
- Publish information and guides on prequalified products

MMSS coordinates, assists, or intervenes directly in three areas—

1. Information on products and markets
2. Information on technical resources
3. Liaison with industry

MMSS is located within the RBM Partnership Secretariat, which is accountable to the RBM Board through its Executive Secretary.

Distribution

The detailed steps in the distribution of antimalarials will differ from country to country, depending on how the public and private distribution systems are organized, and whether or not a central medical store plays a role in the distribution system. (In a "pull" system, the health facilities order medicines from the stores or suppliers based on their own determination of their needs. In a "push" system, the central store determines the supplies to be sent to each health facility based on the information it has received about the needs at the health facilities.) The short shelf life of ACT (12–24 months) makes it imperative that distribution systems function effectively to avoid medicine loss due to the expiration of stock.

Box 9. Key Questions for Distribution

- Is there a comprehensive distribution strategy and a detailed distribution plan?
- Does the plan ensure that medicines will get to dispensing points at least several months before expiry?
- Does the plan allow for effective coordination/collaboration between the public and private sectors?
- Is there existing capacity (public and private) to implement the distribution plan?
- Are the storage capacity and conditions adequate and appropriate? If not, what plans exist to improve them?
- What is the distribution and transportation capacity and is it adequate?

Provided that the medicines are in stock at the central medical store, distribution to the peripheral level can take two to four weeks or more. In Zambia, for example, facilities must request a product that is then delivered in one month through a central or cascade system.

The distribution plan should also take into account the private sector. Unavailability of the product in the private sector encourages leakage and use of monotherapies.

Inventory Management

Inventory management measures need to be assessed and upgraded, or established if they do not already exist, at all health facilities to ensure that stocks of antimalarials are managed appropriately to prevent stock-outs and to ensure that wastage due to expiry is minimal.

Box 10. Key Questions for Inventory Management

- What inventory control mechanism is in place and is it reliable? Is a physical check of medicines carried out at least annually?
- What is the average stock turnover time and is there a policy and practice of issuing stock according to first expiry/first out at all levels?
- Are there functional managing information systems to manage product flow?
- How well is the shelf life of products managed throughout the existing supply chain? What systems are in place for dealing with expired products?
- Are adequate security measures in place to prevent theft of stored products?

Mechanisms will be needed to ensure that records are regularly kept and updated and that physical checks are regularly performed. Provisions must be made to prevent diversion of medicines from the public facilities to the private sector. Furthermore, due to the short expiry of

ACTs, it will be essential to strengthen pharmaceutical management systems to ensure that products do not expire before they are used and to efficiently remove any expired stock from the facilities and stores. Provisions for recalling short-expiry products in districts or facilities with low utilization and transferring them to those areas with high utilization may need to be put in place.

Quality Assurance

During policy change, the main quality assurance issues are product efficacy (drug resistance monitoring), product safety (pharmacovigilance), product quality at registration and procurement, and postmarketing quality surveillance systems. While many countries may already have systems for quality control at registration, systems for postmarketing surveillance for quality may need to be developed. Building capacity in existing structures that collect similar information for other essential medicines could be considered to make the best use of available human resources.

Box 11. Key Questions for Quality Assurance

- Is there a system or procedures in place for monitoring the efficacy of the medicines?
- Is there a system or procedures in place for reporting adverse effects of medicines?
- Is there a system or procedures in place for monitoring the quality of medicines during registration and/or procurement?
- Is there a system or procedures in place for monitoring the quality of medicines already in the market? Are samples regularly tested by a qualified laboratory?

Pharmacovigilance

Mechanisms must be in place for surveillance of adverse events associated with the use of ACTs.[7] Establishing a regular reporting system through the health facilities or through special studies will ensure monitoring. This reporting system for ACTs must be developed within the systems for monitoring adverse events for other medicines. Forms for recording adverse events should be provided to the health facilities. At each health system level, a point person must be selected to collate the data and a system must be developed for reporting back to the central level.

[7] Artemisinins are currently not recommended for use in the first trimester of pregnancy. It is likely that they will, however, be given to a cohort of the pregnant population unaware of their pregnancy. Clinical studies are under way to detect adverse effects that may arise in the course of using ACTs.

Product Quality Surveillance System

Product quality surveillance must be integrated at all levels of the health system to ensure that the medicines available in the market are of the appropriate quality. A comprehensive system includes ensuring quality during pharmaceutical registration, procurement, and distribution through the public and private sectors; it also includes a mechanism for removing from the supply chain any products found to be of inappropriate quality and that pose a danger to the health of those who use them.

Monitoring and Evaluation

Monitoring and evaluation (M&E) is an essential part of the reprogramming process and occurs throughout planning and implementation. Planning for evaluation and monitoring needs to be done early and integrated throughout the implementation process, so that data generated from monitoring can be used to guide any changes in implementation strategies by malaria programs, governments, and external stakeholders. M&E is particularly important for ACTs because health care workers have little experience with their use. Proposals for reprogramming should have a strong M&E component. Some key questions related to the development of M&E systems are listed in Box 12.

Box 12. Key Questions for Monitoring and Evaluation Systems

- Is there an M&E plan to track implementation progress and performance relative to defined/established targets?
- What information sources exist for monitoring, and what needs to be developed?
- How will performance be evaluated?
  - Internal versus external evaluation?
  - Process versus outcomes evaluation?

Data for monitoring and evaluation can be obtained from existing surveys, such as Demographic and Health Survey (DHS) and HMIS data, or through special studies. The decision on which information source(s) to use depends on each country context and the type of information systems available. Types of information systems include—

- *DHS:* DHS surveys are nationally representative household surveys and provide data for a wide range of monitoring and impact evaluation indicators. Typically, these surveys are conducted every five years in most endemic countries.
- *HMIS:* Most countries have an existing HMIS that provides basic information on mortality and morbidity rates.

- *Drug Management Information Systems:* These systems may exist to provide information on management of pharmaceutical supplies.

- *Malaria indicator survey:* This set of tools is being prepared by the M&E Reference Group to assess coverage of key RBM interventions including insecticide-treated net (ITN) coverage, antimalarial treatment, and the use of intermittent preventive treatment (IPT) at the household level.

- *Malaria information system:* Some countries have a sentinel system that collects routine malaria information from selected health centers. Information on drug availability and other indicators of change may be available or may be incorporated into this system.

- *Adverse drug reaction/pharmacovigilance reporting systems:* These systems are used to collect and provide data about adverse drug reactions experienced by patients under actual use conditions. This information may then be used to help drug regulatory authorities and others in the health community to modify the regulations pertaining to the medicine.

- *Special studies:* In the absence of good data to monitor the uptake of the policy, it may be necessary to carry out special research to obtain particular data. Such data are collected every five years in most endemic countries.

Some sample M&E indicators are listed in Annex 4.

ANNEX 1. CHECKLIST OF KEY ACTIONS (ILLUSTRATIVE)

This table is a template with illustrative activities that countries may use in developing their implementation plans. The list of activities is not comprehensive—countries should modify to meet their specific needs.

Issues	Key Actions	Technical/ Operational Lead	Estimated Timeline	Resource Requirements
Planning and coordination mechanisms	Identify stakeholders			
	Determine their importance at the various stages, their roles and responsibilities, and how they should be engaged (stakeholder analysis)			
	Identify composition of transition committee or, if using an existing mechanism, determine which existing committee or group should carry out this process			
	Establish working groups or task forces and their respective membership within the committee			
	Establish terms of reference for working groups/task forces			
	Develop/review mode of work and frequency of meetings			
Financing	Develop/review budget for transition and implementation			
	Identify potential national-level resources—e.g., heavily indebted poor country trust fund			
	Evaluate current spending profile and redirect funds if necessary			
	Develop a strategy for accessing funds			
	Develop/review proposals for the GFATM (see below) or other funding agency			
	Identify commitments from departments within the MOH and from donors			
	Evaluate cost-sharing and exemption mechanisms and develop methods for improving equity			
	Develop/review financial accountability mechanisms			

Issues	Key Actions	Technical/ Operational Lead	Estimated Timeline	Resource Requirements
Revision of drug regulation	Register new medicine (if there is a system of registration)			
	Establish fast-track registration system as needed			
	Evaluate whether regulatory requirements may have a negative impact on implementation and, if so, establish mechanisms to alleviate this			
	Evaluate and strengthen regulatory enforcement capacity if needed			
	Promulgate regulations for appropriate importation, distribution, prescribing, and dispensing of ACTs, and ensure that they are consistent with the policy			
Essential medicines list and standard treatment guidelines	Determine which guidelines need to be revised			
	Determine the process for revision and the groups involved			
	Determine whether new guidelines need to be published or an addendum made to the existing guidelines			
	Publish revised guidelines/EML or addendum			
	Disseminate new guidelines and EML			
	Revise pre-service and in-service training curricula to incorporate new guidelines			
	Develop/review plan for training health workers and develop training materials			
	Convene training workshops soon after procuring new antimalarial and carry out a cascade training			

Issues	Key Actions	Technical/ Operational Lead	Estimated Timeline	Resource Requirements
Behavior change communication/ information, education, communication	Develop/review BCC strategies, and coordinate with IEC strategy			
	Develop/review IEC strategies			
	Develop/review plan for implementing the BCC strategies			
Phasing out old medicines	Determine pipeline for the old medicine through central- and peripheral-level data collection			
	Adjust future procurements of the current medicine to make sure that large pipelines of old medicine do not accumulate when the new medicine is procured			
	Develop/review a plan for the phase-out of the current medicine from the health system as the new medicine becomes available			
	When policy change occurs, withdraw old medicine from peripheral areas following the phase-out plan			
Quantification	Obtain consumption data and morbidity data from the field			
	Use this data to calculate potential consumption for a phased or nationwide implementation, allowing for some buffer stock and keeping in mind the short shelf life of ACTs			
	Calculate potential consumption of rapid diagnostic tests if this diagnostic method is chosen and/or commodities for microscopy			
	Ensure that forecasts for parallel procurement efforts of the MOH and grants (including GF) are coordinated			

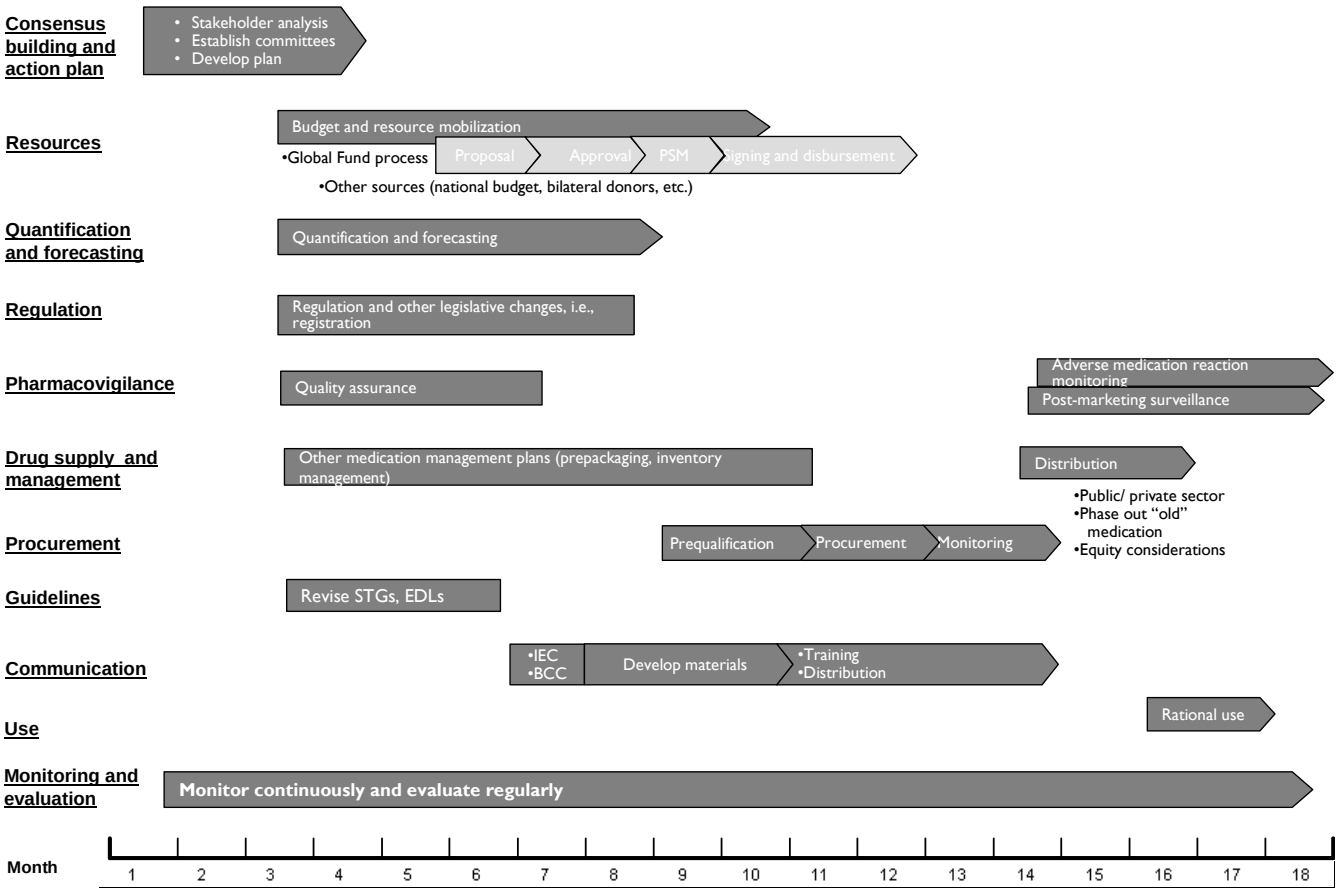
Issues	Key Actions	Technical/ Operational Lead	Estimated Timeline	Resource Requirements
Procurement	If GFATM is the source of funding, follow the steps under GFATM requirements			
	Develop a procurement plan for antimalarials and diagnostic commodities			
	Review current procurement procedures, including efficiency and transparency, and identify weaknesses; develop mechanisms to address weaknesses			
	Identify source of technical assistance and obtain the technical assistance as needed			
	Process procurement through WHO or UNICEF if using artemether-lumefantrine			
	Determine if there is a need to prepackage the product and identify supplier(s) for a prepackaged product or identify a manufacturer that can prepackage			
	Develop packaging and labels for prepackaged product if needed and pretest these			
	Develop tender documents			
	Initiate and manage procurement			
	Monitor supplier performance			

Issues	Key Actions	Technical/ Operational Lead	Estimated Timeline	Resource Requirements
Distribution	Develop/review a distribution plan			
	Review/develop distribution systems to allow for coordination between the public and private sectors			
	Develop/review strategies to avoid leakage to the private sector			
	Develop/review storage capacity and conditions to meet GMPs			
	Develop/review human capacity for efficient implementation of distribution plan and supervision			
	Develop/review transportation system			
	Develop/review redistribution systems and systems to remove expired stocks			
	Develop/review systems to monitor efficiency of distribution system and redistribution mechanisms			

Issues	Key Actions	Technical/ Operational Lead	Estimated Timeline	Resource Requirements
Inventory management	Review/develop inventory management systems to improve managing pharmaceuticals in the peripheral health facilities			
	Develop/review security measures to prevent theft of stored products			
	Develop/review systems to ensure management of the shelf life of products and develop/review systems for dealing with expired products			
Revision of quality assurance mechanism	Develop/review system for monitoring of adverse events			
	Confirm that there is quality control at registration			
	Develop/review systems for quality assurance during medicine registration and procurement			
	Develop/review system for dealing with violations of medicine quality standards			
	Establish mechanism to coordinate the various surveillance systems—adverse medication reaction, product quality, effectiveness, etc.			
	Develop/review plan for postmarketing product quality surveillance; ensure that samples will be regularly tested by a qualified laboratory and monitor the number of samples tested that meet established norms			

Issues	Key Actions	Technical/ Operational Lead	Estimated Timeline	Resource Requirements
M&E	Develop/review plan for postmarketing product quality surveillance, monitoring quality of antimalarial products, output: percentage of samples tested that meet accepted standards			
	Define program milestones (indicators)			
	Identify data needs			
	Develop/adapt and implement information systems			
	Identify and address human and information technology resource needs			
	Develop schedule for M&E activities			

ANNEX 2. ILLUSTRATIVE TIMELINE FOR IMPLEMENTATION



ANNEX 3. GFATM QUESTIONNAIRE FOR GRANTEES

Questionnaire for GFATM Grantees who have purchased antimalarials OR who will use GFATM funds to purchase ACTs

This questionnaire asks for critical information about the procurement status of artemisinin-based combination therapy (ACT) in countries that have been funded or are in the process of being funded by the Global Fund.

Please circle the answer to the questions below. For question 2, please complete the corresponding tables on the following pages.

1. **Has procurement of any health products started?** *YES / NO*

2. **Has procurement of antimalarial products started?** *YES / NO*

   If Yes, please complete Table 1 **and** Table 2.

   If No, please complete Table 2 only.

Table 1. Current procurement of all antimalarials (ACT and non-ACT) with GF funds
(first two shaded rows are provided as examples only)

Drug Name	Strength (1)	Unit (2)	Pack size	Pack Cost (USD)	Unit Cost[8] (3) USD	Number of Units (4)	Number of Packs	Total Cost (3) x (4) USD	Manufacturer / Supplier	Date of Purchase (mm/dd/yy)	Expected Stock-Out Date
Amodiaquine	*150 mg*	*Tab*			*0.01*	*230,000*		*2,300*	*Ipca*	*07/22/04*	*07/22/05*
Artemether-lumefantrine	*Co-formulated adult 35 kg+*	*Tab*	*10*	*2.40*	*0.24*	*2,470,000*	*247,000*	*592,800*	*Novartis / IDA*	*04/17/04*	*10/17/04*

[8] Indicates currency and exchange rate at time of procurement.

Table 2. Estimated Number of ACT Treatments Required by Type of ACT and Age of Patient

Month / Year													Total (Year 1)
First 12 months	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
Type of ACT: _____ (e.g., artesunate + amodiaquine, artemether/lumefantrine)													
Infant													
Child													
Adolescent													
Adult													
Type of ACT: _____ (e.g., artesunate + amodiaquine, artemether/lumefantrine)													
Infant													
Child													
Adolescent													
Adult													

Table continues

Month / Year													Total (Year 2)
Second 12 Months	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	
Type of ACT: _____ (e.g., artesunate + amodiaquine, artemether/lumefantrine)													
Infant													
Child													
Adolescent													
Adult													
Type of ACT: _____ (e.g., artesunate + amodiaquine, artemether/lumefantrine)													
Infant													
Child													
Adolescent													
Adult													

ANNEX 4. SAMPLE M&E INDICATORS

These indicators were developed through a collaboration between WHO, the Joint United Nations Programme on HIV/AIDS, GFATM, USAID, UNICEF, the World Bank, and other partners.[9]

	Service Delivery Area	Output	Outcome
Prevention	• Insecticide-treated nets (ITNs)	• Number of insecticide treated nets (ITNs), long-lasting ITNs (LLITNs), pretreated nets, or re-treatment kits distributed* • Number of nets re-treated* • Number of sentinel sites established for monitoring insecticide resistance*	• Households owning ITNs (Malaria-PI 1**) • Children under five years of age using ITNs (Malaria-PI 2**)
	• Malaria in pregnancy	• Number of nets, LLITNs, pretreated nets or re-treatment kits distributed* • Number of nets re-treated* • Number of pregnant women receiving correct IPT*	• Pregnant women using ITNs (Malaria-PI 3**) • Pregnant women receiving IPT (Malaria-PI 4**)
	• Prediction and containment of epidemics		• Malaria epidemics detected and properly controlled (Malaria-PI 5**)
	• Indoor residual spraying	• Number of homes and areas sprayed with insecticide*	
	• Behavior change communication (BCC)	• Number of targeted areas with BCC services*	

Table continues

[9] Global Fund to Fight AIDS, Tuberculosis and Malaria. 2004. *Monitoring and Evaluation Toolkit: HIV/AIDS, Tuberculosis and Malaria.* <http://www.theglobalfund.org/pdf/guidelines/pp_me_toolkit_en.pdf> (accessed Aug. 10, 2004).

	Service Delivery Area	Output	Outcome
Treatment	• Prompt, effective antimalarial treatment	• Number of patients with uncomplicated and severe malaria receiving correct diagnosis and treatment* • Health facilities with no reported stock-outs of antimalarials (Malaria-TI2†)	• Children under 5 years of age with access to prompt, effective treatment (Malaria-TI1†) • Patients with severe malaria receiving correct treatment (Malaria-TI3†)
	• Monitoring drug resistance	• Number of patients with uncomplicated and severe malaria receiving correct diagnosis and treatment* • Health facilities with no reported stock-outs of antimalarials (Malaria-TI2†)	
	• Home-based management of malaria	• Number of caretakers recognizing signs and symptoms of malaria*	

***** Outputs and outcomes here are also measured as "counts" of increased capacity provided against a need that has been estimated as a pre-condition for change and they can be quantified through direct observation or an annotated inventory. For these "counts," the toolkit **does not** provide a detailed description in the annexes. Both percentages and numbers ("counts") are required. However, if a denominator cannot be obtained, focus should be on the "count."

******Prevention indicators

† Treatment indicators

ANNEX 5. RESOURCES AND REFERENCES

Policy Formulation

Abdulla, S., C. Goodman, P. Coleman, G. Mubyazi, N. Kikumbih, and T. Okorosobo. 2000. *The Costs, Effects and Cost-Effectiveness of Changing the First Line Drug for the Treatment of Malaria in Tanzania.* (Technical report) Tanzania: Tanzania National Malaria Control Programme.

Brabin, B. J., F. H. Verhoeff, P. Kazembe, L. Chimsuku, and R. Broadhead. 1997. Antimalarial Drug Policy in Malawi. *Annals of Tropical Medicine and Parasitology* 91(Suppl. 1):S113–S115.

Fevre, E. M., and G. Barnish. 1999. Malaria Treatment Policies: When and How Should They Be Changed? *Annals of Tropical Medicine and Parasitology* 93(6):549–60.

Global Fund to Fight AIDS, Tuberculosis and Malaria. 2004. *Guide to the Global Fund's Policies on Procurement and Supply Management.* <http://www.theglobalfund.org/pdf/guidelines/pp_guidelines_procurement_supplymanagement_en.pdf> (accessed Aug. 15, 2004).

Goodman C. A., P. G. Coleman, and A. J. Mills. 2001. The Cost-Effectiveness of Antenatal Malaria Prevention in sub-Saharan Africa. *American Journal of Tropical Medicine & Hygiene* 64(1–2 Suppl):45–56.

Kitua A. Y. 1999. Antimalarial Drug Policy: Making Systematic Change. *Lancet* Suppl:SIV32:354.

Shretta R., J. Omumbo, B. Rapuoda, and R. W. Snow. 2000. Using Evidence to Change Anti-malarial Drug Policy in Kenya. *Tropical Medicine and International Health* 5(11):755–64.

WHO. 2000. *The Use of Antimalarial Drugs. Report of WHO Technical Consultation.* WHO/CDS/RBM/2001/33. Geneva: WHO.

WHO. 2001. *Monitoring Antimalarial Drug Resistance. Report of a WHO Consultation, Geneva, Switzerland, 3–5 December 2001*. WHO/CDS/RBM/2002.39. Geneva: WHO.

WHO. 2003. *Assessment and Monitoring of Antimalarial Drug Efficacy for the Treatment of Uncomplicated Falciparum Malaria*. WHO/HTM/RBM/2003.50. Geneva: WHO.

WHO. 2004. Position Paper of WHO Roll Back Malaria Department on malaria treatment policy. Geneva: WHO.

WHO/AFRO. 2003. Framework for Developing, Implementing and Updating National Antimalaria Treatment Policy: A Guide for Country Malaria Control Programmes. AFR/MAL/03.02. *Malaria: Liaison Bulletin of the Malaria Program* 2(2):1–4. <http://www.afro.who.int/malaria/bulletins/1999-12_vol2-2.pdf> (accessed Aug. 15, 2004).

Williams, H. A., D. Durrheim, and R. Shretta. 2004. The Process of Changing National Treatment Policy: Lessons from Country-Level Studies. *Health Policy and Planning* 19(6): 356–70.

Wirima, J. J. W. 1999. Development of an Antimalarial Drug Policy. *Malaria and Infectious Diseases in Africa*. No. 9. <http://chez.com/malaria/som10an.htm> (accessed Aug. 18, 2004).

Pharmaceutical Management

MSH and WHO. 1997. *Managing Drug Supply: The Selection, Procurement, Distribution, and Use of Pharmaceuticals.* 2nd ed. W. Hartford, CT: Kumarian Press.

WHO. 1988. *Estimating Drug Requirements: A Practical Manual.* Action Programme on Essential Drugs and Vaccines. WHO/DAP/88.2. Geneva: WHO.

General References

Green, A. 1999. *An Introduction to Health Planning in Developing Countries.* 2nd ed. Oxford: Oxford University Press.

Management Sciences for Health (MSH). 2005. *Pharmaceutical Management for Malaria Assessment Manual* [formerly *Drug Management for Malaria Assessment Manual*]. Rev. ed. Submitted to the U.S. Agency for International Development by the Rational Pharmaceutical Management Plus Program. Arlington, VA: Management Sciences for Health.

MSH and WHO. 1997. *Managing Drug Supply: The Selection, Procurement, Distribution, and Use of Pharmaceuticals.* 2nd ed. W. Hartford, CT: Kumarian Press.

Roll Back Malaria. 1999. Proposed Methods and Instruments for Situational Analysis. <http://www.doh.gov.za/issues/malaria/red_reference/rbm/background/rbm12.pdf> (accessed Aug. 17, 2004).

Roll Back Malaria Partnership Board. 2004. *Assuring Access to Effective Malaria Case Management.* Geneva: Roll Back Malaria Partnership.

Shretta, R. 2002. *Requirements for the Introduction of Antimalarial Combination Therapy in Selected African Countries*. Submitted to the U.S. Agency for International Development by the Rational Pharmaceutical Management Plus Program. Arlington, VA: Management Sciences for Health.

WHO. 2001. *Antimalarial Drug Combination Therapy*. Report of a WHO Technical Consultation. WHO/CDS/RBM/2001/35, reiterated in 2003. [Position of WHO's Roll Back Malaria Department on malaria treatment policy.] <http://www.rbm.who.int/cmc_upload/0/000/016/998/who_apt_position.pdf> (accessed Aug. 15, 2004).

WHO/EDM. 1988. *Estimating Drug Requirements: A Practical Manual.* Action Programme on Essential Drugs and Vaccines. WHO/DAP/88.2. Geneva: WHO.

WHO/EDM. 1999. *Indicators for Monitoring National Drug Policies: A Practical Manual.* 2nd ed. Geneva: WHO. <http://www.who.int/medicines/library/par/indicators/who_edm_par_993.shtml> (accessed Aug. 17, 2004).

www.msh.org/rpmplus

www.theglobalfund.org

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