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CHILD SURVIVAL AND HEALTH GRANTS PROGRAM

TECHNICAL REFERENCE MATERIALS

2014

MALARIA

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ABBREVIATIONS AND ACRONYMS

ACT	artemisinin-based combination therapy
ANC	antenatal care
CCM	community case management
CHW	community health worker
CSHGP	Child Survival and Health Grant Program
GMAP	Global Malarial Action Plan
GMP	Global Malaria Programme
iCCM	integrated community case management
IMCI	integrated management of childhood illnesses
IPT	intermittent preventive treatment
IPTp	intermittent preventive treatment in pregnancy
IPTp-SP	IPTp with sulfadoxine-pyrimethamine
IRS	indoor residual spraying
ITNs	insecticide-treated nets
LBW	low birth weight
LLINs	long-lasting insecticidal nets
M&E	monitoring and evaluation
MCHIP	Maternal and Child Health Integrated Program
MiP	malaria in pregnancy
MOH	Ministry of Health
NGO	nongovernmental organization
NMCP	National Malaria Control Program
PMI	President's Malaria Initiative
PVO	private voluntary organization
RBM	Roll Back Malaria
RDT	rapid diagnostic test
SP	sulfadoxine-pyrimethamine
TRM	Technical Reference Materials
USAID	United States Agency for International Development
WHO	World Health Organization

INTRODUCTION TO THE TECHNICAL REFERENCE MATERIALS

The Technical Reference Materials (TRMs), a product of the Bureau for U.S. Agency for International Development, Global Health, Office of Health, Infectious Disease, and Nutrition (USAID/GH/HIDN), are a series of guides to help program planners and implementers consider the many elements in a particular technical area of the Child Survival and Health Grants Program (CSHGP). These guides are not an official policy for practice; rather, they are basic everyday summaries to be used as field reference documents. They may also be accessed in the form of electronic toolkits on the [Knowledge for Health](#) website.

The TRMs are organized in modules that correspond to the primary interventions and key strategies that are central to CSHGP. Each module covers the essential elements that need to be considered during implementation, resources for NGOs and others implementing community-oriented programs to consult when planning interventions, and examples of tools most commonly used among CSHGP grantees to collect baseline population-level data.

The TRM modules cover the following topics:

Technical Interventions

- Family Planning and Reproductive Health
- Immunization
- Malaria
- Maternal and Newborn Care
- Nutrition
- Pneumonia Case Management and Control of Diarrheal Disease

Cross-cutting Strategies

- Social and Behavior Change
- Health System Strengthening
- Monitoring and Evaluation
- Quality Assurance

Technical specialists in the USAID Collaborating Agency (CA) community, CORE Group Working Groups, USAID technical staff, and community-oriented practitioners all contribute to updating the TRMs on an ongoing basis. The revision date for each TRM module is at the bottom of each page. The modules are living documents, and we depend on readers to tell us of the usefulness of the information, the need for additions or amendments, and general comments. We ask that users of these documents tell us of their usefulness and let us know information that should be amended or changed, additions and subtractions, and general comments. This will help us keep the modules alive and responsive to your needs. Please share comments with MCHIP at info@mchipngo.net.

MCHIP is grateful for the many contributions and reviews by staff in the Offices of the Bureau of Global Health and many collaborating agencies, CORE Group working groups, and private voluntary organization (PVO) and nongovernmental organization (NGO) partners that use these guides and provide valuable insight on how to improve them. USAID contributors to this TRM include Larry Barat, Misun Choi, Katherine Farnsworth, Christen Fornadel, George Greer, Kevin Griffith, and Pascal Zinzindohoue. Other contributors include Claire Boswell, Independent; Bill Brieger, MCHIP; Nene Diallo, Africare, CORE's Malaria Working Group; Hannah Koenker, JHU CCP; Bob Lennox, MSH, CORE's Malaria Working Group; Chris Mfornyam, Africare, CORE's Malaria Working Group; Vincent Olughor, Independent, CORE's Malaria Working

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OVERVIEW

The devastating disease of malaria contributes to high rates of morbidity and mortality globally. The 2012 World Malaria Report estimated that 219 million cases of malaria occurred worldwide in 2010, which led to 660,000 deaths. This indicates an estimated 26-percent decrease in malaria mortality between 2000 and 2010, primarily as a result of scaling-up preventive interventions. Most malaria deaths occur in children under 5 years of age, and most are in Africa, where one out of every five childhood deaths is caused by malaria. *Plasmodium falciparum*, the parasite responsible for most malaria-associated deaths, affects children in three ways: (1) acute malarial illness, (2) chronic or persistent malarial parasitemia with anemia, and (3) malaria infection transmitted from mother to newborn. Children contract malaria because they have no access to preventive measures, such as insecticide-treated mosquito nets (ITNs). Children die because their caregivers seek traditional but ineffective treatment or they lack access to correct diagnosis and life-saving drugs.

The interagency consensus statement¹ on optimizing the delivery of interventions for Malaria in Pregnancy (MiP) states that MiP is a significant contributor to maternal and newborn morbidity and mortality. Children are directly affected by malaria in most of Sub Saharan Africa and some areas of South and Southeast Asia. The disease affects mostly the adult population, but it also inflicts an economic burden on the entire family. Approximately 125 million women living in malaria-endemic countries throughout the world, with more than 30 million of them living in tropical Africa where there is intense transmission of *Plasmodium falciparum*, become pregnant every year². An estimated 10,000 of these women and 200,000 of their infants die as a result of malaria infection during pregnancy³. Approximately 11 percent of neonatal deaths in malaria-endemic African countries are the result of low birth weight (LBW) caused by *P. falciparum* infections during pregnancy.⁴

Malaria interventions in endemic and epidemic areas alike focus on prevention and treatment. The intervention goal in a child survival project that addresses malaria control is to reduce malaria-associated mortality and morbidity, especially in children and pregnant women.

STRATEGIC APPROACH

Roll Back Malaria (RBM) strategy to reduce malaria morbidity and mortality is to reach universal coverage; that is, to ensure complete coverage of life-saving preventive measures and provide access to treatment in a population. RBM, a global framework to implement coordinated action against malaria with hundreds of partners, is working to strengthen health systems to deliver these interventions effectively. RBM's Global Malaria Action Plan (GMAP) defines two

stages of malaria control: (1) scaling-up for impact (SUFU) of preventive and therapeutic interventions and (2) sustaining control over time.

Roll Back Malaria Partnership Targets

The RBM initiative, hosted by the World Health Organization (WHO), has set these targets:

By 2015:

- Universal coverage continues with effective interventions
- Global and national mortality is near zero for all preventable deaths
- Global incidence is reduced by 75 percent from 2000 levels to less than 85–125 million cases per year
- The malaria-related Millennium Development Goal is achieved, halting and beginning to reverse the incidence of malaria by 2015
- At least 8–10 countries currently in the elimination stage will have achieved zero incidence of locally transmitted infection

Beyond 2015:

- Global and national mortality stays near zero for all preventable deaths
- Universal coverage, which translates to about 80 percent utilization, is maintained for all populations at risk until local field research suggests that coverage can be targeted gradually to high-risk areas and seasons only, without risk of a generalized resurgence
- Countries currently in the pre-elimination stage will achieve elimination

Roll Back Malaria has a two-pronged approach to malaria prevention and control:⁵

1. **Scaling-up for impact** aims to rapidly reach universal coverage for all populations at risk by extending locally appropriate malaria control interventions, such as long-lasting insecticide-treated nets (LLINs), indoor residual spraying (IRS), intermittent preventive treatment in pregnancy (IPTp), drugs, and diagnostics, supported by strengthened health systems. Delivery strategies may involve mass campaigns and distribution of interventions through existing public- and private-sector outlets and community health workers (CHW). Strengthening health systems and building capacity for malaria control begin during scale-up and continue through the implementation.
2. **Sustaining control**, important to prevent the resurgence of malaria, aims to maintain universal coverage of interventions until countries enter the pre-elimination and then elimination stages. After the scale-up of core interventions (MIP, LLINs, case management and IRS), the malaria burden usually declines and the need for case management drops dramatically. Unfortunately, malaria control does not eliminate the mosquito vector, the parasite or the favorable environmental conditions that promote transmission. To keep malaria at bay, countries must maintain high coverage of preventive interventions, even in the absence of numerous infections. The goal of sustained control is to *maintain* universal coverage with interventions until countries enter the pre-elimination and then elimination stages.ⁱ

ⁱ For more information about setting up surveillance systems for malaria control and elimination, see [WHO's operational manual \(2012\)](#).

RBM's strategy, *home as the first hospital*, increases emphasis on caregivers' recognition of suspected malaria and treatment seeking in both formal and nonformal health care systems. This radical shift requires availability of diagnostic tools and the means to use available treatment. The strategy provides an exceptional opportunity for NGOs to play a vital role in the local implementation and national adaptation of this policy, which involves the use of new tools and application of skills in national malaria control programs and public health systems. NGOs' extensive experience in working with communities for health and development, combined with their expertise in linking the community with health facilities to assure household-to-hospital continuum of care, can help make the *home as the first hospital* approach succeed.

WHO⁶ recommends that organizations that plan to implement a malaria intervention should consider including some or all of the following activitiesⁱⁱ:

1. *Improve malaria disease recognition and case management.* Case management is defined as parasitological diagnosis, counseling, and treatment. It includes home-based management of fever, community case management (CCM) in appropriate contexts, assurance of household-to-hospital continuum of care, and reduction of anemia.
2. *Prevent and treat malaria in pregnant women* through antenatal services, including using IPTp and promoting and distributing LLINs.
3. *Reduce malaria transmission*, especially among young children and pregnant women, by distributing LLINs, promoting community-wide use of ITNs, and using artemisinin-based combination therapy (ACT) treatment.
4. *Promote IRS* where it takes placeⁱⁱⁱ.

Key Global Malaria Overview Resources

World Malaria Report 2012 [Fact Sheet](#)

[World Malaria Report 2012](#)

Roll Back Malaria, 2008, [Global Malaria Action Plan for a Malaria-free World](#)

[Malaria Atlas Project](#)

[Malaria Consortium](#)

Roll Back Malaria, [Toolbox](#)

ⁱⁱThere may be an opportunity to contribute to seasonal malaria chemoprevention (SMC) activities if working in the Sahel. See [WHO's policy statement](#)

ⁱⁱⁱ A recent Cochrane Review found that where a sufficient proportion of habitats can be targeted, larval site management can reduce the number of malaria cases and the proportion of people infected with the parasite: Trusting, L., et al. (2013). "Mosquito larval source management for controlling malaria." Cochrane Review DOI: [10.1002/14651858.CD008923.pub2](https://doi.org/10.1002/14651858.CD008923.pub2)

PROGRAM DESIGN

GETTING STARTED: ASSESSMENT AND SITUATION ANALYSIS

Before NGOs engage in malaria interventions, they should gather baseline and background (epidemiological and entomological) information on the malaria situation in their program area. This information is available in countries' health information systems at relevant levels, such as district; in large surveys, such as Demographic Health Surveys, Malaria Indicator Surveys, Multiple Indicator Cluster Surveys, or in a Pubmed search. NGOs also need to review national policies and strategies, assess these guidelines for availability at peripheral levels, and determine if they are implemented by health workers by assessing the availability and quality of care from public and private sectors, community volunteers, and the nonformal health sector. NGOs also need to assess community and household practices (preventive, care seeking, and treatment), assess availability of antimalarial products and drugs and their logistics, and explore local partners, including the local Ministry of Health (MOH) representatives, and opportunities for collaboration.

Information gathered and analyzed will help program teams and their stakeholders identify which interventions and their locations will have the greatest impact. Baseline information also should feed into the project's monitoring and evaluation plan. To have an impact, interventions may need to be staged across several key areas. NGOs can use the assessment information collected and evaluate program decisions on the basis of the following information:

- The presence of other partners that are working in the program area and areas of potential collaboration to avoid duplication of efforts;
- An inventory of the organization's and partner's comparative advantages, existing relationships, and strengths;
- Existing community and health-related services and structures in place; and
- Resources that are available for program implementation.

IMPLEMENTATION

MALARIA CASE MANAGEMENT

The past decade has seen the accomplishment of unprecedented progress in malaria control efforts in most Sub Saharan African countries. As countries have scaled-up interventions like ITNs, IRS, improved diagnostic tests, and highly effective antimalarial drugs, mortality in children under age 5 has fallen dramatically. It is now clear that the cumulative efforts and funding by national governments the President’s Malaria Initiative, The Global Fund to Fight AIDS, Tuberculosis, and Malaria, the World Bank, and many other donors are working: **the risk of dying from malaria is declining**. According to the World Health Organization’s 2012 World Malaria Report, the estimated annual number of global malaria deaths has fallen by more than one-third, from about 985,000 in 2000 to about 660,000 in 2010.⁷

Diagnosis

For decades, most cases of malaria in Sub Saharan Africa were diagnosed through clinical signs and symptoms, and the presence of fever was considered an essential symptom for malaria. This approach resulted from a combination of circumstances: a high percentage of people with fever had malaria; first-line treatments for malaria, such as chloroquine and sulfadoxine-pyrimethamine (SP), were low-cost and safe; and diagnostic testing, particularly microscopy, was not widely available and often of poor quality.

Now, with the introduction of more costly ACTs for treatment of malaria and growing evidence of a declining malaria burden in many parts of Sub Saharan Africa, a larger role for diagnostic testing is warranted. The 2010 revised WHO treatment guidelines⁸ now call for all patients with suspected uncomplicated malaria to undergo quality-assured diagnostic testing with either microscopy or rapid diagnostic tests (RDT), with subsequent treatment decisions based on test results. The older method of diagnosis based on clinical signs and symptoms alone should be used only when parasitological confirmation is unavailable.

The development of relatively low-cost RDTs was a major factor in WHO’s shift in policy guidance. Standardized product testing conducted by WHO, the Foundation for Innovative New Diagnostics, and CDC has demonstrated the availability of numerous high-quality RDTs. These tests are relatively easy to use with only a few hours of training. Many countries are now scaling-up RDT use in peripheral health facilities and at the community level.

The use and scale-up of RDTs poses some logistical and technical challenges. Ensuring a continuous supply of RDTs at point-of-care adds additional stress on weak supply chain management systems. The test kits’ performance can be affected adversely by high temperature and humidity, although newer versions of these tests have fewer problems. Some skill is required to collect an appropriate blood sample and conduct the test. Most RDTs are less sensitive for non-*falciparum* malaria species and are not designed to determine the density of parasitemia, which is required for monitoring the response to treatment for severe malaria. As with microscopy, testing produces biohazardous waste that must be disposed properly.

Despite these challenges, a priority needs to be scaling-up diagnostic testing with both microscopy and RDTs. The goal is to test everyone with suspected malaria, and then treat only

people with a positive malaria test. This requires that quality-assured diagnostic testing for malaria is available at all levels of the health care system.

Treatment

WHO guidance recommends categorizing patients with parasitologically-confirmed malaria (or clinically suspected malaria, if diagnostic testing is unavailable). The categories, used for prescribing treatment, are (1) *uncomplicated* and (2) *severe* disease.

Uncomplicated malaria is defined as symptomatic malaria without signs of severity or evidence of vital organ dysfunction. For uncomplicated malaria, WHO recommends ACTs as the treatment of choice. Artemisinin, the most rapidly acting of all antimalarial drugs, partner an artemisinin drug (e.g., artesunate, artemether) with a second antimalarial that has a longer half-life. The combination of two effective antimalarial drugs with different modes of action against the parasite greatly reduces the probability of promoting the development of drug resistance. ACTs have a short shelf life of about 24–36 months, which requires precise estimates of need and a well-functioning supply chain to ensure these drugs are consumed before they expire.

First- and second-line antimalarial drugs are country specific. The recommended first-line ACT should be based on the known therapeutic efficacy in the country where it will be used. Monotherapy, including with artemisinin drugs, is no longer recommended because of the likelihood of promoting the spread and intensification of drug resistance, and monotherapy has been banned by many countries.

Severe malaria is characterized by fever plus one or more of the following symptoms or findings: prostration, impaired consciousness or coma, convulsions, circulatory shock, pulmonary edema, acute respiratory distress syndrome, abnormal bleeding, jaundice, severe anemia, acute renal failure, disseminated intravascular coagulation, acidosis, hemoglobinuria, and parasitemia greater than 5 percent.

Severe malaria is a medical emergency; it should be managed with the immediate initiation of appropriate parenteral (i.e., intravenous or intramuscular) treatment. In 2011, WHO modified 219 treatment guidelines for severe malaria, based on evidence from a large, multicenter, randomized trial, to recommend parenteral artesunate as the first-line treatment in children and adults, with parenteral quinine or parenteral artemether as alternatives. Management of patients with severe malaria also includes ancillary treatments to deal with complications, which could include intravenous hydration, transfusion, and glucose supplementation.

WHO issued guidance on management of severe malaria.⁹ Currently, only one WHO-prequalified injectable artesunate preparation is available, and it is significantly more costly than injectable quinine; therefore, treatment decisions must be planned carefully, considering when and how to procure and implement injectable artesunate, how the transition from quinine to artesunate will be rolled out, and the respective use of these two severe disease treatments.

Management of severe malaria at peripheral facilities and the community level, where facilities are not equipped to manage severe malaria cases, should focus on rapid referral to an appropriate health facility and pre-referral treatment. Rectal artesunate is the preferred pre-referral treatment for patients with severe febrile illness, accompanied with an injectable antibiotic when feasible.

Providing peripheral health workers with rectal artesunate may have little effect if systems are not in place to ensure rapid referral to a facility where definitive care can be provided.

Key Malaria Diagnostic and Treatment Resources

WHO, 2009, [Malaria Microscopy Quality Assurance Manual—version 1, 2009](#)

WHO, 2011, [Guide for good practices for selecting and procuring rapid diagnostic tests for malaria](#)

WHO, 2010, [Guidelines for the treatment of malaria, second edition, 2010](#)

WHO Malaria Rapid Diagnostic Tests, [Information on RDTs](#)

WHO, 2011, Universal access to malaria diagnostic testing—An operational manual

Malaria Rapid Diagnostic Test Performance Results of WHO product testing of malaria RDTs [Round 4 \(2010-2012\)](#)

WHO Global Malaria Information Programme, 2012, [Information note on recommended selection criteria for procurement of malaria rapid diagnostic tests \(RDTs\)](#)

Community and Household

Because access to adequate diagnosis and treatment can be difficult in much of rural Sub Saharan Africa, countries are encouraged to develop policies and support scaling-up programs that include diagnosis with RDTs and treatment of malaria. Several studies have demonstrated that malaria diagnosis and treatment can be provided to children younger than 5 years through community-based agents, such as CHWs. WHO and UNICEF now recommend that countries implement integrated community case management (iCCM) of sick children younger than 5 years as an essential method to improve access to malaria diagnosis and treatment.¹⁰

The iCCM approach provides diagnosis and treatment of pneumonia, diarrhea, and malaria through community volunteers or health extension workers and includes using RDTs and standard algorithms. The approach also provides a platform to facilitate referral of severe malaria, including use of pre-referral rectal artesunate. Because access to adequate diagnosis and treatment may be difficult in many rural areas of Sub Saharan Africa, countries are encouraged to develop policies and support scaling-up of iCCM programs that include diagnosis (with RDTs) and treatment of malaria.

In line with the Community - Integrated Management of Childhood Illnesses (C-IMCI) framework¹¹, NGOs that provide support in malaria endemic areas can play a key role in improving home and community care and assuring household-to-hospital continuum of care, thus reducing morbidity and mortality from malaria.

Caregivers can help avoid deaths and assure adequate treatment of malaria by recognizing early symptoms of malaria and knowing the danger signs of the disease, such as an inability to drink or breastfeed, lethargy or change in consciousness, convulsions, vomiting everything, high fever, fast or difficult breathing, and severe anemia, and then seek urgent care from an appropriate provider. Other home management actions caregivers can encourage are taking the full course of appropriate antimalarial drugs (dosage and duration), continued feeding and increased fluids intake, and continued fluids and feeding immediately after illness.

Several potential strategies can improve malaria home care: (1) leading behavior change interventions that help mothers and caregivers recognize early signs of malaria and know the appropriate care to seek, (2) providing increased access to first-line antimalarial drugs in facilities and communities; (3) promoting cooperation among existing community-based providers for training, supportive supervision, and assuring a steady supply of quality drugs; (4) working with the drug industry and large distributors to improve packaging and instructions; (5) working with national programs and regulatory authorities to support local interventions; and (6) working with the private sector.

Key Case Management Resources

WHO, 2009, [Malaria case management operations manual](#)
WHO, 2010, Guidelines for the treatment of malaria, second edition, 2010. [Revisions, 2011](#)
WHO, 2010, [Good procurement practices for artemisinin-based antimalarial medicines](#)
WHO-UNICEF, [WHO/UNICEF joint statement on integrated community case management \(iCCM\) CCM Central](#)
WHO, 2011, [Global plan for artemisinin resistance containment \(GPARC\)](#)
WHO, 2010, [Global report on antimalarial efficacy and drug resistance: 2000–2010](#)

Integrated Community Case Management

The strategy for iCCM is to train, supply, and supervise community health workers to treat children for diarrhea, pneumonia, and malaria in malaria-affected countries by using oral rehydration solution and zinc, oral antibiotics, and ACT respectively. Use of RDTs makes it possible to diagnose and treat at the community level. In some countries, iCCM also provides an opportunity to assess children for acute malnutrition by measuring their mid-upper arm circumference, and some countries have integrated this measurement into their iCCM strategy. WHO and UNICEF issued a joint statement in support of iCCM, shown in the text box.

Supportive Supervision of CHWs

Regular and frequent supportive supervision should be built into a successful CHW program from the start. Supervision is essential to ensure delivery of quality services by reinforcing training, motivating volunteers with constructive feedback and continued learning, and collecting routine monitoring data.

The supervision process needs to include various activities, depending on factors such as size of the

program catchment area, distance to CHW homes and accessibility, seasonal influences, and CHW and supervisor workloads. Supervision can include the following activities:

- *Consultation observations.* Supervisors directly observe CHWs as they perform case management of sick child in their workplace. As an alternative, supervisors can accompany CHWs on home visits to do the observations.
- *Simulated consultations.* Supervisors can conduct structured mock consultations when no patients are available or when supervisors cannot accompany CHWs on home visits.
- *Medication management.* Supervisors review CHW medicine registers, observe locations and maintenance of medications, and address stock issues.
- *Record review.* Supervisors check CHW registers for completeness and accuracy.
- *Follow-up interviews with families of sick children.* Supervisors interview caregivers about information, treatments, and counseling received from the CHW.
- *CHW meetings.* Supervisors convene meetings with all CHWs or subgroups at a central location to provide feedback, collect reporting forms, and provide refresher training. CHWs can ask questions, raise issues, and seek support and assistance.

Supervisors also need to develop appropriate tools, such as supervision checklists, and use them consistently.

Key Community-based Management and CCM Resources

WHO/UNICEF [Joint Statement on CCM](#)

[CCM Central](#) is a centralized place to find tools, best practices, discussion fora, and other resources for integrated community case management (iCCM)

CORE Group, Save the Children, BASICS, and MCHIP, 2nd Edition, 2012, [Community Case Management Essentials, Treating Common Childhood Illnesses in the community](#)

CORE Group, 2009, Community-based Integrated Management of Childhood Illnesses (C-IMCI) [Program Guidance](#)

CORE Group, 2003, [The Household and Community Integrated Management of Childhood Illness Facilitator's Guide](#)

[CHW Central](#) is an online resource for information and dialogue about community health workers

Health Facility

Caregivers' recognition of illness and appropriate care seeking or treatment of children within the community is the vital first step in reducing morbidity and mortality due to malaria. It is however as important to assure household-to-hospital continuum of care and it is the responsibility of the health worker to ensure that those children who reach the health facility are given the best possible treatment. This means that children with uncomplicated (mild to moderate) malaria must be given prompt treatment with an effective antimalarial drug, and children with clinical features of severe malaria, who have an increased risk of dying, must be identified rapidly, treated immediately, and referred to an appropriate health facility where maximal clinical care is possible.

The clinical presentation of malaria may be nonspecific, hence the need for parasitological testing. In addition, patients often have more than one underlying disease, and where possible, children are best treated within an IMCI framework. The malaria section of the IMCI algorithm^{iv} for use at the primary care level includes assessment, classification, treatment, referral of severely ill children, recognition of treatment failure, use of second-line antimalarials, and counseling. Counseling focuses on compliance with instructions on antimalarial and antipyretic drugs, recognition of danger signs at home, and use of other home care strategies, such as continued feeding and increased fluids intake.

Included in malaria treatment is the recognition and management of anemia.^v Management includes iron supplementation, deworming, and counseling of caregivers on nutrition and prevention of anemia. Iron supplementation (3–4 mg elemental iron/kg/day for 14 days) should be given to all children with Hb < 9 g/dl (Hct < 27%). CHWs also should discuss with mothers the advantages of acquiring or purchasing an ITN, which can reduce the incidence of malaria episodes and all-cause mortality in children younger than 5 years.

Children with malaria who fail to receive prompt and appropriate treatment may deteriorate and develop severe malaria over a few days. Mothers and health workers should be aware of the clinical features or danger signs of severe malaria that include multiple convulsions, prostration, coma, respiratory distress, and shock. Less common, but to be recognized by health workers, are symptoms of hemoglobinuria and abnormal bleeding tendency. These symptoms of severe malaria can be detected without the need for laboratory investigations.

When higher level health facilities are unavailable for referrals, another possibility is to train first-level health workers to manage more complicated cases at the primary level. Health workers must learn that the foremost importance is to recognize severely ill children and identify them for priority treatment. Rapid treatment saves lives. It is imperative that a child with any of these danger signs receives immediate attention. Rapid recognition, identification, and treatment can be a challenge when staff is poorly trained or overburdened. Even health workers with a limited clinical experience should know that if a child is convulsing, is prostrated, or has respiratory distress, the patient must be taken to the top of the queue for immediate assessment and treatment.

ACT is used to treat uncomplicated malaria. For severe malaria, immediate treatment includes parenteral artesunate, artemether, or quinine; treatment of hypoglycemia; and restoration of normal circulating volume. The mortality of children with respiratory distress and severe anemia

^{iv} Algorithms may be out of date in project areas. Review these first and discuss updating them with health authorities to avoid giving mixed messages.

^v Malaria treatment in children is complicated by pre-existing anemia. (a) Iron deficiency anemia depresses the allosteric effect of 2,3-bisphosphoglycerate molecules, synthesized in the red blood cell, on the oxygen-carrying capacity of hemoglobin in children. This means less oxygen is delivered to respiring tissues and cells causing poor utilization of nutrients. (b) Iron deficiency anemia in children, assessed as %PCV of <39% or Hb conc. of <13g/dl, is an indication of the presence of protein-calorie malnutrition and secondary immunodeficiency state, when the immune system is compromised ahead of malaria infection in children. (c) During malaria parasite-host interactions, an additional anemia-of-infection burden is imposed on the host as iron trapped in hemozoin, a malaria toxin, and deposited in monocytes is unavailable to the bone marrow for erythropoiesis.

is extremely high, and these children should be transfused rapidly. Rapid blood transfusion, is well tolerated, and leads to rapid clinical improvement in most cases. It is important that blood for transfusions is screened first for HIV and hepatitis viruses. In many cases, concurrent bacteremia is found in children with severe malaria; it is associated with a three-fold increase in mortality. It is also advisable to start parenteral antibiotics in children who remain severely ill following initial resuscitation.

Key Facility-Focused Resources and Resources for Severe Malaria

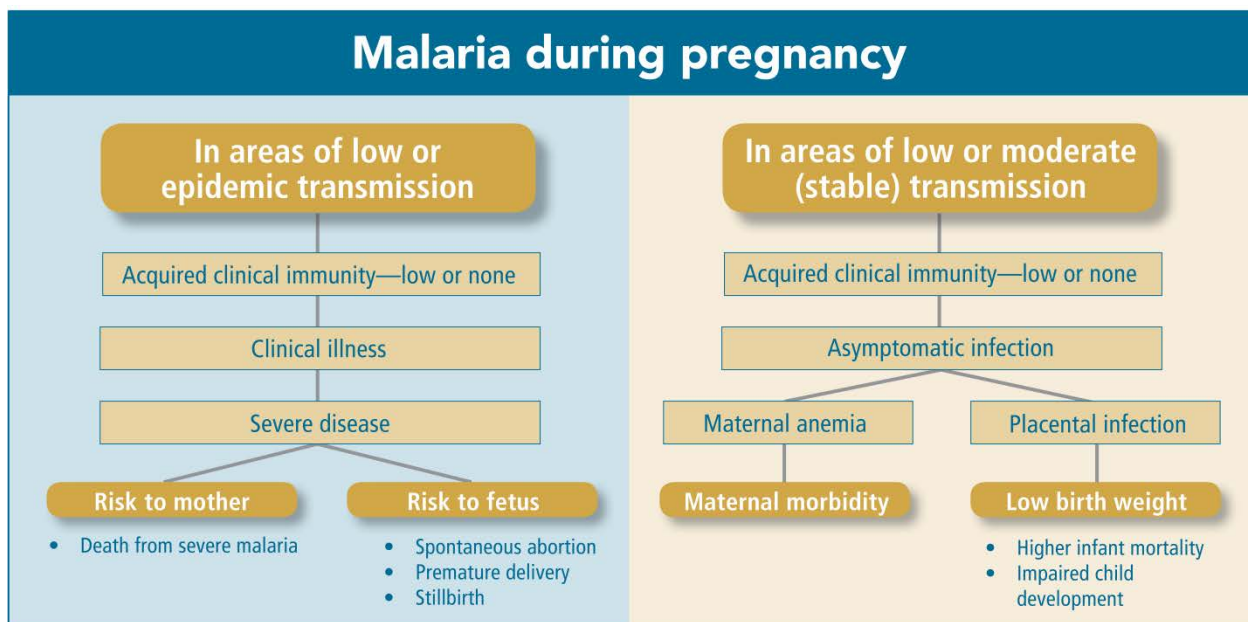
WHO and UNICEF, 2005, [Model IMCI Handbook: Integrated Management of Childhood Illness](#)

WHO/RBM, 2000, [Management of Severe Malaria: A Practical Handbook](#)

WHO, 2010, [Guidelines for the treatment of malaria, second edition](#)

PREVENTION AND TREATMENT OF MALARIA IN PREGNANT WOMEN

Each year, approximately 25 million African women become pregnant in malaria-endemic areas; these women are at risk for *Plasmodium falciparum* malaria infection during pregnancy. Most of these women reside in areas of relatively stable malaria transmission, where the level of immunity to malaria increases as they age. A pregnant woman's immunity, however, decreases and women who are pregnant for the first time are at highest risk. Pregnant women with malaria, in stable transmission settings, are also more likely to be asymptomatic. The principal impact of malaria infection during pregnancy is associated with maternal anemia and the presence of parasites in the placenta. This results in impairment of fetal nutrition and contributes to low birth weight (LBW), a leading cause of poor infant survival and development in Africa.



Simple interventions for pregnant women can reduce the burden and consequences of MiP. WHO supports a three-prong approach to prevent and control MiP in areas with stable malaria transmission:

1. Uptake of IPTp, with an appropriate antimalarial drug
2. Use of ITNs
3. Prompt diagnosis and case management of malaria illness

Recognizing that malaria in pregnancy is both a maternal and a newborn health issue, developing and strengthening the capacity of communities and health facilities to prevent and control malaria during pregnancy using the three prong approach is a high priority for the Africa region, where stable malaria transmission is prevalent.

In areas of *low malaria transmission* the focus is on:

1. Use of ITNs
2. Prompt diagnosis and case management of malaria illness

Intermittent Preventive Treatment in Pregnancy

WHO recommends IPTp with sulfadoxine-pyrimethamine (IPTp-SP). In September 2012, the WHO Malaria Policy Advisory Committee reviewed the most recent evidence on efficacy and effectiveness of IPTp-SP and issued new policy recommendations that promote the increased uptake of IPTp-SP in all areas of Africa with moderate-to-high transmission of *Plasmodium falciparum* malaria.¹⁵ WHO's recent policy update confirms the critical importance of scaling-up IPTp-SP as part of routine antenatal care (ANC) services and outlines the following recommendations for administration:

- SP should be given at each scheduled ANC visit, with the first dose of SP being administered as early as possible in the second trimester, or after the first fetal movements are felt, known as quickening.
- Each dose of SP should be given at least a month apart.
- The last dose of SP can be administered up to the time of delivery, without safety concerns.
- SP ideally should be administered under directly observed therapy to be certain the patient swallows the medication. SP can be taken with or without food.
- IPTp should be administered at a dosage of three tablets of sulfadoxine-pyrimethamine, with each tablet containing 500mg/25mg SP, for a total required dosage of 1,500mg/75mg SP.
- WHO recommends the administration of folic acid at a dosage of 0.4mg daily, which is safe for use with SP. Folic acid at a daily dosage equal to or more than 5mg should not be administered with SP because the folic acid counteracts the efficacy of the SP antimalarial drug.^{vi} Pregnant women should take folic acid throughout pregnancy^{vii15}
- SP should not be administered to women who are receiving co-trimoxazole prophylaxis because it creates a higher risk of adverse events. Good communication and sharing of records between health workers who provide HIV and ANC services is required to avoid that risk.

Despite the spread of SP resistance and reduction of malaria transmission in some areas of Sub Saharan Africa, IPTp-SP continues to remain effective in preventing adverse consequences of malaria in maternal and newborn outcomes. Scientific evidence that supports these new recommendations, as well as information to assist in-country policymakers and health care providers with policy implementation, is summarized in WHO's Policy Brief on Intermittent Preventive Treatment of Malaria in Pregnancy using Sulfadoxine-Pyrimethamine.¹⁶

Social and behavior change strategies can be used to improve early attendance and multiple visits at ANC. The strategies also can be used to help mothers understand the need to attend ANC, receive IPTp, and sleep under an ITN every night.¹⁷

^{vi} WHO (2012) recommends daily iron and folic acid supplementation in pregnant women at the dose of 30–60 mg of elemental iron and 0.4 mg of folic acid to reduce the risk of low birth weight infants, maternal anemia, and iron deficiency at term.

^{vii} See USAID's [Nutrition TRM](#) for further guidance on nutrition during pregnancy

WHO currently does not recommend IPTp for pregnant women who live in low-transmission or unstable malaria settings. In these settings, women are unlikely to have asymptomatic infections of malaria; that is, they usually present with symptoms or possibly serious malaria. In these places, improved case management, use of ITNs, and rapid treatment-seeking for fever during pregnancy likely are the best advice for the present.

Use of Insecticide-treated Nets

The second component of WHO's prevention approach, the use of ITNs, benefits pregnant women and their families. In areas of stable transmission, ITNs reduce the risk of malaria, which in turn produces significant protection against maternal anemia and LBW. ITNs use also benefits infants who sleep under nets with their mothers because it decreases their exposure to malaria infection, which reduces the incidence of anemia and the risk of death, while enhancing development.

Priority needs to be placed on developing ANC-based programs that support both IPTp and the use of ITNs, along with other essential elements of ANC. In areas with poor access to ANC or low ANC attendance, it is important to develop the community-based universal distribution of ITNs, targeting women of reproductive age and pregnant women through women's groups and CHWs, including traditional birth attendants. ITN distribution and the development of effective community-based infrastructures to achieve high levels of ITN use can be a major challenge. Locally defined and applied strategies that engage both communities and facilities in the promotion and ownership of health care will be most successful.

Because of their biological vulnerability, pregnant women should receive free or subsidized ITNs. For example, a voucher approach, linked with the commercial distribution or through health clinics and CHWs, could partially or fully cover the price of the ITN, depending on the national policy and local context.

Social and behavior change activities should accompany ITN distribution to ensure that pregnant women understand the need to sleep under a mosquito net every night throughout the year and know how to use and care for nets properly. Messages to women about the care and use of ITNs should be incorporated in ANC and sick and well-child visits.

Prompt Diagnosis and Malaria Case Management During Pregnancy

Malaria case management is another essential component of malaria control during pregnancy. Pregnant women with symptomatic malaria are at higher risk of fetal loss, premature delivery, and death, and they need urgent treatment. The goal in treatment of malaria during pregnancy is to cure the infection completely; any level of parasitemia has consequences for mother and fetus.

All countries where malaria is transmitted need policies to guide effective diagnosis and case management for the disease in pregnant women. These guidelines need to address the unique clinical features of malaria infection in pregnant women and provide specific indications, contraindications, and potential complications associated with antimalarial drugs during pregnancy.

Pregnant women with symptomatic acute malaria are a high-risk group, and they must receive prompt, accurate diagnosis before beginning effective antimalarial treatment. The records on these women need to note accurately that they are pregnant women, rather than categorize them merely as adults. This information will help track the incidence of malaria in pregnancy and how pregnant women are accessing and receiving services. Current WHO Guidelines for the Treatment of Malaria¹⁸ recommend that pregnant women in the first trimester with uncomplicated *P. falciparum* malaria be treated with quinine plus clindamycin for 7 days (quinine monotherapy if clindamycin is not available). Artesunate plus clindamycin for 7 days is indicated if this treatment fails. ACTs are recommended to treat uncomplicated *falciparum* malaria in the second and third trimesters of pregnancy. As an alternate, artesunate plus clindamycin, or quinine plus clindamycin, can be given for 7 days during this period. For pregnant women with severe malaria, parenteral antimalarial drugs should be administered in full doses without delay. Parenteral artesunate is preferred over quinine in the second and third trimesters¹⁹. Prompt and effective case management reduces adverse outcomes for the mother and newborn. This must be clearly articulated in all national policies and guidelines and accurately recorded at facility-level.

During the past decade, there has been increased recognition of the burden of malaria-associated anemia for pregnant women (with a risk of death) and LBW for the fetus. Anemia does not need to be symptomatic to pose appreciable risk during pregnancy. Case management guidelines should provide advice on appropriate screening and therapy for maternal anemia in malaria-endemic areas.²⁰ *P. falciparum* parasites may be present in the placenta and contribute to maternal anemia, even in the absence of documented peripheral parasitemia. In a malaria-endemic area, pregnant women with severe anemia must be treated presumptively with an effective antimalarial, whether peripheral parasitemia is verified or there is a history of fever.

Community and Household

In all malaria endemic areas (high and low transmission), communities and particularly women need to be educated on the increased risk of MiP and the consequences of the disease to the mother and child. In most stable malaria transmission settings in Africa, more than 70 percent of pregnant women attend ANC at least once during their pregnancy, which makes ANC an optimal platform to deliver MiP prevention. All too often, women come late in their pregnancy, which reduces their uptake of IPTp and the likelihood of receiving an ITN early in pregnancy. Communities and facilities can work together to encourage pregnant women to use ITNs and access ANC early in their pregnancies.

In areas of *high malaria transmission*:

- Encourage all pregnant women to seek antenatal care during pregnancy and take IPTp as early as possible in the second trimester.
- Distribute ITNs or LLINs to pregnant women early in the pregnancy and encourage them to continue to use them throughout pregnancy and during the postpartum period.
- Assure prompt, effective case-management for pregnant women who show malaria symptoms.

In areas of *low malaria transmission*:

- Distribute ITNs, preferably LLINs, to pregnant women early in the pregnancy and encourage them to continue to use them throughout pregnancy and during the postpartum period.
- Assure prompt, effective case-management for pregnant women who show malaria symptoms.

In some malaria-endemic areas, ANC programs may not be well developed, and attendance may be low. To accelerate the delivery of services to pregnant women, NGOs and community-based health providers can deliver some components of the proposed malaria control package; however, it is important to link these community-based initiatives (including training, supervision, and supply/logistics support) as much as possible with the public health system to ensure a collective response that leads to the delivery of comprehensive services for pregnant women and their families. Traditional birth attendants may be effective at promoting the use of ANC services and ITNs. Organizations that provide support programs are encouraged to explore innovative opportunities in the community for program delivery to extend ANC-based programs and serve women where clinic-based programming is underdeveloped.²¹ In the community, important resources for women are the woman's partner and family, such as her mother and mother-in-law. In addition, other local groups influence healthy choices. These resources should be fully tapped to take advantage of the range of opportunities to develop effective, sustainable approaches to prevent and control MiP and other diseases that pose risks for pregnant women and unborn children.

Health Facility

In all malaria-endemic areas (high and low transmission), it is important to ensure the availability of a comprehensive package of ANC services, which should include access to early diagnosis and quality case management of malaria; access to micronutrient supplementation to prevent anemia (iron and folate tablets administered to all pregnant women); access to early diagnosis and effective treatment for anemia; education on the increased risk of MiP; tetanus toxoid immunization; screenings for hypertension, HIV, and syphilis; and other important activities outlined in the Focused Antenatal Care (FANC) protocol in that country. The logistics for using directly observed therapy during administration of IPTp also should be in place, which means providing clean cups and drinking water, so that the health care provider can observe pregnant women as they take the IPTp.

The underpinning of MiP program implementation is a partnership between national reproductive health programs and national malaria control programs. Reproductive health programs, which support all maternal and newborn health efforts, play a vital role in MiP program implementation. Malaria programs play a vital role in providing technical oversight throughout implementation. Health care workers, particularly in entry-level facilities, should be trained to recognize and manage febrile illness and suspected malaria. Collaboration with staff responsible for integrated management of pregnancy and childbirth (IMPAC) and those responsible for IMCI can be effective in developing systematic management protocols and drug supply logistics. These treatment protocols need to incorporate knowledge of the patterns of drug resistance among children and adults.

Health System

WHO's [Making Pregnancy Safer](#) (MPS) initiative works with the health sector, focusing on effective evidence-based interventions that target the major causes of maternal and newborn morbidity and mortality. The target is the reduction of maternal and infant morbidity and mortality. Interventions should seek to strengthen local health systems and identify actions at the community level that ensure that women and their newborns have access to and utilize the care they need, when they need it. Particular importance is placed on skilled attendance during childbirth and providing an appropriate, effective continuum of antenatal and perinatal care.

Countries that develop policies on malaria control during pregnancy and actively participate in RBM and MPS receive assistance in accelerating program development. This early phase of programming partnership will involve partners that have a commitment to maternal and child health, such as UNFPA, World Bank, UNICEF, USAID, and DFID, to build on the unique program infrastructure and partnerships in place in individual countries and communities. PVOs and NGOs can help assure that households and communities are included in the definition of the health system and that programs, such as IPTp under supervision of a community provider, is considered during policy debates.

Key Malaria in Pregnancy (MIP) Resources

MCHIP, 2008. [Prevention and Control of Malaria in Pregnancy in The Africa Region: A Program Implementation Guide](#)

[RBM MIP Working Group](#)

WHO, 2012, [WHO Policy Recommendation for IPTp-SP](#)

WHO, 2010, [Guidelines for the treatment of malaria, second edition](#)

WHO/AFRO, 2004, [A Strategic Framework for Malaria Prevention and Control during Pregnancy in the Africa Region](#)

WHO, 2014, [Policy Brief on IPTp](#) **Other resources coming soon:**

RBM MIP Working Group MIP Consensus Statement

INSECTICIDE-TREATED NETS

The effectiveness of ITNs is well documented. The emergence of insecticide resistant *anopholine* mosquitoes poses a serious threat to malaria control and underscores the importance of ITNs as a physical barrier to malaria transmission. ITNs reduce the incidence of malaria episodes by half, and in malaria-endemic areas, the widespread use of ITNs can be expected to reduce all-cause child mortality by about a fifth.²² Recent data on the use of ITNs by pregnant women indicate a significant impact on maternal anemia, preterm delivery, and LBW.

ITNs reduce human-vector contact by acting as a barrier between humans and mosquitos or by repelling mosquitoes, driving them away from sleepers and preventing vector mosquitoes from biting. ITNs also kill or shorten the lifespan of mosquitoes that land on them. High levels of ITN coverage (80 to 85 percent of adults and children in a community) provide protection to individuals that sleep under ITNs and other community members.^{viii} Because of the documented effectiveness in reducing malaria-related illness and death, public and private outlets should promote ITNs throughout malaria-endemic African countries. Distribution through ANC and Expanded Program for Immunization (EPI) clinics was the most common approach used to reach the most vulnerable population of children under 5 years and pregnant women in early ITN programs.

For example, in 2003 a large scale ITN distribution was linked to a measles vaccination campaign and was found to be relatively inexpensive and highly effective, quickly achieving high coverage in the target groups²³. Strong evidence showed that universal coverage of all individuals not only reduced overall malaria, but provided greater protection to vulnerable groups. These results provided impetus for mass universal ITN campaigns, which are the most effective means of quickly achieving high coverage.

The WHO/Global Malaria Programme's (GMP) statement in 2008 gave recognition to the superiority of LLINs and the need for universal coverage:

“The WHO/GMP calls upon national malaria control programs and their partners involved in insecticide-treated net interventions to purchase only long-lasting insecticidal nets (LLINs). LLINs are designed to maintain their biological efficacy against vector mosquitoes for at least three years in the

^{viii} Threshold coverage where ITNs provide a mass effect depends on context. PMI, RBM and MDGs have targets of 80 – 85% for programmatic reasons. A modeling study indicates that the threshold effect may be lower in certain ecological situations. See Killeen GF, Smith TA, Ferguson HM, et al. [Preventing childhood malaria in Africa by protecting adults from mosquitoes with insecticide-treated net](#). *PLoS Medicine* (2007)

field under recommended conditions of use, obviating the need for regular insecticide treatment. In order for their full potential to be realized, LLINs should be deployed as a vector control intervention. WHO/GMP, therefore, recommends full coverage of all people at risk of malaria in areas targeted for malaria prevention with LLINs.” (p.1)²⁴

The statement also made this stipulation:

“The way in which full coverage should be achieved may vary with particular epidemiological and operational situations. Where young children and pregnant women are the most vulnerable groups, their protection is the immediate priority while progress is made towards achieving full coverage. In areas of low transmission, where all age-groups are vulnerable, national programs should establish priorities on the basis of the geographical distribution of the malaria burden” (p. 1)²⁴

The statement continued:

“In most high-burden countries, ITN coverage is still below agreed targets. The best opportunity for rapidly scaling-up malaria prevention is the free or highly subsidized distribution of LLINs through existing public health services (both routine and campaigns). LLINs should be considered a public good for populations living in malaria-endemic areas. Distribution of LLINs should be systematically accompanied by provision of information on how to hang, use and maintain them properly” (p. 1)²⁴.

Between the Global Fund for AIDS, Tuberculosis, and Malaria and PMI, a massive scale-up to deploy LLINs has taken place over the past few years. National Malaria Control Programs (NMCPs) in many countries also have adopted policies of universal coverage for ITNs, most often defined as one net per two people in a household. Mass campaigns in Sub Saharan Africa have been highly successful, for the most part, in bringing down malaria prevalence; however, the issue of net replacement now looms large. Coverage may drop rapidly after mass campaigns. Keeping coverage high between campaigns requires several approaches. In addition to delivery through routine services at ANC and EPI clinics, other possible channels include subsidized sales through clinics, employer-based schemes, and commercial sales. Other potential new channels are under investigation that will provide LLINs continuously. These channels include distribution of nets through community structures and schools, which is being pilot tested now.

There is also the critical issue of appropriate use. Even in countries that have a traditional culture of net use, behavioral changes may be necessary to ensure the nets are hung and used every night. New evidence is emerging that indicates that in many settings in Sub Saharan Africa, access to a net is the most important determinate of use.²⁵

Additional evidence shows that using new indicators can help distinguish between low use in populations due to access in the households (that is, insufficient nets

for all occupants to sleep under an ITN) and low use caused by behavioral issues (that is, enough ITNs are available but not used). New evidence suggests that it is mostly an issue of lack of access to ITNs that is holding down high usage, not behavioral issues in households with nets²⁶. Previous behavioral strategies often included post-distribution door-to-door “Hang up, Keep up” campaigns. Evidence is weak that these campaigns are effective, including some studies that found no significant differences between Hang-Up and control groups. The additional costs and logistics required for Hang-Up campaigns, indicates they should be considered only in areas where strong evidence points to low use resulting from behavioral factors rather than from not having enough nets available.

To be successful, ITN programs must create conditions for sustained public demand for nets, provide access to nets, and instruct on appropriate use of affordable nets. The success of reducing malaria morbidity and mortality depends on a reliable logistics system to deliver ITNs and clear instructions on the proper and consistent use of nets by the most vulnerable members of the household.

Community and Household

At present, public demand for mosquito nets varies, but in general, nets seem to have high acceptability in many communities. To some degree, this success is based on a defense against the nuisance of mosquitoes. Programs can take critical advantage of this nuisance factor and build an intervention on it, without needing to educate the community on malaria transmission. In other cases, re-educating the community on the knowledge that mosquitoes are the sole cause of malaria may be important to increase ITN use. One caution to note is how to convey the idea that not all mosquitos are alike. *Culex* mosquitoes, which do not transmit malaria, but which certainly are a nuisance, can develop resistance to insecticides faster than *Anopheles* mosquitoes. This could lead to the false impression that the nets don’t work anymore, while, in fact, the nets are still providing protection from malaria when used faithfully. Communication strategies must be designed carefully, taking into consideration local conditions and customs based on research to understand what motivates families to acquire and appropriately use an ITN.

ITN promotion activities should be based on comprehensive formative research that takes into consideration behavioral, market, and social environments in the project area. Behavioral change interventions for ITNs focus on two overarching objectives: (1) building a net culture and (2)

promoting repair and replacement behaviors. NGOs must keep these two types of interventions in mind when conducting baseline investigations during program design. Some issues to explore are type of net (current use in the community, latent demand, and barriers to net acquisition and use); household sleeping patterns (where at-risk children sleep, until what age, and with whom, and whether people sleep outdoors during part of the year); net preferences (type, size, color, durability); decision making (how decisions are made on net purchasing and net use for children^{ix}); pricing; preferred sources of purchase; and all factors related to net use.

NGOs need to use clear, consistent key messages that are convincing and persuasive to the target community on the basis of local belief systems. Successful strategies to consider are participatory message development (asking the community how they themselves would communicate key messages) and the use of a creative ad agency combined with pre-testing. These strategies should include messages on how to use ITNs correctly, how to hang ITNs, and how to wash and dry the ITNs, plus other tips for their care. Other information to convey to local communities is peak biting times for *Anopheles* mosquitoes, which may increase better use of nets. Some NGOs train community agents, such as CHWs, to visit homes to help hang nets and review with families how to care for nets.^x

Something else to consider is that sleeping arrangements vary in different areas of one country or intervention area. Children in one household can sleep in different places from one night to the other. These variations open up potential needs and markets for different sizes and colors of nets and innovative methods of net placement and hanging. Methods need to be devised so that when children move from one room to another or from one place in the same room to another the net can be deployed easily in that new area.

To promote the appropriate community-wide use of insecticide-treated materials, programs need to target different categories of users (pregnant women, mothers, and children) and the community at large (families, community leaders, health workers, shopkeepers, traditional healers, and all other influential people) using a range of communication channels, such as media (radio, television, print), community health workers, social groups, and local theater. Harmonized messages reinforce each other and lend credence to all components of the communication campaign. Reaching all community members with these messages assumes even greater importance as universal coverage policies are rolled out.

Facility and Health System

In some areas, mosquito nets are made available at health facilities, health posts, or community pharmacies. Antenatal and EPI clinics are also used as sites for routine distribution and promotion of ITNs to pregnant women. In some countries, however, mosquito nets are still not widely or consistently available and routine distribution programs require specialized logistical management. New continuous channels now being tested, such as school and community-based delivery, will also pose logistic challenges.

^{ix} A key determinant of net use by children <5 is the number of nets in the household.

^x See MCHIP's [Malaria Communities Program ITN case study](#)

The mass distribution of highly subsidized or free LLIN inhibits unsubsidized commercial markets; however, commercial and subsidized distribution systems are more likely to be sustainable over the long term, and some social marketing programs have reached large enough numbers so that they are efficient in costs per net.

Subsidies must be targeted to ensure they have the maximum possible health impact; the need to identify effective mechanisms is urgent. Target groups must be defined clearly. Targeting pregnant women through ANC clinics is a good option because it also extends protection to the newborn child for several years. Also for consideration is the form the subsidy takes. It is important to improve economic access; correct pricing (full-price-subsidized-donated) is a key factor in improving access and creating demand. A number of options are available, such as including creative financing for net production and distribution, including cross-subsidization of costs, and providing incentives for distributors and retailers.

Key ITN Resources

[RBM Vector Control Working Group](#)

Alliance for Malaria Prevention [Toolkit for Mass LLIN Campaigns](#)

USAID, K4Health, 2014 [Continuous Distribution Toolkit](#)

USAID, K-4 Health, 2014, [LLIN Care and Repair Interventions Toolkit](#)

RBM, 2008, [ITN and LLIN and Pesticide Use Toolkit](#)

C-Hub, 2012, [NetMark: A Regional Partnership for Sustainable Malaria Prevention. Document archive](#)

Current listing of approved chemicals and treated netting is available at [WHO Pesticide Evaluation Scheme](#)

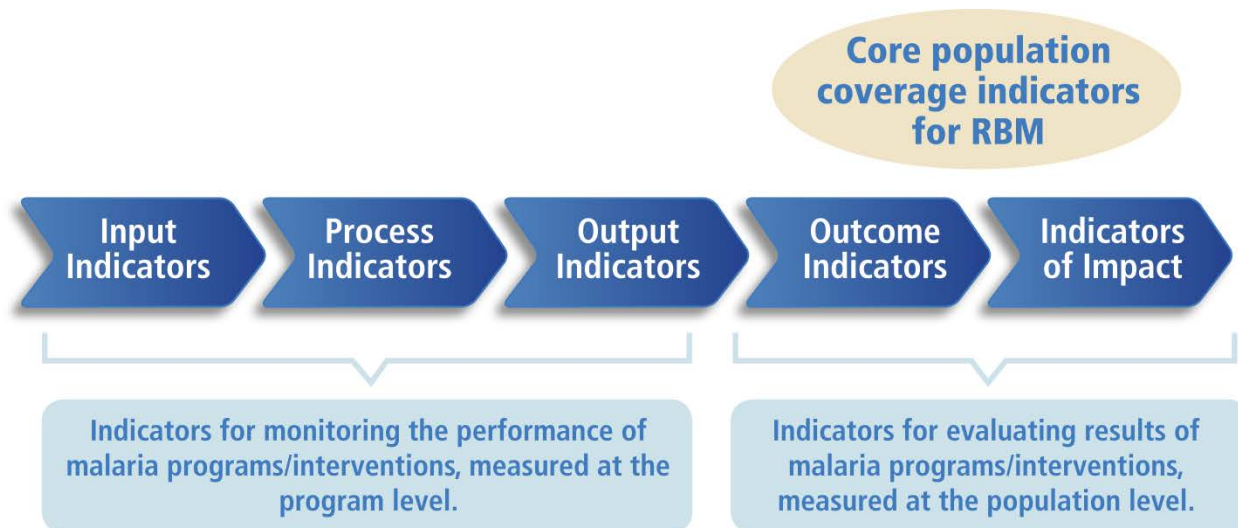
RBM, 2005, [Scaling-up Insecticide-Treated Netting Programmes in Africa: A Strategic Framework for Coordinated National Action](#)

MONITORING AND EVALUATION

Expanding coverage of core malaria interventions requires careful monitoring of program implementation and evaluation of impact. Monitoring and evaluation will help to develop a firm basis to guide investments in malaria prevention and effective antenatal services. Operational research on improved control of malaria, especially MiP, is also required to assist in is also needed to improve program implementation.

Baseline information should feed into the project’s monitoring and evaluation plan²⁷. NGOs should consult the Malaria Knowledge, Practices and Coverage (KPC) survey module, which aligns with the Malaria Indicator Survey (MIS), and the RBM document, “Framework for Monitoring Progress & Evaluating Outcomes and Impact.” NGOs also should consider those guidelines for indicators to monitor the progress of malaria control interventions to ensure uniformity in reporting between projects and countries and to help guide program decision making. In general, NGOs should collect information to monitor their progress against results and collect core outcome indicators to share with the NMCP. Routine data collection can provide important insight and value for program implementation because it helps guide program decisions moving forward. PMI and other partners are working to increase the capacity of NMCPs to monitor and evaluate their programs. NGOs, especially those that receive PMI funding, should assure that their M&E activities feed into national M&E efforts and consider collecting core population coverage indicators.

The following framework is useful to picture a project’s M&E plan.



KEY INDICATORS

The KPC is a small population-based survey available that has been used by NGOs for baseline and final surveys in project areas. Indicators from this tool provide information about achievements in the project areas and can be used to estimate lives saved and provide an estimate of impact. The KPC tool consists of three parts: KPC modules, Rapid CATCH, and key indicators. The key indicators listed in this section are useful to guide program activities and measure

implementation accomplishments. Refer to the knowledge, practice, and coverage module for the questionnaire and tabulation plan for all indicators.

ITN Ownership and Use and IRS Coverage

Scenario 1: Contexts with universal ITN coverage policies or projects with strong emphasis on ITNs:

- Percentage of all households that own at least one ITN

Scenario 2: Contexts with targeted ITN distribution or projects with limited activities on ITN use, but want a basic understanding of coverage in the project area:

- Percentage of households of children ages 0–59 months that own at least one ITN
- Percentage of children ages 0–59 months who slept under an ITN the previous night

Malaria in Pregnancy

IPT during last pregnancy:

- Percentage of mothers of children ages 0–23 months who received IPT for malaria, divided into the following categories:
 - 1 dose
 - 2 doses
 - 3 doses
 - 4+ doses

Maternal Knowledge of Danger Signs

- Percentage of mothers of children ages 0–59 months who know at least two signs of childhood illness that require immediately seeking assessment and treatment by a provider outside the home

Care Seeking

- Percentage of children age 0–59 months with fever in the last 2 weeks for whom advice or treatment was sought from an appropriate provider
- Percentage of children ages 0–59 months with a fever in the last 2 weeks for whom advice or treatment was sought from a CHW
- Percentage of mothers of children ages 0–59 months with fever in the 2 weeks preceding the survey who made the decision to seek treatment from an appropriate provider jointly with their partner
- Percentage of mothers of children ages 0–59 months with fever in the past 2 weeks who sought treatment from a CHW who received a follow-up visit from a CHW

Testing and Treatment

- Percentage of children ages 0–59 months with a fever during the last 2 weeks who had a finger or heel stick
- Percentage of mothers of children age 0–59 months who received the results of the malaria diagnostic test of the children who had had finger or heel stick
- Percentage of children receiving an ACT (or other appropriate treatment for malaria) among children ages 0–59 months with fever in the last 2 weeks

Additional CHW Activities and Caregiver Behaviors

- Percentage of mothers of children ages 0–59 months who state there is a CHW in her community
- Percentage of mothers of children ages 0–59 months who know that CHWs perform “X” activity^{xi}
- Percentage of mothers of children ages 0–59 months who state that there is a CHW in the community and who knows malaria-specific activities performed by CHWs
- Percentage of mothers of children ages 0–59 months who practice the recommended behavior. Examples:
 - Mother took child aged 0–59 months with fever to an appropriate provider the same day that fever began or the next day
 - Mothers had child aged 0–59 months sleep under an ITN the previous night

Additional Indicators for Areas Where RDTs Are Used

- Percentage of fever cases that were tested for malaria before treatment
- Percentage of confirmed malaria cases among children younger than 5 years, who received post-treatment follow-up care in the community
- Percentage of facility or communities with no stockouts of RDTs the last reporting period
- Percentage of children with fever and a positive RDT test who were given ACT
- Percentage of children with fever, a positive RDT test, and given ACT, who had the first dose observed by a health care provider (specify various appropriate providers, including CHW)
- Percentage of children with fever and a positive RDT test who were given ACT by a CHW and had the first dose observed by a CHW (indicator can be constructed from the same questions used for the previous indicator)
- Percentage of children with fever and a negative RDT test who were not treated with ACT (to see if ACT use is reduced for fever that has not been diagnosed as malaria, one aim of RDT testing)

^{xi} Based on program and context. See KPC module for instructions

- Percentage of children with fever and a negative RDT not treated with ACT, but given an alternative treatment (to make sure that when malaria is ruled out for children with fever, the other illness that caused the fever is treated)

Key Malaria M&E Resources

RBM, 2000, [Framework for Monitoring Progress and Evaluation Outcomes and Impact](#)

CORE Group, 2013, [Mortality Assessment for Health Programs \(MAP\) System](#)

RBM, 2009, Third Edition, [M&E Toolkit](#)

RBM, 2009, [The Global Fund Data Quality Audit Tool](#)

RBM, 2013, [Household Survey Indicators](#)

SPECIAL CONSIDERATIONS

INDOOR RESIDUAL SPRAYING

The objective of IRS is to reduce the mean life-span of the female mosquito population below the duration required for malaria parasite life phases that occur in the mosquito (the sporogonic cycle) to develop, and thus, substantially reduce the mosquito population's ability to sustain malaria transmission.

IRS was widely used in Asia, the Americas, and countries with seasonal transmission in the southern part of Africa and Ethiopia during the WHO Malaria Eradication Program (1955-1969). Combined with other measures, IRS led to eradication in Europe, Russia and several Asian and Caribbean countries. Some countries have continued using IRS while some discontinued the practice when WHO ended that program. It wasn't until WHO's position statement on IRS in 2006²⁸ and the inclusion of IRS as one of PMI's main malaria interventions that IRS in sub-Saharan Africa in particular became widely implemented again. IRS uses residual insecticides to which *Anopheles* female mosquitoes' susceptibility has been demonstrated.^{xii} These insecticides are applied to interior walls of houses and other structures. The insecticide remains on treated surfaces where mosquitoes might rest, sometimes before, but usually after, taking a blood meal. Several insecticides formulations are available. The insecticide is effective 3 to 12 months to kill resting mosquitoes, depending on the insecticide, the surface on which it is applied, and local conditions.

In 2006, WHO published a position statement on the use of IRS to scale-up global malaria control and elimination. The statement said IRS can be effective

“in almost all settings as long as certain conditions for implementation are met: (1) in unstable, epidemic-prone malaria transmission areas, IRS will prevent seasonal increases in transmission, will prevent and control epidemics and can be used for the elimination of local transmission of malaria; (2) in stable-endemic malaria areas with moderately intense but seasonal transmission, IRS can prevent seasonal increases in transmission and reduce levels of infection prevalence and highly seasonal morbidity and mortality; and (3) in stable-hyperendemic areas where very intense seasonal or perennial transmission occurs, IRS, with a higher frequency of application than in the above instances, can reduce the level of transmission and reduce levels of infection prevalence, morbidity, and mortality” (p. 3–4).²⁹

IRS typically is implemented by teams of spray operators that treat houses in at-risk areas before the rainy season. Heavy rains prompt increases in the *Anopheles* vector population. The spray operators use compression sprayers to apply measured amounts of insecticide on interior walls of houses and structures. To be effective, IRS must attain coverage rates of at least 85 percent of the houses in a target area. IRS programs in South Africa, Mozambique, Malawi, Ghana, and

^{xii} Entomological monitoring is beyond the scope of this document. Entomological data is used to (1) determine the insecticide resistance profile of malaria vectors in IRS and LLIN areas, (2) help assess the quality of spraying, and (3) monitor the effectiveness of IRS activities through changes in the vector population.

Zambia, as well as Bioko Island in Equatorial Guinea, have substantially reduced the malaria burden in targeted communities.

Before houses are sprayed, communities must be educated about the spraying purpose and their roles and responsibilities during the campaign. IRS requires homeowners to move household goods out of their houses, evacuate sick people, stay out of the house for up to 2 hours after spraying, and sweep out homes after returning to the household. Residents must not wash or replaster walls after the spray application. NGOs can contribute to IRS programs by conducting SBC campaigns that discuss these roles and responsibilities with community members and increase the community's general knowledge about malaria. Because IRS often is used with ITN programs, NGOs have an opportunity at the same time to promote the use of ITNs as additional protection against mosquitoes.

To support pesticide management improvement in IRS programs, USAID and its partners conduct Supplemental Environmental Assessments (SEA) in the countries where they work.

Key Vector Control Resources

RBM, [Vector Control Working Group](#)
PMI, [Pesticide Management](#)
WHO, [Pesticide Evaluation Scheme](#)
WHO, [Integrated Vector Management](#)
WHO, 2013, [IRS Operational Manual](#)

GOING TO SCALE

NMCPs have seen a remarkable increase in funding. As NMCPs move forward in this era of health-sector reform, decentralization, and going to national scale, the role of NGOs and their focus on malaria in health centers, homes, communities, and the marketplace are more important than ever. Renewed emphasis is placed on collaborative relationships between NGOs and NMCPs, plus National Reproductive Health Programs in recognition that MiP is a reproductive health issue in all countries. As described in the beginning of this TRM, the RBM strategy emphasizes collaborative relationships between stakeholders as it is focused through the RBM Country Partnership. NGOs should seek out and organize participation in RBM country partnerships to ensure they benefit from, and make substantial contributions to, the national process of scaling-up malaria control interventions.

Key Global Malaria Partners

[Global Fund for AIDS, Tuberculosis and Malaria \(GFATM\)](#)
[Roll Back Malaria Partnership](#)
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Roll Back Malaria Partnership:

<http://www.rbm.who.int/>

The President's Malaria Initiative:

<http://www.pmi.gov/>

World Bank's "Booster Program":

<http://www.worldbank.org/>