

Final Draft

**Strategic Framework for
Malaria Control During Pregnancy
in the WHO Africa Region**

November 1, 2002

OUTLINE

PREFACE

ABBREVIATIONS

EXECUTIVE SUMMARY

1. INTRODUCTION
2. MALARIA INFECTION DURING PREGNANCY
 - ❖ Effects of malaria by intensity of transmission
 - In areas of stable transmission
 - In areas of unstable transmission
3. DEVELOPING EFFECTIVE CONTROL PROGRAMMES
 - ❖ Learning from history
 - ❖ Programming partnerships for malaria control during pregnancy
 - Making Pregnancy Safer
4. POLICY FOR MALARIA CONTROL DURING PREGNANCY IN AFRICA
 - ❖ Case management of malaria illness during pregnancy
 - ❖ Prevention of malaria during pregnancy
 - Intermittent preventive treatment
 - Insecticide-treated nets
 - ❖ Opportunities for community-based programming
 - ❖ Estimated cost-effectiveness of malaria prevention during pregnancy
5. PROGRAMME IMPLEMENTATION FOR MALARIA CONTROL DURING PREGNANCY
6. MONITORING AND EVALUATION OF PROGRAMMES FOR MALARIA CONTROL DURING PREGNANCY
7. OPERATIONAL RESEARCH PRIORITIES FOR CONTROL OF MALARIA DURING PREGNANCY
8. RECOMMENDED READING

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PREFACE

The Africa region experiences the majority of the global burden of malaria-associated maternal illness and low birth weight . Pregnant women in malaria-endemic areas of Africa often do not receive adequate preventive and curative care, contributing to the avoidable and unacceptably high numbers of maternal and infant deaths. Therefore, developing and strengthening national capacity for control of malaria during pregnancy is a high priority for the Africa region.

The RBM initiative is committed to forging partnerships to promote maternal and child health and development in Africa. At the global, regional and national levels RBM has created a crucial partnership with Making Pregnancy Safer (MPS), a WHO initiative aimed at strengthening health systems to ensure that women and their newborns access quality antenatal care and reproductive health services. The focus of this partnership is to strengthen case management of malaria for all pregnant women and to prevent malaria during pregnancy using cost-effective preventive approaches (IPT and ITN's) delivered through ANCs and programmes that provide services to the community.

This strategic framework provides guidance for policy makers and national programmes for the prevention and case management of malaria in pregnant women, who remain the main adult target group in the WHO Africa region. The recently strengthened partnerships in support of programmes to reduce the burden of malaria and to improve reproductive health services provides an opportunity for a new focus on rolling back malaria in pregnant women. This framework describes a strategy for prevention and control of malaria during pregnancy and provides details as needed to support this strategy. This document does not provide the level of detail which will be required in the form of standard guidelines for programme development. These more detailed guidelines will be developed as a companion document to this strategic framework. As governments develop national plans of action, countries in the Africa region are encouraged to adapt and expand this framework according to their epidemiologic and programme realities. By building stronger collaborations at the national and local levels for effective antenatal services, the Abuja goal of 60% coverage of pregnancies with IPT and ITNs can be achieved by 2005.

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ABBREVIATIONS

ANC	antenatal clinic
CQ	chloroquine
HIV	human immunodeficiency virus
IMCI	Integrated Management of Childhood Illnesses
IMPAC	Integrated Management of Pregnancy and Childbirth
IPT	intermittent preventive treatment
ITN	insecticide-treated nets
LBW	low birth weight
MPS	Making Pregnancy Safer
RBM	Roll Back Malaria
SP	sulfadoxine-pyrimethamine
WHO	World Health Organisation

EXECUTIVE SUMMARY

Controlling the enormous health impact associated with malaria has become a global priority. The focus of this commitment is Africa, which experiences the vast majority of malaria-related illness and death. This renewed commitment is supported by more effective malaria control approaches that have been defined in the past decade. Prevention of the serious health impact of malaria during pregnancy in Africa represents one of the most imminently achievable public health goals of the Roll Back Malaria (RBM) partnership.

The deleterious effects of malaria infection during pregnancy on both maternal and infant health are caused chiefly by *Plasmodium falciparum*. In areas of epidemic and low (unstable) malaria transmission, adult women have no significant level of immunity and will develop clinical illness when parasitaemic. Pregnant women with no immunity are at risk for dying from severe malarial disease and/or for spontaneous abortion, premature delivery or stillbirth.

In areas of high and moderate (stable) malaria transmission, adult women are semi-immune, and most malaria infections in pregnant women are asymptomatic. However, these asymptomatic infections contribute to development of severe anaemia in the mother, resulting in an increased risk of maternal mortality. The impact on the infant's health results from maternal infection mainly during the second half of pregnancy. Malaria infection of the placenta and malaria-caused maternal anaemia contributes to low birth weight (LBW), which results in higher infant mortality and in impaired child development.

Despite the toll that malaria exacts on pregnant women and their babies, for several reasons malaria control during pregnancy has not received broad programme support in the past. First, the fact that malaria infection in women is largely asymptomatic in areas of greatest burden mandates a preventive approach which has usually been given low priority. In addition, the control approach to date, weekly chloroquine (CQ) chemoprophylaxis has not been fully supported because of implementation difficulties related to delivery and compliance, as well as concerns about the promotion of drug resistance. The evolution of CQ resistance in Africa has posed yet an additional impediment to control efforts due to the limited armamentarium of antimalarial drugs which have both demonstrated efficacy and safety during pregnancy. The lack of effective linkages between malaria control and antenatal care programmes has also limited the success of efforts to control malaria during pregnancy.

The promising news is that during the past decade more effective control approaches have been demonstrated to address these limitations.. The African Summit on Roll Back Malaria (RBM) in April 2000 adopted the Abuja Declaration, in which regional leaders committed to achieving 60% coverage of pregnant women at risk for malaria with available control tools by 2005.

In order to reach this target, this strategic framework for malaria control during pregnancy recommends a three-pronged approach— use of intermittent preventive treatment (IPT), insecticide-treated nets (ITN), and case management of malaria illness— to reduce the burden of malaria infection among all pregnant women. In the majority of settings of stable malaria transmission in Africa, more than 70% of pregnant women attend antenatal clinic (ANC) at least once during their pregnancy, making a clinic-based prevention approach feasible.

The World Health Organisation (WHO) 20th Malaria Expert Committee designated IPT using an efficacious, preferably single-dose, anti-malarial drug as the preferred approach to reduce the adverse consequences of malaria during pregnancy. IPT involves the administration of full, curative treatment doses of an effective antimalarial drug at predefined intervals during pregnancy, beginning in the second trimester after quickening. IPT provides a highly effective base for programmes through use of safe and effective antimalarial drugs in treatment doses which can be linked to antenatal clinic visits. The potential of IPT to attain high levels of programme coverage and its benefit in reducing maternal anaemia and LBW makes it a preferred strategy in the WHO Africa region in areas of stable malaria transmission to the failed strategy of weekly CQ chemoprophylaxis.

ITN use during pregnancy in areas of stable transmission also provides significant protection against maternal anaemia and LBW. In addition, ITN use benefits the infant who sleeps under the net with the mother by decreasing exposure to malaria infection and subsequent severe disease. Priority should be placed on developing ANC-based programmes that support both IPT and ITN's, along with other essential elements of the antenatal care package.

At present there are no fully effective and feasible approaches to prevent malaria in non-immune pregnant women in endemic or epidemic-prone areas. Non-immune pregnant women exposed to malaria require prompt access to treatment of febrile illness. Essential elements of the antenatal care package should, then, include malaria diagnosis, where available and needed, and treatment with antimalarial drugs which have an adequate safety and efficacy profile for use in pregnancy.

Expanding coverage of programmes requires the careful monitoring of programme implementation and evaluation of impact. This will assist to develop a firm basis for all countries in the region to invest in malaria prevention and in more effective antenatal services for pregnant women. Operational research related to improved control of malaria during pregnancy is also required to assist in improving programme implementation. Research to develop new approaches, address issues related to prevention of malaria in pregnancy in low endemic areas and discover and develop new drugs is also urgently required. This evidence-based approach to malaria control during pregnancy is ready to be implemented in the region. African nations are adopting the prevention

approaches recommended in this strategic framework and are documenting their experiences and successes in controlling malaria during pregnancy. RBM partners are committed to supporting national efforts to implement programmes that address control of malaria during pregnancy.

POLICY SUMMARY

BEST PRACTICES FOR MALARIA CONTROL DURING PREGNANCY

- ◆ Effective case management of malaria illness for all women of reproductive age in malarious areas must be assured.
- ◆ The policy for malaria control during pregnancy should emphasize a preventive package of intermittent preventive treatment (IPT) and insecticide-treated bed nets (ITN's), particularly in areas of stable transmission.
- ◆ All pregnant women should receive at least 2 doses of IPT after quickening, during routinely scheduled antenatal clinic visits as recommended by WHO.
- ◆ Presently, the most effective drug for IPT is sulfadoxine-pyrimethamine due to its good safety profile in pregnancy, relative efficacy in reproductive-age women, and good programme feasibility, with the opportunity to deliver it as a single dose treatment under observation by the health worker.¹
- ◆ To assure that women receive at least 2 doses, delivery of IPT doses may best be linked to routinely scheduled antenatal clinic visits. WHO recommends a schedule of 4 ANC visits, with 3 visits after quickening. The delivery of IPT with each scheduled visit will likely assure that a high proportion of women receive at least 2 doses.
 - ◆ There is no evidence that receiving 3 or more doses of IPT with SP will result in an increased risk of adverse drug reactions.
 - ◆ IPT doses should not be given more frequently than monthly.
- ◆ ITN's should be provided to pregnant women as early in pregnancy as possible, and their use should be encouraged for women throughout pregnancy and during the postpartum period.
 - ◆ ITN's can be provided either through the antenatal clinic or through other systems in the private and public sectors that may be available at the community level.
- ◆ Anaemia is one of the most important consequences of malaria infection during pregnancy. As part of routine antenatal care, every woman should receive iron/folate supplementation as well as appropriate malaria interventions (e.g. IPT, ITN). In addition, every woman should be screened for anaemia, and those found to have moderate to severe anaemia should be managed according to national reproductive health guidelines.
- ◆ Programs should seek the highest possible coverage of pregnant women with these interventions – at least 60% (Abuja RBM goals) and preferably higher – and document this accomplishment. Given current high rates of antenatal clinic attendance in most sub-Saharan African countries, this should be achievable.

¹ Current scientific evidence suggests the following: 1) at least 2 IPT doses are required to achieve optimal benefit in most women; 2) in HIV-infected women, one study has demonstrated that monthly dosing of IPT (with most women getting 3-4 doses) was necessary to achieve optimal benefit; 3) to achieve optimal benefit in settings with HIV prevalence in pregnant women of greater than 12%, it is more cost effective to treat all women with a 3-dose regimen than to screen for HIV and provide this regimen only to HIV+ women; 4) there is no evidence of any additional risk with a third dose of IPT; and 5) there is no evidence to suggest that more than 3 IPT doses during pregnancy offers additional benefit. Research to assess the safety, efficacy, and programme feasibility of other antimalarials for use in IPT is ongoing.

1. INTRODUCTION

The African Summit on Roll Back Malaria (RBM) in April 2000 adopted the Abuja Declaration, in which regional leaders committed to achieving 60% coverage of pregnant women in malaria-endemic communities by 2005. This target will be met by the following approach:

“Support and promote the use of malaria preventive measures such as chemoprophylaxis and/or intermittent preventive treatment for pregnant women, especially those in their first pregnancies.”

This bold commitment can be realized if strong programme partnerships are forged to apply what is known about the impact and control of malaria infection during pregnancy.

Each year, more than 30 million African women become pregnant in malaria-endemic areas and are at risk for *Plasmodium falciparum* malaria infection during pregnancy. Most women in the region reside in areas of relatively stable malaria transmission, where the principal impact of malaria infection during pregnancy is associated with malaria-related anaemia in the mother and with the presence of parasites in the placenta. The resultant impairment of foetal nutrition contributing to low birth weight (LBW) is a leading cause of poorer infant survival and development in Africa.

Pregnant women resident in areas of low or unstable malaria transmission have little or no immunity to malaria and are at a 2-3-fold higher risk of developing severe disease as a result of malaria infection than are nonpregnant adults living in the same area. In these areas maternal death may result either directly from severe malaria or indirectly from malaria-related severe anaemia. In addition, malaria infection of the mother may result in a range of adverse pregnancy outcomes, including spontaneous abortion, neonatal death, and LBW.

Despite the fact that the serious impact of malaria infection during pregnancy has been known for a half century, coverage of pregnancies at risk for malaria infection according to WHO and national guidelines has been unacceptably low in most endemic countries. Control of the impact of malaria during pregnancy depends on both preventing infection, since most women in areas of stable transmission will not experience serious clinical illness themselves, and in clearing parasitaemia when it occurs. The previous policy of weekly chemoprophylaxis was limited by poor compliance outside the clinic setting. Further, the expansion of drug resistance of *P. falciparum* to chloroquine (CQ) and other drugs has further eroded programme effectiveness.

In the past decade, strategies have been developed to more effectively control the impact of malaria during pregnancy. These strategies can serve as the basis

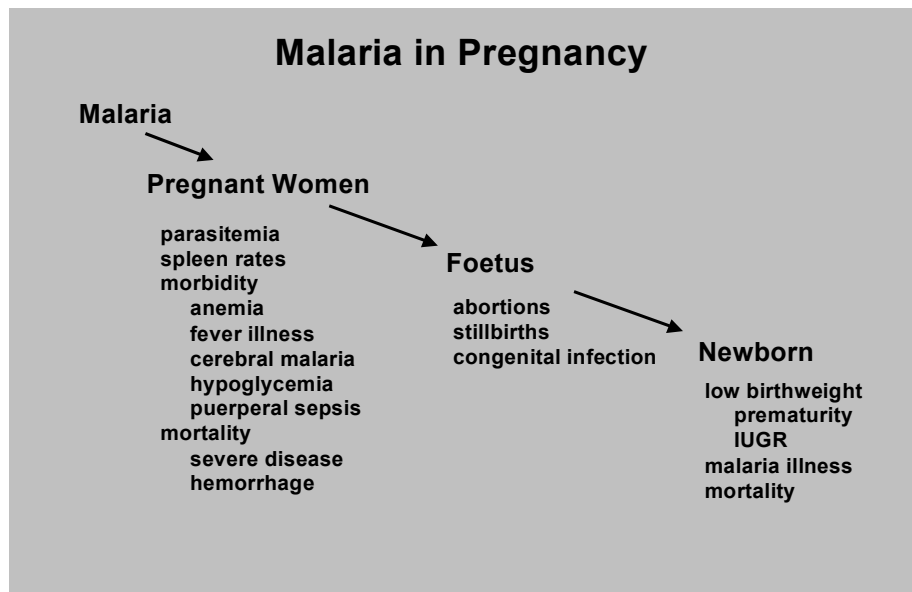
for highly effective programmes in the Africa region. The development of intermittent preventive treatment (IPT) approach constitutes a major advance for achieving high programme coverage and effectiveness. Similarly, the demonstrated ability of insecticide-treated net (ITN) use during pregnancy to reduce both the maternal and infant health impact of malaria infection makes possible a powerful prevention approach for Africa.

The RBM partnership is committed to accelerating implementation of malaria control during pregnancy in Africa. The Malaria Control Programme at the Africa Regional Office of the World Health Organisation (WHO)/AFRO) in collaboration with the Division of Reproductive Health is addressing the problem of malaria during pregnancy by jointly planning strategies to ensure safe pregnancy in malaria-endemic areas. The initial focus will be on strengthening malaria preventive services and correct malaria case management for pregnant women attending antenatal care.

2. MALARIA INFECTION DURING PREGNANCY

OVERVIEW

Malaria infection during pregnancy results in a wide range of adverse consequences for the pregnant woman, the developing foetus, and the newborn infant.



IMPACT ON MATERNAL HEALTH

The effect of infection on the mother may range from negligible to severe, depending on the level of immunity to malaria infection which the mother has acquired prior to pregnancy and the efficacy of these immune responses during

her pregnancy. Acquired antimalarial immunity depends on the intensity of malaria transmission, the number of previous pregnancies, and the presence of other conditions, such as HIV infection, which may further impair the efficacy of immune responses during pregnancy.

Even asymptomatic infections (those without fever or clinical illness) frequently worsen maternal anaemia. Anaemia is more common in pregnant women than nonpregnant women for a variety of reasons, including the dilutional effects of increased intravascular volume during the second trimester as well as the increased demand on iron and folate stores. Although anaemia during pregnancy has multiple causes (HIV infection, inadequate nutrition, haemoglobinopathies, and hookworm infection), the contribution of malaria is substantial. Severe maternal anaemia increases the mother's risk for death, and malaria-related maternal anaemia is estimated to cause as many as 10,000 maternal deaths each year in Africa.

IMPACT ON INFANT HEALTH

Malaria infection in the mother, especially in areas of low or epidemic (unstable) transmission, can result in abortion, stillbirth, or congenital infection.

Malaria infection also affects the health of the newborn. Maternal infection during the second half of pregnancy, in combination with maternal anaemia, can interfere with foetal weight gain. Placental malaria infection and maternal anaemia contribute to intrauterine growth retardation or prematurity and result in LBW.

Malaria and HIV

HIV infection diminishes a pregnant woman's ability to control *P. falciparum* infections. The prevalence and intensity of malaria infection during pregnancy is higher in women who are HIV-infected. Women with HIV infection are more likely to have symptomatic infections and to have an increased risk for malaria-associated adverse birth outcomes. Multigravidae with HIV infection are similar to primigravidae without HIV infection in terms of susceptibility to and negative consequences of malaria infection. Therefore, in the presence of HIV infection the risk associated with placental malaria appears to be independent of the number of pregnancies.

OTHER MALARIA SPECIES

The effects of the other three parasites that cause malaria in humans (*P. vivax*, *P. malariae*, and *P. ovale*) are less clear. Pregnant women in Africa at risk for *P. vivax* infection reside primarily in areas of low or unstable transmission. In these areas, *P. vivax* infections are likely to result in febrile illness. A study among non-immune pregnant women in Thailand reported that *P. vivax* malaria during pregnancy is associated with maternal anaemia and low birth weight, but to a lesser extent than *P. falciparum*. There is a need for studies to better define the impact of *P. vivax* infection on the health of pregnant African women and

newborns. There is also a need to assess whether antimalarial prophylaxis with CQ may be justified in areas where *P. vivax* infection among pregnant women is common and contributes to maternal anaemia and infant low birth weight.

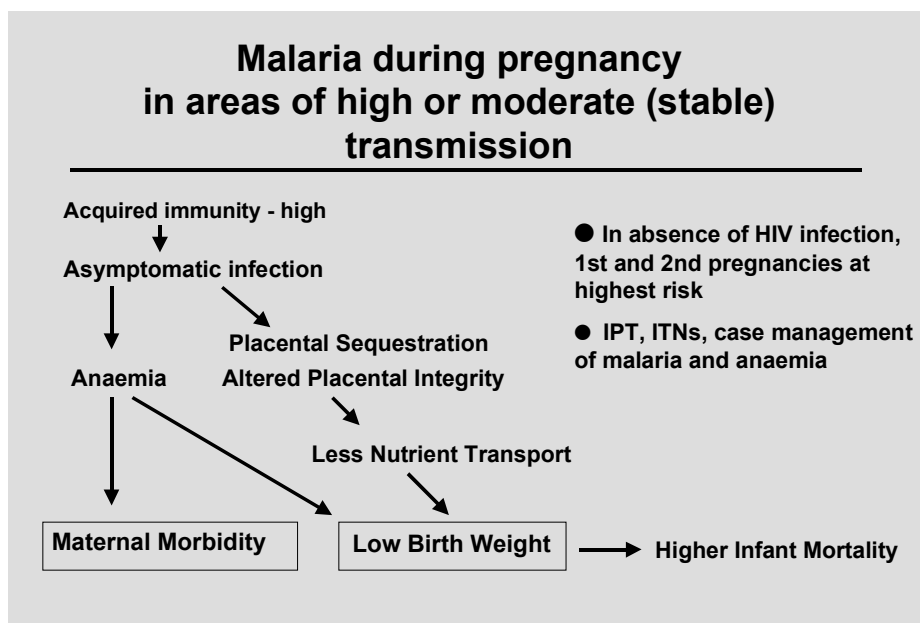
EFFECTS OF MALARIA DURING PREGNANCY BY INTENSITY OF TRANSMISSION

The symptoms and complications of malaria during pregnancy differ by the intensity of malaria transmission of the setting and thus the level of immunity the pregnant woman has obtained. While these settings are presented as two distinct epidemiologic conditions, in reality, the intensity of transmission and immunity in pregnant women occur on a continuum, with potentially diverse conditions occurring within a country.

AREAS OF HIGH OR MODERATE (STABLE) TRANSMISSION

Stable transmission predominates in Africa south of the Sahara, and consequently this region bears the greatest burden of malaria infections during pregnancy. In these areas of high or moderate (stable) malaria transmission, the ill health effects are particularly apparent in the first and second malaria-exposed pregnancies.

Despite the higher prevalence of parasitaemia and higher parasite density compared to non-pregnant women, *P. falciparum* infection in pregnant women in these areas is usually asymptomatic. Maternal immunity reduces the risk for severe illness. Thus, clinical malaria is not a prominent feature of the infection during pregnancy, and in settings of stable malaria transmission, maternal mortality due solely to malaria is uncommon. In these settings, the major detrimental effect of infection is LBW and maternal anaemia.



In areas with stable malaria transmission (where prevalence during pregnancy ranges from 10% - 65%), malaria during pregnancy contributes to approximately 2%-15% of maternal anaemia and 8%-14% of LBW. Malaria contributes to an estimated 8%-36% of prematurity and to an additional 13%-70% of intrauterine growth retardation, depending on level of malaria risk. Importantly, maternal malaria infection accounts for almost 30% of all the causes of LBW that can be prevented during pregnancy (that is, by antenatal interventions). Maternal malaria infection is estimated to account for 3%-8% of all infant deaths.

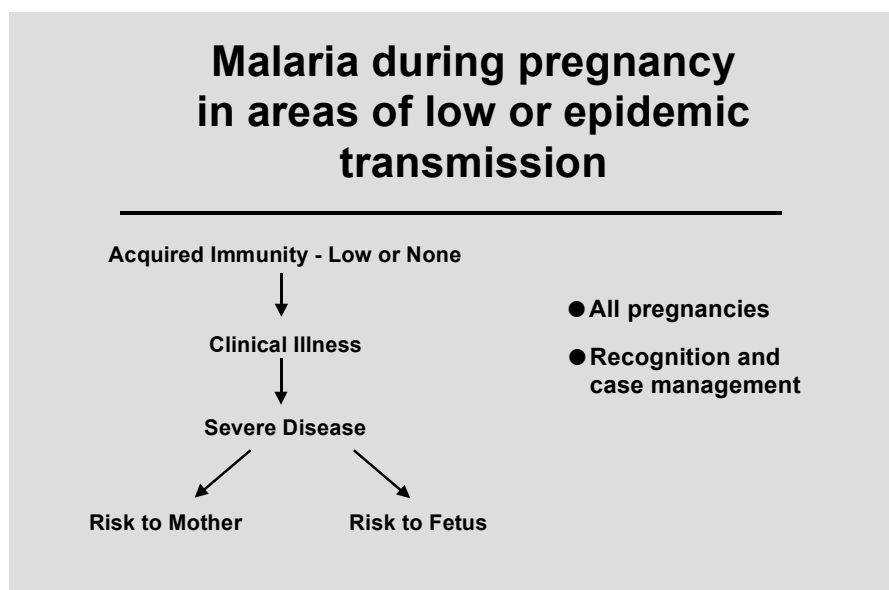
MALARIA’S CONTRIBUTION TO ANAEMIA, LOW BIRTH WEIGHT, AND INFANT DEATH

Adverse health event	Percentage of the total caused by malaria infection
Maternal anaemia	2-15
Low birth weight (LBW)	8-14
Preterm – LBW	8-36
IUGR*- LBW	13-70
Infant death	3-8

* IUGR: intrauterine growth retardation

IN AREAS OF LOW OR EPIDEMIC (UNSTABLE) TRANSMISSION

In areas of unstable malaria transmission, women of reproductive age have relatively little acquired immunity to malaria, and hence all pregnant women are at similar risk for malaria infection. Its consequences in these settings are maternal illness, severe malaria with central nervous system complications, anaemia, and adverse reproductive outcomes, including stillbirths, abortions,



Antenatal chemoprophylaxis with chloroquine (CQ) has been shown to be of limited effectiveness. Therefore, CQ chemoprophylaxis no longer has a role in national policies for the control of malaria in pregnancy in the Africa region.

and LBW. Abortion is common in the first trimester, and prematurity is common in third trimester. Other consequences during pregnancy commonly associated with *P. falciparum* infection include hypoglycaemia, hyperpyrexia, severe haemolytic anaemia, and pulmonary oedema.

3. DEVELOPING EFFECTIVE CONTROL PROGRAMMES

LEARNING FROM HISTORY

In the past, WHO recommended that pregnant women in malaria-endemic areas receive full antimalarial treatment on their first contact with antenatal service followed by weekly chemoprophylaxis (i.e., frequent, regular use of an antimalarial drug given at less than a therapeutic dose). The drug most commonly used for chemoprophylaxis has been CQ. The implementation of this policy has been limited by a number of factors, including (1) spread of antimalarial drug resistance, particularly to CQ, (2) poor compliance with a weekly regiment throughout pregnancy, and (3) adverse effects, especially pruritis associated with CQ.

The spread of CQ resistance across most of the Africa region has seriously affected the choice of antimalarial drugs available for preventing malaria during pregnancy. For the east, central, southern and now much of western areas of the Africa region, CQ no longer will eliminate *P. falciparum* infection. Consequently, national policies that continue to advocate CQ use for weekly prophylaxis will have negligible programme effectiveness due to the drug's marginal efficacy in addition to the aforementioned problems with compliance resulting from the need for frequent dosing.

Even as recently as the late 1980s, few African countries had programmes that provided chemoprophylaxis to most pregnant women. For example, one well-supported community health programme in western Kenya that used village health-care workers to provide chemoprophylaxis to pregnant women was able to provide weekly CQ chemoprophylaxis to only 29% of primigravidae. One problem limiting coverage of pregnant women was acceptability of the CQ chemoprophylaxis regimen.

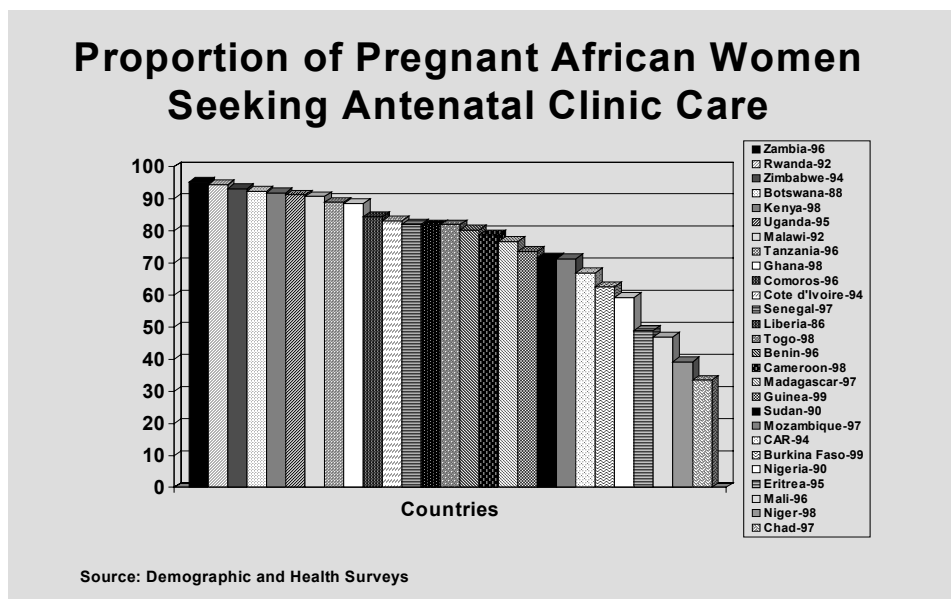
In Malawi, where more than 90% of pregnant women attend ANCs, local taboos against ingesting bitter substances, such as CQ, during pregnancy limited women's acceptance of chemoprophylaxis. A survey of seven regions in four countries found that although 34%-68% of pregnant women reported using an antimalarial drug during their pregnancy, only 1%-18% reported using an

antimalarial drug on a weekly basis at a dosage close to the WHO recommendation.

PROGRAMMING PARTNERSHIPS FOR MALARIA CONTROL DURING PREGNANCY

The Africa region experiences the majority of the global burden of malaria-associated maternal illness and LBW. Consequently, this region requires an accelerated effort to implement comprehensive programmes to prevent and control malaria during pregnancy.

It has been documented that across the region, an average of more than 70% of women attend ANC at least once during pregnancy. This represents a unique opportunity for prevention of malaria, along with other priority diseases affecting pregnant women.



RBM has targeted the ANC as the site for accelerating programme implementation of malaria control during pregnancy for those areas with stable malaria transmission and high ANC attendance. The development and strengthening of community-based programmes are important in areas with low ANC coverage and can further enhance coverage of pregnant women in areas with adequate ANC coverage.

RBM has developed partnerships with programmes that are similarly committed to strengthening entry-level reproductive health clinic services. Principal among these partners are the WHO Making Pregnancy Safer (MPS) initiative and the national reproductive health services. These partners focus on prevention and case management capacity building in entry-level health facilities and on the

progressive expansion of trained and supplied community-based health-care workers and skilled birth attendants in these health facilities.

MAKING PREGNANCY SAFER

The strategy of WHO's Making Pregnancy Safer (MPS) initiative is to work with the health sector, focusing on effective evidence-based interventions that target the major causes of maternal and newborn morbidity and mortality. MPS works both to strengthen health systems and to identify actions at the community level needed to ensure that women and their newborns have access to the care they need, when they need it. Particular importance is placed on skilled attendance at delivery and the provision of an appropriate and effective continuum of antenatal and perinatal care.

- ◆ The target is reduction of maternal and infant morbidity and mortality.
- ◆ The interventions focus on six areas (technical and policy support, advocacy, building partnerships, establishing norms and developing tools, research and dissemination, monitoring and evaluation).
- ◆ The MPR initiative builds on the Safe Motherhood Initiative and is in the development stage.
- ◆ Five priority African countries have been identified, four of which are countries in which RBM is active--Ethiopia, Mauritania, Mozambique, Nigeria, and Uganda.

4. POLICY FRAMEWORK FOR MALARIA CONTROL DURING PREGNANCY IN AFRICA

Pregnant women in malaria-endemic areas of Africa often do not receive adequate preventive and curative care, contributing to the avoidable and unacceptably high numbers of maternal and infant deaths. Health care for these women should be delivered in a comprehensive "package," based on the extent of defined health burden and opportunities for intervention.

Policies that address the control of malaria during pregnancy in the Africa region must be responsive to the range of malaria epidemiologic settings and antenatal care conditions encountered. The goal of the policy is to attain high levels ($\geq 60\%$) of antenatal coverage for pregnant women with prompt and effective treatment for malaria illness and an effective range of preventive measures (ITNs and IPT). A regional policy is based on common approaches that will serve all countries. This policy will provide guidance to individual countries on how to tailor national guidelines, according to the local epidemiology of malaria and antenatal care conditions.

The regional approach for the control of malaria during pregnancy is designed to address the range of malaria transmission and health services settings

encountered in the Africa Region. The high utilization of ANC and reproductive health clinic services by African women provides an opportunity for national programmes to initially strengthen malaria prevention and treatment services in the clinic setting. This will be accomplished by working with partners responsible for and investing in strengthening clinic services for women of reproductive age.

POLICY SUMMARY

BEST PRACTICES FOR MALARIA CONTROL DURING PREGNANCY

- ◆ Effective case management of malaria illness for all women of reproductive age in malarious areas must be assured.
- ◆ The policy for malaria control during pregnancy should emphasize a preventive package of intermittent preventive treatment (IPT) and insecticide-treated bed nets (ITN's), particularly in areas of stable transmission.
- ◆ All pregnant women should receive at least 2 doses of IPT after quickening, during routinely scheduled antenatal clinic visits as recommended by WHO.
- ◆ Presently, the most effective drug for IPT is sulfadoxine-pyrimethamine due to its good safety profile in pregnancy, relative efficacy in reproductive-age women, and good programme feasibility, with the opportunity to deliver it as a single dose treatment under observation by the health worker.¹
- ◆ To assure that women receive at least 2 doses, delivery of IPT doses may best be linked to routinely scheduled antenatal clinic visits. WHO recommends a schedule of 4 ANC visits, with 3 visits after quickening. The delivery of IPT with each scheduled visit will likely assure that a high proportion of women receive at least 2 doses.
 - ◆ There is no evidence that receiving 3 or more doses of IPT with SP will result in an increased risk of adverse drug reactions.
 - ◆ IPT doses should not be given more frequently than monthly.
- ◆ ITN's should be provided to pregnant women as early in pregnancy as possible, and their use should be encouraged for women throughout pregnancy and during the postpartum period.
 - ◆ ITN's can be provided either through the antenatal clinic or through other systems in the private and public sectors that may be available at the community level.
- ◆ Anaemia is one of the most important consequences of malaria infection during pregnancy. As part of routine antenatal care, every woman should receive iron/folate supplementation as well as appropriate malaria interventions (e.g. IPT, ITN). In addition, every woman should be screened for anaemia, and those found to have moderate to severe anaemia should be managed according to national reproductive health guidelines.
- ◆ Programs should seek the highest possible coverage of pregnant women with these interventions – at least 60% (Abuja RBM goals) and preferably higher – and document this accomplishment. Given current high rates of antenatal clinic attendance in most sub-Saharan African countries, this should be achievable.

¹ Current scientific evidence suggests the following: 1) at least 2 IPT doses are required to achieve optimal benefit in most women; 2) in HIV-infected women, one study has demonstrated that monthly dosing of IPT (with most women getting 3-4 doses) was necessary to achieve optimal benefit; 3) to achieve optimal benefit in settings with HIV prevalence in pregnant women of greater than 12%, it is more cost effective to treat all women with a 3-dose regimen than to screen for HIV and provide this regimen only to HIV+ women; 4) there is no evidence of any additional risk with a third dose of IPT; and 5) there is no evidence to suggest that more than 3 IPT doses during pregnancy offers additional benefit. Research to assess the safety, efficacy, and programme feasibility of other antimalarials for use in IPT is ongoing.

Programmes are urged to adopt a multi-pronged approach that employs ITNs, IPT, and prevention and treatment of anaemia, along with appropriate case management services. Linking with community-based maternal and reproductive health services is important to serve the greatest number of women at risk. In those areas where ANC services are not well developed, malaria control programmes should explore partnerships with community health-care workers, such as traditional and skilled birth attendants.

Countries that develop policies on malaria control during pregnancy and actively participate in RBM and MPR will be assisted in accelerating programme development. This early phase of programming partnership will involve partners that have a commitment to maternal and child health (e.g., UNFPA, World Bank, UNICEF, USAID, DFID, and MNH) and build on the unique programme infrastructure and partnerships in place in individual countries and communities.

CASE MANAGEMENT OF MALARIA ILLNESS AND ANAEMIA DURING PREGNANCY

MALARIA ILLNESS

Case management of malaria illness is an essential component of malaria control during pregnancy in all areas where pregnant women are at risk for malaria. Pregnant women with symptomatic malaria are at higher risk for foetal loss, premature delivery, and death. Therefore, she needs to be urgently treated. Treatment of malaria during pregnancy aims to completely cure the infection, as any level of parasitaemia is of consequence to the mother and foetus.

Each country in the Africa region where malaria is transmitted requires a policy that guides effective case management for malaria illness in pregnant women. These guidelines need to address the unique clinical features of malaria infection in pregnant women as well as specific indications, contraindications, and potential complications associated with antimalarial drugs during pregnancy.

The recommended antimalarial drugs for treatment of uncomplicated malaria are CQ in CQ-sensitive areas and sulfadoxine-pyrimethamine (SP) in areas with CQ resistance. Quinine is another alternative in areas where both CQ and SP are not effective, and it is the drug of choice for treatment of uncomplicated malaria in the first trimester of pregnancy. WHO recommends that the following drugs not be used during pregnancy: halofantrine, tetracycline, doxycycline, and primaquine.

Health-care workers particularly in entry-level facilities should be trained in the recognition and management of febrile illness and suspect malaria. Collaboration with staff responsible for Integrated Management of Pregnancy and Children (IMPAC) as well as those responsible for Integrated Management of Childhood

Illnesses (IMCI) will be particularly effective in developing systematic management protocols and drug supply logistics.

ANAEMIA

During the past decade, the burden of malaria-associated anaemia for the pregnant woman (risk for death) and the foetus (LBW) has been increasingly recognized. Anaemia need not be symptomatic to pose appreciable risk during pregnancy. Consequently, case management guidelines such as the Essential Care Practice Guide recently developed by MPS should provide advice on appropriate screening and therapy for maternal anaemia in malaria-endemic areas. *P. falciparum* parasites may be present in the placenta and contribute to maternal anaemia even in the absence of documented peripheral parasitaemia. Therefore, a pregnant woman with severe anaemia from a malaria-endemic area must be treated presumptively with an effective antimalarial, whether or not peripheral parasitaemia is present or whether or not she has a history of fever.

PREVENTION OF MALARIA DURING PREGNANCY

Controlling the effects of malaria infection on the pregnant woman and her foetus requires a balanced programme of effective case management of malaria illness and prevention of the consequences of asymptomatic infection. In most areas of malaria transmission, highly effective prevention interventions are required. Pregnant women in these areas require a preventive package, as well as prompt access to diagnosis and effective treatment for anaemia and clinical malaria. This preventive package consists of IPT and ITN's.

INTERMITTENT PREVENTIVE TREATMENT

The most promising preventive approach using antimalarial drugs for pregnant women is intermittent preventive treatment (IPT), which is based on the use of antimalarial drugs given in treatment doses at predefined intervals after quickening. Use of a single-dose drug such as SP offers solutions to the problems associated with previous efforts to deliver chemoprophylaxis, in that all dosing of pregnant women be given under direct observation in the clinic. WHO recommends that in areas of stable transmission, IPT with an effective, preferably one-dose, antimalarial drug be provided as part of antenatal care, starting from the second trimester onwards.

IPT WITH SULFADOXINE-PYRIMETHAMINE (SP)

At this time, SP is the single-dose antimalarial with the best overall effectiveness for prevention of malaria in pregnancy in areas of Africa with stable transmission of *P. falciparum* malaria, and where resistance to SP is low. SP has a good safety profile in pregnancy, good efficacy in reproductive-age women in most areas, and good programme feasibility, with the opportunity to deliver it as a single dose treatment under observation by the health worker. Monitoring of ANC programmes that are using IPT with SP has demonstrated high levels of IPT

acceptance by pregnant women. Malawi, which has experience with wide-scale IPT programming, has found strong acceptance with the IPT regimen distributed in ANC and has consistently achieved coverage levels greater than 80% for the first dose.

Both sulfonamides and pyrimethamine are generally considered safe in the second and third trimesters of pregnancy. Although there is concerns that sulfa drugs may be associated with kernicterus when given to premature neonates, this problem has not been noted in studies of IPT where sulfadoxine-pyrimethamine (SP) has been administered to the mother. Studies examining the risk to the fetus from *in utero* exposure to SP combinations have generally not found any increased risk in spontaneous abortions or congenital defects. One retrospective study of antifolate drugs given before and during pregnancy did find that there was an increased risk of birth defects when such drugs were taken during the first trimester, but not during the second or third trimester. When given weekly as prophylaxis, SP has been associated with rare severe cutaneous reactions such as toxic epidermal necrolysis and Stevens-Johnson syndrome. However, there is no evidence that the risk of severe cutaneous reactions is any greater in pregnant women or when SP has been used for treatment. Although sulfonamides are excreted in breast milk, the risk to healthy full-term neonates is believed to be minimal. Pyrimethamine is usually given in combination with sulfadoxine. However, studies in which pyrimethamine has been given alone have also found no increase in adverse pregnancy outcomes. In addition, pyrimethamine is considered to be compatible with breast feeding.

Several studies have been conducted to detect adverse reactions to SP, including cutaneous reactions and other potentially serious conditions that would either pose risks to the pregnant woman or infant or limit programme effectiveness. No evidence has been found of increased risk for serious cutaneous side effects or for increased jaundice in the newborn when SP has been delivered in the second and third trimesters. Although the data on safety of SP is reassuring, there remains an ongoing need for monitoring of safety of all antimalarials used for treatment and prevention in pregnancy, including SP.

IPT REDUCES MATERNAL ANAEMIA AND LOW BIRTH WEIGHT IN EAST AND SOUTHERN AFRICA

Studies in Kenya and Malawi have shown that IPT with SP has a beneficial impact on maternal and infant health. IPT with SP when delivered as part of antenatal care significantly reduces the prevalence of maternal anaemia and placental parasitaemia and the incidence of low birth weight. No significant adverse reactions to SP in either the mother or infant have been detected.

IPT WITH OTHER ANTIMALARIAL DRUGS

In areas of Africa where resistance to SP is intensifying, alternatives to SP -- either alone or in combination with artemisinin compounds-- require urgent evaluation for use in pregnancy. A WHO meeting to review the pre-clinical (animal) and limited human data on use of artemisinin compounds in pregnancy concluded that these drugs have a good safety profile, particularly in the second and third trimesters of pregnancy and during lactation. Although formal trials of the safety of these drugs in pregnancy are needed, these may be difficult to conduct. It is, then, essential that post marketing surveillance of pregnant women who are exposed to new drugs be as vigilant and complete as possible.

IPT DOSING SCHEDULE

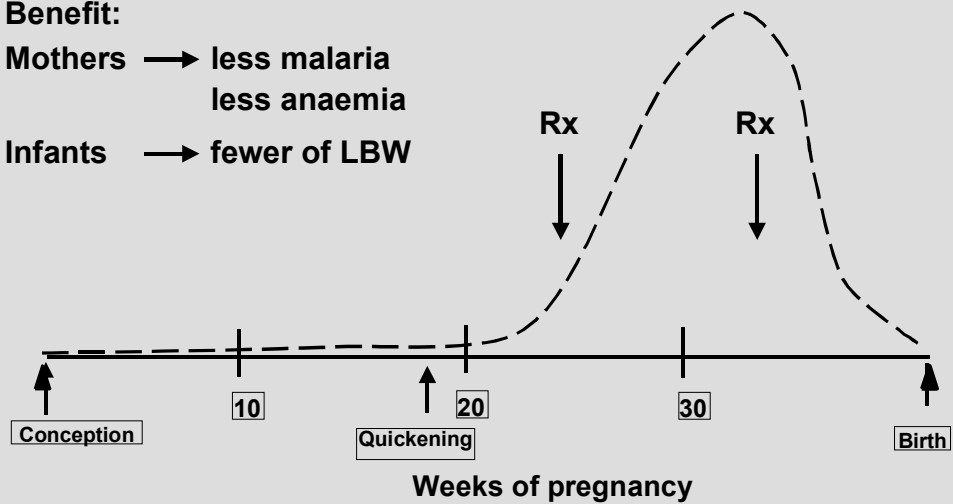
All pregnant women should receive at least 2 doses of the recommended antimalarial drug (SP, according to the currently available evidence) at the first regularly scheduled ANC visit after quickening (first noted movement of the foetus) (Figure) and during each regularly scheduled visit thereafter. Studies conducted in Malawi and Kenya showed that the maximum benefit of IPT can be gained by receiving two doses or more (in HIV infected pregnant women) doses of SP. However, even a single dose of SP is beneficial. To assure that women receive at least 2 doses, delivery of IPT doses may best be linked to routinely scheduled antenatal clinic visits. WHO presently recommends an optimal schedule of 4 ANC visits, with 3 visits after quickening. The delivery of IPT with each scheduled visit will likely assure that a high proportion of women receive at least 2 doses. There is no evidence that delivery of more than 3 doses of IPT-SP will confer additional benefit. However, there is also no evidence that receiving 3 or more doses of IPT with SP will result in an increased risk of adverse drug reactions. For pregnant women who have 4 or more antenatal visits after quickening, it is advisable to deliver no more than 3 doses of SP to minimize unnecessary drug exposure and thereby further decrease the potential for drug-related toxicity.

Intermittent Preventive Therapy

Benefit:

Mothers → less malaria
less anaemia

Infants → fewer of LBW



INSECTICIDE-TREATED NETS

The second component of the prevention package is the use of ITN's. ITN's reduce human-vector contact by physically excluding vector mosquitoes, killing them if they land on ITN's, or repelling them, thereby driving them from the vicinity of sleepers. Because of their documented effect in several studies on reducing malaria-related illness and death, ITN's are being promoted for use through public and private sector outlets in African countries.

The use of an ITN by a pregnant woman benefits the woman as well as her family. The demonstrated impact of ITN's on lessening the risk for LBW and maternal anaemia is important. Further, the infant who sleeps under the net with the mother will also have marked benefits: reduced malaria exposure, decreased incidence of anaemia, decreased risk for death, and enhanced development.

Insecticide-Treated Nets Reduce LBW and Prematurity in Kenya

In highly malarious western Kenya, studies indicate that women who were protected by insecticide-treated bed nets every night in their first four pregnancies delivered approximately 25% fewer babies who were either small for gestational age or born prematurely than women who were not.

The distribution of ITN's and the development of effective community-based infrastructure to achieve high levels of compliance is a major challenge; locally defined and applied strategies will be most successful. Incorporation of messages to women in both antenatal and well and sick child visits about the benefits of ITN use will be important in achieving high levels of use.

TABLE. INTERVENTION STRATEGIES ACCORDING TO TRANSMISSION INTENSITY

	CASE MANAGEMENT	INTERMITTENT PREVENTIVE TREATMENT (IPT)	INSECTICIDE-TREATED NETS (ITN's)
HIGH/MEDIUM TRANSMISSION-- PERENNIAL (STABLE)*	Risk for febrile illness and severe malaria limited. Screen and treat anaemia with recommended antimalarial drug and iron supplementation	Provide pregnant women a standard IPT**** dose at the first regularly scheduled ANC visit after quickening. At each subsequent routine visit***** provide an IPT dose, with a minimum of two doses given at not less than a month interval.	Begin use early in pregnancy and continue postpartum Emphasise including young children under ITNs.
HIGH/MEDIUM TRANSMISSION-- SEASONAL (STABLE)*	Risk for febrile illness and severe malaria limited. Screen and treat anaemia with recommended antimalarial drug and iron supplementation	Provide pregnant women a standard IPT**** dose at the first regularly scheduled ANC visit after quickening. At each subsequent routine visit***** provide an IPT dose, with a minimum of two doses given at not less than a month interval.	Begin use early in pregnancy and continue postpartum Emphasise including young children under ITNs.
LOW TRANSMISSION (UNSTABLE)**	Risk for febrile illness and anaemia high. Promptly recognize and treat all potential malaria illness with an effective drug. Screen and treat anaemia with recommended antimalarial drug and iron supplementation. Consider <i>P.vivax</i> infection in east and northern Africa.*****	IPT cannot be recommended in these areas, based on present evidence.	Begin use early in pregnancy and continue postpartum. Emphasise including young children under ITNs.
EPIDEMIC TRANSMISSION (UNSTABLE)***	Risk for severe malaria illness high. Risk for febrile illness and anaemia high. Promptly recognize and treat all potential malaria illness with an effective drug. Screen and treat anaemia with recommended antimalarial drug and iron supplementation. Consider <i>P.vivax</i> infection in east and northern Africa.*****	Not indicated.	Begin use early in pregnancy and continue postpartum. Emphasise including young children under ITNs

* Adult women have high level of acquired antimalarial immunity

** Adult women have no or very low level of acquired antimalarial immunity

*** Adult women have no acquired antimalarial immunity

**** Presently the most effective drug for IPT is sulfadoxine-pyrimethamine.

***** WHO recommends an ideal visit schedule of 3 ANC visits after quickening, for a total of 3 IPT doses.

***** CQ prophylaxis to decrease the burden of *P. vivax* in pregnancy may be considered, but no evidence on efficacy/effectiveness of this strategy is presently available.

OPPORTUNITIES FOR COMMUNITY-BASED PROGRAMMING

In areas where most women attend ANC at least once during their pregnancy, country programmes should focus initially on the ANC as the locus for malaria control during pregnancy. The ANC will be the logical point of service for IPT, and a strong partnership between malaria and reproductive health programmes cooperating in the full range of implementation steps (e.g. training, procurement of drugs and supplies, service delivery, supervision, and monitoring and evaluation) will be necessary for success. The ANC can also serve as a valuable locus for ITN distribution, advocacy, and education among pregnant women. However, in some communities, ITN's may be distributed and supported through private and public sector programmes.

In some malaria-endemic areas, ANC programmes may not be well developed and attendance will be low. Programmes will need to assess the most cost-effective strategies for controlling malaria during pregnancy. To accelerate the delivery of services to pregnant women, national programmes should explore partnerships with non-governmental organisations and community-based health providers to deliver some components of the proposed malaria control package. Traditional birth attendants may be effective at promoting the use of antenatal clinic services, in use of ITN's and, with appropriate training and logistic support, could deliver IPT. Programmes are encouraged to explore innovative opportunities in the community for programme delivery both to extend ANC-based programmes and to serve women where clinic-based programming is underdeveloped. Within the community, the woman's partner and family (e.g., mother and/or mother-in-law) in addition to other local groups are hidden resources for developing capacity to make healthy choices. These resources should be fully tapped in order to take complete advantage of the range of opportunities to develop effective and sustainable approaches for prevention and control of malaria during pregnancy, as well as for other diseases posing an undue burden for the pregnant woman and her infant.

ESTIMATED COST-EFFECTIVENESS OF MALARIA PREVENTION DURING PREGNANCY

Malaria prevention during pregnancy using a package consisting of IPT and ITN's can be highly cost-effective. IPT with either SP or CQ has been estimated to cost in the range of \$12-21 per disability-adjusted life year (DALY) prevented, a very favourable cost.

ITN use by children in several settings has been shown to be very cost-effective. More pregnant women are using ITN's, and the cost-effectiveness of ITN use by pregnant women is likely to be similar to that for children. The antenatal prevention package (of IPT and ITN's) is expected to produce comparable enhanced cost-effectiveness. As regional coverage attains the 60% target, the

estimated 75,000-200,000 annual infant deaths attributable to maternal malaria infection should be significantly reduced.

5. PROGRAMME IMPLEMENTATION FOR MALARIA CONTROL DURING PREGNANCY

Developing and strengthening national capacity for control of malaria during pregnancy is a high priority for the Africa region. Implementation of programmes requires a systematic approach to development of national policy and programmes, as well as advocacy for the control approaches. RBM places a high priority on effective partnership with Family and Reproductive Health, and particularly with the MPS initiative and other national and local programmes or initiatives responsible for ANC and reproductive health clinic services. It is essential to develop or strengthen these programme links at the national, district, and local levels.

In each country, the roles of the national, district, and local levels of the malaria control programme and reproductive health services in the implementation process must be clearly defined. The following are the proposed steps in programme implementation:

- **Establish a technical advisory group with national and partner stakeholders to advise on policy and national implementation planning**

The planning and implementation of interventions for malaria control during pregnancy will require new partnerships among obstetric, maternal and child health, and malaria experts. As a country commits to strengthen capacity in malaria control, a representative technical advisory group that includes malaria, maternal and reproductive health experts (both from public and private sectors), key bilateral and multilateral partners, nongovernmental organisations, and religious organisations involved in health-care delivery should be constituted. The technical advisory group should be charged with providing technical advice for policy and planning issues, mobilizing support, and resources. This technical advisory group should also have an active role in coordinating and monitoring programme implementation. Most countries have already set up technical advisory committees for malaria control; their terms of reference may need to be revised to include issues related to malaria control during pregnancy.

- **Conduct needs assessment and situation analysis to define the epidemiology of malaria during pregnancy and the capability of the reproductive health and antenatal programmes**

Before a country begins to develop or strengthen its capacity to control malaria during pregnancy, key programme determinants and needs should be assessed to serve as baseline. Determination of the intensity of malaria transmission and the effects of malaria during pregnancy (e.g., LBW, anaemia) can in most settings be inferred from available malaria infection prevalence and maternal morbidity data. Some settings, such as urban areas, highland areas, and areas at the fringe of stable malaria transmission (e.g. in the Sahel region), may require special studies.

The critical determinant is the capacity of reproductive health services to partner, incorporate, and efficiently deliver malaria control interventions for pregnant women. The entry point will be clinic-based services, but outreach and community-based programmes, such as those that have trained and supplied traditional birth attendants, should also be assessed.

- **Develop or review the national malaria control policy and policy and guidelines for malaria control during pregnancy**

Each country will need to develop or review the policy and guidelines for control of malaria during pregnancy. This policy should be an integral part of the national malaria control policy and should also be reflected in the reproductive health policy. Involvement of all interested parties and contributors is crucial. The policy should address critical issues identified during the situation analysis and needs assessment, clearly define strategies and approaches for malaria prevention and control during pregnancy, and be consistent with the goals defined by the national malaria control programme and reproductive health programme. The previous section provides guidance that can assist in the development of the policy.

- **Develop or update a comprehensive strategy and implementation plans for malaria control during pregnancy**

During the RBM inception process, most malaria-endemic countries in the region carried out situation analysis exercises to identify strengths, opportunities, threats, and weaknesses of issues related to malaria control and health systems during the last 5 to 10 years. These countries are at various stages of developing strategic and implementation plans for malaria control in the context of the Roll Back Malaria initiative. The goal, objectives, strategic options, and implementation approaches, as well as indicators for monitoring and evaluation, for malaria prevention and control during pregnancy should be defined in the context of a national 5- to 10-year strategic plan for malaria control. All stakeholders should be involved in the planning process.

The 1- to 2-year implementation plans for the national and district level should be derived from the national strategic plan. The implementation plans should

state the expected results within a specific time frame, activities to be implemented, responsible person, indicators to monitor, cost, and source of funds for each activity.

- **Develop advocacy and communication strategies for malaria control**

Appropriate Information, Education, and Communication (IEC) strategies and programmes need to be developed to create messages for women and the general public to educate them about the burden of malaria infection during pregnancy and the appropriate prevention and control measures pregnant women should expect to receive. Emphasis should be given to effective communication between control programme staff and pregnant women in order to enhance compliance with control measures among women and families at risk for malaria.

Health-care providers are also an important target for IEC messages, particularly in settings that are introducing a change in policy. Compliance of pregnant women and the general public with the new policy will depend on the changes in behaviour of health personnel.

Advocacy tools should be developed to enhance and sustain political commitment, influence key decision makers about the effectiveness and cost benefits of the defined strategies, and mobilize resources for programme implementation.

- **Assist to strengthen support systems for antenatal services, including interventions for malaria control during pregnancy**

The implementation of malaria control interventions during pregnancy to achieve RBM and reproductive health goals requires a favourable environment (e.g., political commitment, provision of facilities and resources) and strengthened human resource capabilities and institutional capacity at the country level. Effective procurement and supply systems, as well as referral, communication, supervision and surveillance systems, need to be established to ensure adequate access to essential services and commodities such as drugs, ITN's, and other supplies required for quality care. This will require well-planned logistics and financing. Partnerships with other clinic-based procurement, supply, and referral systems such as those that have been developed for IMPAC, IMCI and the Expanded Programme on Immunisation will be particularly important.

The aim of the system is to increase access to and compliance with prevention and control measures by pregnant women and the general population. Adequate geographical coverage should be ensured, as should coverage of the poorest and marginalized populations. Assurance of equity in access to services must be a priority for national programmes.

- **Build personnel capacity for malaria control during pregnancy**

In most countries, plans to strengthen malaria control during pregnancy will initially focus on the capacity of health facilities to deliver effective malaria prevention interventions and case management. The investments in building the health system capacity should be made in a coordinated manner involving all programme partners.

Well-trained and well-equipped health-care workers are required to support implementation and provide quality care. Intensification of training and retraining of health personnel is a priority. In-service training regarding policy and guidelines for malaria control during pregnancy should be conducted at all levels of the health system. Adequate training manuals may need to be developed or reviewed. Preservice education through the incorporation of a malaria control syllabus into the curriculum of schools of medicine, nursing, public health, and related health training institutions is a medium-term strategy to improve health-care workers' skills for malaria control. Nonformal providers should be engaged, and their links with the formal health sector should be ensured. Specific approaches to ensure the involvement of private medical practitioners, who treat a substantial portion of malaria cases, may be required.

Regular supervision of trained health personnel is important to motivate staff and ensure quality of care. The issue of an overall strategy for human resources development should be addressed within the context of national health systems.

- **Define a research agenda for malaria and its control during pregnancy**

National programmes and research partners may at times find it necessary to conduct operational research to assess both basic issues regarding the biology and control of malaria during pregnancy as well as operational issues relevant to national programme implementation. National programme leaders should have prompt access to results of such investigations to inform national programme planning and implementation. Documenting and sharing best practices is essential for improving programme implementation.

6. MONITORING AND EVALUATION OF PROGRAMMES FOR MALARIA CONTROL DURING PREGNANCY

An effective system for monitoring progress and evaluating outcomes and impact will be critical to measure a country's success in controlling malaria during pregnancy.

Monitoring is needed to measure the progress of the health programme at all levels. Monitoring can help verify that activities are being implemented as planned, ensure accountability, and detect problems and constraints to provide local feedback to the relevant authorities and support them in promoting better planning.

Evaluation of outcomes and impact is needed to document periodically whether defined strategies and implemented activities are leading to expected results. Monitoring is a continuous process, while evaluation will need to be conducted intermittently.

Five critical areas for monitoring and evaluation have been identified that relate directly to RBM objectives:

- Impact of malaria, i.e., morbidity, mortality, and economic losses
- Improvements in malaria prevention and disease management including prevention and control of epidemics
- Related health sector development
- Intersectoral linkages that need to be created or reinforced
- Support and partnerships

Each of the interventions for malaria control and prevention during pregnancy (case management, IPT, ITN's) has a key implementation partner, and shared monitoring and evaluation procedures must be developed among these partners. Strong partnerships are needed to conduct monitoring and evaluation of malaria during pregnancy, and the monitoring and evaluation framework should be a cooperative effort from the start between malaria and reproductive health experts. Therefore, both RBM and MPS staff need to work closely to develop and implement this strategy.

The approach to monitoring and evaluation of control programmes for malaria during pregnancy is to focus on a limited number of indicators that can be used at minimal cost to track implementation progress and alert programme managers of obstacles. Thus, it will be important that these indicators and approaches to data collection be integrated into the indicators for the MPS or MNH programmes at the country level.

The most important indicators for monitoring programmes to control the adverse consequences of malaria during pregnancy are process indicators, i.e., those that measure whether or not interventions known to be effective in reducing the adverse consequences of malaria during pregnancy are being implemented. It is also important to measure the potential impact of prevention programmes in reducing the burden of maternal anaemia and LBW, even though other factors, especially HIV and malnutrition, may affect anaemia and LBW.

The following process and impact indicators have been recommended:

PROCESS INDICATORS:

- The percentage of pregnant women receiving either appropriate IPT or chemoprophylaxis
- The percentage of ANC staff trained in IPT for pregnant women
- The percentage of pregnant women who receive screening for anaemia and appropriate treatment
- The percentage of pregnant women who report use of an ITN since their last clinic visit

IMPACT INDICATORS:

- The percentage of pregnant women with severe anaemia (haemoglobin \leq 7 gm/dL) at 34 weeks gestation or more
- The percentage of LBW newborns (<2500 grams) born to primigravidae and multigravidae

7. RESEARCH PRIORITIES FOR CONTROL OF MALARIA DURING PREGNANCY

Programmes focused on malaria control during pregnancy will be improved through research on both the biology and control of malaria during pregnancy and on operational issues related to programme implementation. National programme leaders will need the results of this research to assist programme planning and implementation efforts. Four priority areas are the following:

- Effective drug regimens for IPT

Alternative antimalarial drugs for use for IPT during pregnancy must have acceptable safety even when used in the latter half of pregnancy. Among the currently available antimalarial drugs, only SP, mefloquine, proguanil, quinine, amodiaquine and Maloprim (combination of pyrimethamine and dapsone) are available for use during pregnancy. Mefloquine is expensive for most Ministries of Health in developing countries and is not widely available in Africa. Proguanil, in addition to problems of compliance, has altered pharmacokinetics during pregnancy, and higher maintenance doses are required. Maloprim has been used in some situations but has similar problems of compliance as CQ; in addition, resistance to pyrimethamine develops very rapidly. Presently the best available alternative to CQ, therefore, is SP. With the emergence of SP resistance in east and southern Africa, there is a need to evaluate other antimalarials, either alone or in combination, with priority based on the likely safety and efficacy profile in pregnancy, as well as affordability.

- Programme options for achieving sustainable high levels of coverage of ITN use by women of reproductive age

Studies have been conducted to determine the efficacy of ITN's in reducing the burden of malaria illness among pregnant women under study conditions. As programmes are scaled up to provide broad access to ITN's, similar efforts should be directed to documenting the beneficial impact of ITN's on maternal and newborn health under programmatic conditions. Evidence already exists that ITN use by pregnant women will significantly reduce the numbers of LBW infants. Many options exist for ITN distribution and finance in Africa, including distribution through the private sector with or without subsidisation. Alternative approaches emphasize the direct provision of ITN's at no cost to highly vulnerable populations, such as young children and pregnant women. In addition to assuring high levels of use of ITN's, it is also critical to develop distribution systems that will be sustainable and in which re-dipping of nets as required will be assured. Operational research at the national and community levels is required to define effective models to assure sustainable and effective ITN use.

- Efficacy of alternative IPT regimens combined with ITN's to control maternal anaemia and LBW

A central element of the control approach for areas of stable malaria transmission is the use of IPT and ITN's by pregnant women. Operational research is needed to determine if long-acting antimalarial drugs are required for IPT if ITN use is continuous. Some of the next generation of potentially efficacious and safe drugs for IPT have short half-lives; it is a priority to assess whether use of these drugs is programmatically acceptable in an IPT regimen.

- Analysis of social and cultural determinants of women using services to control malaria during pregnancy

The reduction of malaria burden by pregnant women and their offspring depends on women having access to and using quality antenatal care services. Many important cultural factors determine how women perceive drug use and other components of the proposed control strategy. Emphasis needs to be placed on a careful assessment and review of such factors as national implementation plans are developed.

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