

The Rapid Assessment of the Burden of Malaria during Pregnancy

1. The Manual

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Executive Summary

Each year, more than 30 million women living in areas where malaria is transmitted become pregnant, and an estimated 200,000 newborns die as a result of their mothers' infection. Nine of 10 malaria deaths worldwide occur in Sub-Saharan Africa, the part of the world most affected by malaria, and in that region, as many as 10,000 pregnant women die each year of malaria-related causes, chiefly anemia. Less is known about the effects of malaria during pregnancy in other parts of the world, but large numbers of pregnant women are at risk. Safe and effective interventions for pregnant women—intermittent preventive treatment, insecticide-treated mosquito nets, and febrile case management—can help prevent the consequences of malaria infection. Malaria-affected countries vary widely in their knowledge of the burden of malaria in pregnancy within their borders and of the impact of any interventions or programs.

This rapid assessment package is designed to help countries obtain the information they need to assess the burden of malaria during pregnancy, to develop a policy or program, to assess program implementation, and to evaluate impact. The information can also be used to advocate for policy change and to provide baseline data. When planning assessments, countries are encouraged to make use of pertinent recent data from reliable sources. However, because data may be lacking and because worldwide a relatively high number of women visit an antenatal clinic at least once during pregnancy (in sub-Saharan Africa, a high proportion visit at least once), this package provides sample surveys and interview guides that can be used to conduct assessments in health facilities that serve pregnant women. By conducting an assessment, health staff can increase their knowledge of issues regarding malaria during pregnancy, while improving their ability to conduct operational research related to malaria during pregnancy.

The package provides most of the materials needed to conduct a rapid assessment: general guidance about planning and conducting a rapid assessment (including where to locate existing data); sample assessment instruments, both quantitative and qualitative, which can and should be adapted to local circumstances; specific information about how to use each tool; and guidance about the use of the information obtained. Other resources, including relevant guidelines, sample PowerPoint presentations for training sessions, training videos, and data analysis software (Epi Info), are also included.

The assessment has been piloted in several countries in sub-Saharan Africa and in Asia. The lessons learned from conducting assessments in these regions are reflected in this package.

Acknowledgements

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Cover credit: Virginia Jacobs, CDC.

Abbreviations

CDC	Centers for Disease Control and Prevention
DHS	Demographic and Health Survey
HCW	health-care worker
ID	identification
IPTp	intermittent preventive treatment for pregnant women
ITN	insecticide-treated net
LBW	low birth weight
MICS	Multiple Indicator Cluster Survey
MIPESA	Malaria in Pregnancy East and Southern Africa: Coalition for Prevention and Control
MoH	Ministry of Health
MIS	Malaria Indicator Survey
RAOPAG	Réseau d’Afrique de l’Ouest contre le Paludisme pendant la grossesse
RBM	Roll Back Malaria
SP	sulfadoxine-pyrimethamine

UNICEF
USAID
WHO

United Nations Children's Fund
U.S. Agency for International Development
World Health Organization

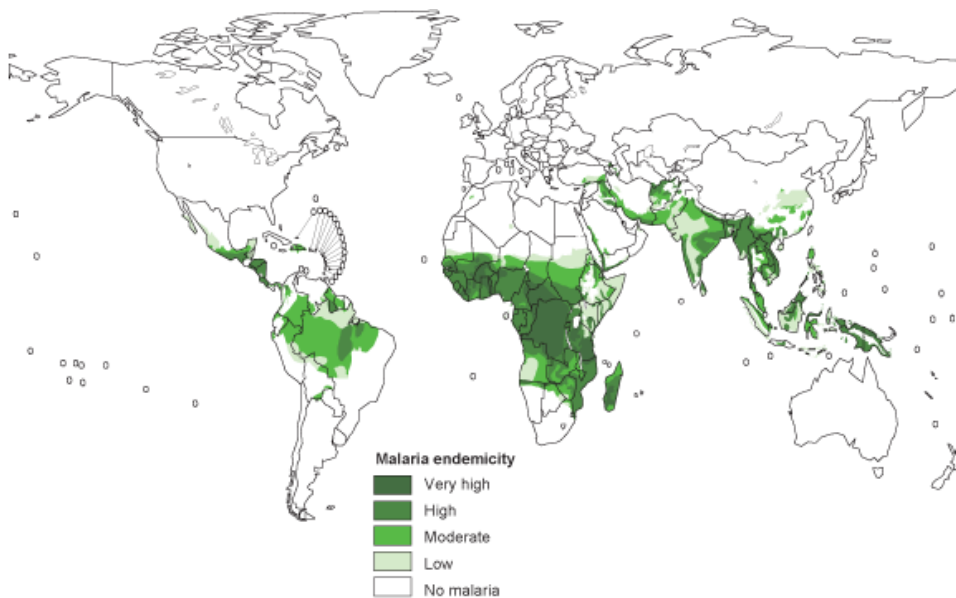
1. Malaria during Pregnancy: Addressing the Burden

1.1 The Burden of Malaria during Pregnancy

Pregnant women and children are particularly vulnerable to infection with any of the parasites that cause malaria in humans: *Plasmodium falciparum*, *P. vivax*, *P. malariae*, and *P. ovale*. Each year, approximately 50 million women in malaria-endemic areas (25 million of these live in Africa) become pregnant and are at risk of the adverse consequences of malaria during pregnancy [1, 2]. Malaria is a threat both to themselves and their babies, leading to about 200,000 newborn deaths each year as a result of malaria in pregnancy [1, 3]. The problem of malaria in pregnant women has not been extensively studied outside sub-Saharan Africa, and limited information exists about the burden of the problem in other areas.

The infecting parasite and the level of transmission (high or low) are key determinants of the consequences of malaria infection during pregnancy.¹

Global Malaria Transmission (Endemicity) Levels



Source: WHO and UNICEF, 2005 World Malaria Report.

¹ Other determinants can include gravidity, parity, age, HIV infection, and access to prompt and effective treatment.

1.1.1 Infection with Plasmodium falciparum

Areas of High (or Stable) Transmission

Sub-Saharan Africa is the region of the world most affected by malaria, and in high (or stable) transmission areas in that region, *P. falciparum*, the most lethal of the four parasites, predominates.

While most adults in areas of high or stable transmission (the majority of sub-Saharan Africa) have developed a partial immunity to malaria that largely prevents clinical illness, a woman's immune system changes during pregnancy, making her more vulnerable to malaria infection. Infected red blood cells can sequester in the placenta, evading immune detection and clearance. This infection can endanger the pregnant woman's health, as well as that of the unborn baby she is carrying, and cause maternal anemia, fetal loss, prematurity, intrauterine growth retardation, and low birth weight (LBW) (<2500 grams) [4-8]. In areas of high *P. falciparum* transmission, maternal anemia and LBW are the principal sequelae of infection.

- Maternal anemia contributes significantly to maternal mortality and causes an estimated 10,000 deaths per year in sub-Saharan Africa [9].
- LBW increases an infant's likelihood of dying fourfold [10, 11] in sub-Saharan Africa. In this region, as many as 16% (or 4 million) of all newborns are estimated to be LBW [12], the single greatest risk factor for neonatal mortality and a major contributor to infant mortality [13]. Of the many factors that contribute to LBW, malaria is a major factor at an estimated 20% [3, 14], and one of the few, along with poor nutrition, anemia, and other infections, that is amenable to intervention once a woman becomes pregnant.
- The risk of bearing a low birth weight baby is 2-7 times higher among primigravidae than among multigravidae [15].

Areas of Low (Unstable or Seasonal) Transmission

Women in areas of low (unstable or seasonal) transmission do not have high levels of acquired immunity and thus usually have symptoms of malaria infection. In these areas, *P. falciparum* malaria infection in the pregnant woman can result in maternal illness, severe disease, anemia, maternal death, and adverse reproductive outcomes, including fetal loss. During the second half of pregnancy, malaria infection can cause pregnancy loss; and, in combination with maternal anemia, it can interfere with fetal weight gain and contribute to prematurity and intrauterine growth retardation, thus resulting in LBW.

1.1.2 Infection with Other Malaria Parasites

The effects of the other three malaria parasites are less well-known. Pregnant women in Africa at risk of *P. vivax* infection live principally in areas of low or unstable transmission, and in these areas, *P. vivax* infections are likely to result in febrile illness. Most data on *P. vivax* infections are from outside Africa, where women have been shown to be at increased risk of *P. vivax* during pregnancy, although the risk is less pronounced than it is among women with *P. falciparum* (Martinez-Espinoza 2004). A study among nonimmune pregnant women in Thailand reported that even single infections with *P. vivax* in the peripheral blood are associated with reductions in birthweight and maternal hemoglobin but to a lesser extent than are those with *P. falciparum* [16, 17]. Robust data on the prevalence of *P. ovale* and *P. malariae* are currently unavailable in any population.

1.1.3 Malaria and HIV

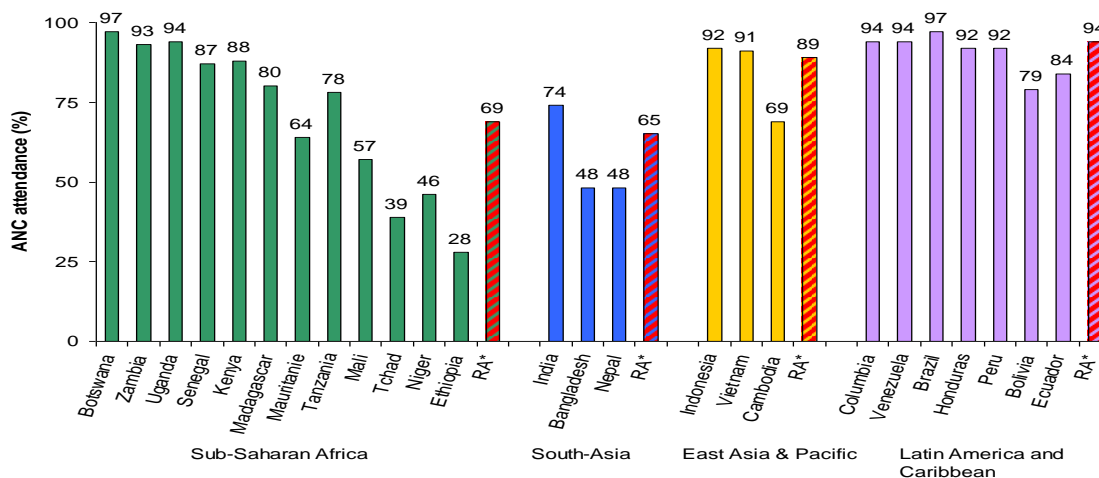
In sub-Saharan Africa, where more than three-fourths (13.5 million) of the world's HIV-infected women reside approximately 25 million pregnant women are at risk of *P. falciparum* infection every year. A review of studies in Africa shows that coinfection with HIV exacerbates the burden of malaria in pregnancy. HIV increases the degree to which malaria is associated with severe anemia and low birth weight beyond the effect of HIV itself on these outcomes. HIV also puts women of all gravidities at risk for placental infection with malaria, not only women in their first or second pregnancy [18]

1.2 Malaria Prevention Interventions for Pregnant Women

In areas of high (or stable) malaria transmission, prevention of the ill effects of malaria during pregnancy requires a preventive approach because most women do not become clinically ill. The World Health Organization (WHO) has recommended a three-pronged strategy (IPTp, ITNs, case management) for controlling malaria during pregnancy in areas of high or stable transmission in Africa [2] (see box). WHO recommends intermittent preventive treatment (IPTp) as an essential component of antenatal care for all pregnant women in areas of high or stable transmission. IPTp involves the administration of an effective antimalarial at treatment doses at predefined intervals during pregnancy and at regularly scheduled antenatal visits. The remaining two interventions, insecticide-treated mosquito nets (ITNs) and effective case management, are recommended for all pregnant women, regardless of the area's malaria transmission level. ITNs are intended to prevent infection, while case management with an effective antimalarial is a treatment intervention. Each intervention is safe, effective, affordable, and deliverable.

If these interventions are offered through antenatal clinics, they can reach many to most pregnant women, since surveys show that a relatively high proportion of women worldwide have at least one antenatal visit with a skilled provider during pregnancy. In many countries in sub-Saharan Africa, East Asia and the Pacific, and Latin America and the Caribbean, more than 70% attend an antenatal clinic at least once.

Antenatal Care Coverage by Region



*RA: regional average

Source: State of the World's Children, Unicef 2008

Prevention and control of malaria in pregnant women should therefore be a critical component of antenatal services, and WHO's strategic framework for prevention and control of malaria during pregnancy in the African region underscores the need for close collaboration between malaria and reproductive health programs [2].

WHO's Recommended Interventions for Malaria Prevention and Control during Pregnancy in Areas of Stable Transmission in Africa

The policy for malaria prevention and control during pregnancy in areas of stable transmission in the African region should emphasize a preventive package of intermittent preventive treatment (IPTp) and insecticide-treated bed nets (ITNs) and ensure effective case management of malaria illness and anemia.

IPTp

All pregnant women in areas of stable malaria transmission should receive at least 2 doses of IPTp after quickening. The World Health Organization recommends a schedule of 4 antenatal clinic visits, with 3 visits after quickening. The delivery of IPTp with each scheduled visit after quickening will likely assure that a high proportion of women receive at least 2 doses. IPTp doses should not be given more frequently than monthly.

The most effective drug for IPTp is sulfadoxine-pyrimethamine (SP) because of its safety for use during pregnancy, effectiveness in reproductive-age women, and feasibility for use in programs, as it can be delivered as a single-dose treatment under observation by the health worker.*

ITNs

ITNs 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. ITNs 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.

Effective case management of malaria illness and anemia

Effective case management of malaria illness for all pregnant women in malarious areas must be assured. Iron/folate supplementation for anemia, an important consequence of malaria infection, should be given to pregnant women as part of routine antenatal care package. Pregnant women should also be screened for anemia, and those with moderate to severe anemia should be managed according to national reproductive health guidelines.

* Current scientific evidence suggests the following: 1) At least 2 IPTp doses are required to achieve optimal benefit in most women; 2) HIV-infected pregnant women receiving daily cotrimoxazole (CTX) should not receive IPTp with SP due to concerns with additive sulfa toxicity; 3) In settings where the HIV prevalence in pregnant women is greater than 10%, and where the daily CTX recommendation is not implemented among HIV-infected individuals, it is more cost effective to treat all women with at least a 3-dose IPTp regimen than to screen for HIV and provide this regimen only to HIV-infected women; 4) In HIV-uninfected pregnant women, there is no evidence that a third dose of IPTp causes any additional risk, that more than 3 IPTp doses during pregnancy offers additional benefit, or that receiving 3 or more doses of IPTp with SP will result in an increased risk of adverse drug reactions. Research to assess the safety, efficacy, and program feasibility of other antimalaria drugs for use in IPTp among both HIV-uninfected pregnant women, and HIV-infected pregnant women receiving daily CTX, is ongoing.

Source: World Health Organization. *A Strategic Framework for Malaria Prevention and Control during Pregnancy in the African Region*. Brazzaville: WHO Regional Office for Africa, 2004. AFR/MAL/04/01.

However the details of the specific interventions and tools used within this strategy have been updated in subsequent documents. The updated treatment recommendation of uncomplicated and severe malaria in pregnancy is part of the WHO Guidelines for the treatment of malaria, (<http://www.who.int/malaria/docs/TreatmentGuidelines2006.pdf>), while an updated recommendation on intermittent preventive treatment in pregnancy (IPTp) is in this report: <http://www.who.int/malaria/docs/IPTp/TechnicalExpertMtgIPTpReport.pdf>

1.3 Information for Action

The following four scenarios describe potential information gaps malaria-endemic countries may have. Each numbered scenario highlights the key unanswered questions and suggests what implications the answers might have for action.

1. The magnitude of the problem of malaria during pregnancy is not well known.

- *Does malaria present a problem for pregnant women and their infants in this area? Does malaria affect women in their first trimester? How big is the problem? Does malaria infection during pregnancy affect maternal morbidity and mortality?*

Even though it can be assumed that malaria during pregnancy is a significant problem and requires intervention in areas with high transmission of *P. falciparum* infections, a more precise documentation of the problem locally can also be used to advocate for increased resources and commitment to develop or enhance a program that addresses malaria during pregnancy. Also, in areas with other malaria transmission patterns (low-intermediate, seasonal, unstable), relatively little may be known about the burden of malaria during pregnancy. If malaria infection affects women in their first trimester, women will need to be encouraged to come in for care early, and the National Malaria Control Program will need to look for a strategy to control the adverse effects of malaria during pregnancy that includes women in their first trimester.

2. The burden of malaria in pregnancy is known, but policy and program strategy have not yet been developed.

- *What proportion of pregnant women seek antenatal care in antenatal clinics? What is the coverage of antenatal clinics? What barriers do pregnant women face when obtaining care from antenatal clinics?*
 - If antenatal clinics provide services for the majority of pregnant women in the area, resources should be directed to provide or improve interventions in antenatal clinics. If antenatal clinic coverage is not high, it is important to learn why and address the causes.
- *What should be done if the prevalence of malaria infection in pregnant women is low? Does it make a difference if pregnant women are symptomatic or asymptomatic?*
 - If prevalence is low, IPTp should not be offered. If most cases of malaria infection are symptomatic, the country may decide to treat cases rather than offer IPTp; if most cases are asymptomatic, then preventive treatment is necessary.

3. Policy has been developed, programs have begun, and information is needed on program implementation.

Coverage of interventions

- *What percentage of pregnant women is the program reaching?*
 - If coverage is low, it will be important to determine the causes, which can be better understood by examining issues relating to

the facility and the clients themselves.

Facility-dependent aspects of providing interventions

- *Are antenatal clinics equipped to provide the recommended interventions? Do they have trained health workers who can provide the needed interventions and care? Are drugs and supplies available? Are health workers aware of what the policy says? Are the antenatal clinic health workers providing the needed interventions appropriately?*
- Lack of needed supplies point to the need for improvement. Any deficiencies revealed in health-care worker knowledge or provision of services can identify specific training needs.

Client-dependent aspects affecting acceptance and use of malaria interventions

- *Are pregnant women able to obtain and willing to take antimalarial medications for IPTp and treatment of malaria illness? Do women have access to and do they use ITNs? What are pregnant women's knowledge of and attitudes about malaria and its effects during pregnancy? What cultural taboos affect how they seek care if they have malaria infection during pregnancy? Where do they receive their information and advice about malaria prevention? What is the best way to provide information about malaria prevention?*
- Understanding what facilitators and barriers exist to women's access and use of needed interventions can help in understanding program implementation issues. Understanding where and how they receive information about malaria can aid in the development of health education and communication campaigns, if needed.

4. Intervention coverage is substantial, and the country wants to determine the impact of the program.

- *Are the programs achieving their goals—improved health for pregnant women and their infants?*
 - Measures of coverage, placental infection, and LBW, as well as other indicators can give a snapshot of the effectiveness of the current program. These measures can also serve as baseline data against which to evaluate the impact of new interventions.

■ ■ ■ ■ ■

Information alone is not sufficient to respond to the problem of malaria during pregnancy. Commitment and resources are needed to translate this information into action.

- **Commitment** by malaria programs and reproductive health programs at national levels and below to use the information obtained to develop or refine policy and guide successful program implementation. The conduct of the assessment may seem to raise awareness of malaria in pregnancy among stakeholders and policymakers—a crucial step toward mobilizing necessary human and capital resources.
- **Adequate human and financial resources** to conduct the assessment, develop strategies for local and subregional programs, and provide ongoing

monitoring and evaluation of these activities. In the process of conducting the assessment and obtaining necessary information, the country strengthens its capacity to conduct operational research, which will likely be needed to continue to guide programs focusing on malaria as well as other diseases that threaten the health of its people.

1.4 Use of the Rapid Assessment Package

This rapid assessment² package is intended to assist a country quickly and comprehensively gather information it needs about the problem of malaria during pregnancy and opportunities for successful intervention.

A country may be able to take advantage of a wealth of information about the problem of malaria during pregnancy — current, relevant, available at no cost — within the Ministry of Health (MoH), for example. Information may also be available from other reliable sources, including Demographic Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), and Malaria Indicator Surveys (MIS). Regional information from networks such as Malaria in Pregnancy East and Southern Africa: Coalition for Prevention and Control (MIPESA) and Réseau d’Afrique de l’Ouest contre le Paludisme pendant la grossesse (RAOPAG) can be another important source of information.

Available sources may not supply all the information needed; thus, this assessment package was developed. The tools in this package are largely designed to obtain information from antenatal clinics and delivery units, even though not all women seek care from antenatal clinics or deliver their babies at a health facility. The currently recommended interventions are facility-based, and most countries that provide interventions for pregnant women concentrate their efforts on expanding implementation in facilities. See Chapter 4 for limitations of this approach.

The package contains a manual with general guidance:

- Chapter 2 outlines the design of a rapid assessment.
- Chapter 3 gives general information about preparing for and conducting a rapid assessment.
- Chapter 4 outlines how to manage, analyze, and interpret the data collected.
- Chapter 5 provides information about preparing a report and using the assessment information gathered.

The rest of the package has more specific tools and information:

- Modules 1-10 have assessment tools ready to be adapted to the needs of each country. Each module contains most of the information and written materials needed for that part of the assessment.
- Resources 1-4 contain a list of relevant articles, guidelines, sample PowerPoint presentations useful for training, and data analysis software (Epi Info).



2 The term “rapid assessment” can be used in multiple ways. As described in this manual, a rapid assessment provides a “snapshot” at one point in time of the problem of malaria and opportunities for intervention. A rapid assessment does not replace program monitoring and evaluation activities, but can form part of a monitoring and evaluation strategy.

The manual does not lay out a “one-size-fits-all” approach and is intended to be adapted for use by countries in all regions of the world affected by malaria.

2. Planning the Rapid Assessment

2.1 Objectives of the Rapid Assessment

Depending on a country's information needs, its rapid assessment could have one or more of the following objectives:

- Determine the burden of malaria
- Determine what sort of policy and program should be developed and implemented
- Assess implementation progress
- Assess the program's impact on infant and maternal health.

It is important to note that regardless of which malaria-related objectives are selected, another objective—to build national capacity to conduct operational research—will be achieved through the process of planning, conducting, and analyzing the assessment.

2.2 Potential Information Sources

Information may be readily available that fills some, although perhaps not all, of the information gaps. Sources³ of ready and recent (e.g., within the previous 5 years) data are various and may include

- Demographic Health Surveys (DHS) (see 2.2.1)
- Multiple Indicator Cluster Surveys (MICS) (see 2.2.2)
- Malaria Indicator Surveys (MIS) (see 2.2.3)
- Roll Back Malaria (RBM) baseline surveys
- National routine health information systems
- Reports by nongovernmental organizations
- Published scientific articles about malaria in pregnancy in the country or the region

Numerous household surveys have been conducted since 2000, including DHS, MICS, MIS, Population Services International surveys, and RBM baseline surveys. The following Web site tracks major household surveys and data collection tools: <http://www.internationalsurveynetwork.org/home/>

Pertinent studies include those conducted not only in the country or district itself, but also in the subregion ("subregion" denotes an area that is part of a WHO-defined "region"). Subregional data are an often underutilized source of information and may provide adequate information, especially about the magnitude of the problem (e.g., prevalence of malaria infection in pregnant women's blood and placenta) from a country with similar geoclimatic characteristics. In addition, since customs and taboos vary by ethnic group, data from the same ethnic group in a neighboring

3 It is important to note that some of the surveys above, for example DHS and MICS, are population-based rather than facility-based, and thus cannot be used to validate results of this facility-based assessment.

country may provide sufficient information about the cultural aspects of malaria and its treatment and prevention.

In recognition of the importance of subregional information and approaches to malaria control and prevention, several subregional networks have been established in the African region that focus on the prevention and control of malaria during pregnancy. MIPESA was created in 2002 to bring together five countries (Kenya, Malawi, Tanzania, Uganda, Zambia), all of which had adopted policy for control of malaria in pregnancy (IPTp, ITNs, and effective case management), in line with WHO recommendations. In West Africa, RAOPAG was formed in 2003 and includes malaria-endemic countries of West Africa. These organizations routinely share their data and experiences at network meetings.

Using available data can save time and money,

- Determine if a recent⁴ study has been done either in the country or in a country with a similar malaria profile.
- If a recent study has been done, consider when, where, and among whom it was conducted.

2.2.1 Demographic and Health Surveys

Demographic and Health Surveys (DHS) are nationally representative household surveys that focus on reproductive and child health. Organized by Macro International, Calverton, MD, USA, and sponsored by the United States Agency for International Development (USAID), a typical DHS has a large sample size (usually between 5,000 and 30,000 households) and uses a multiple-stage cluster design. Because questionnaires are standardized and structured and change little between surveys, DHS outcomes are comparable between countries and over time. The average interval between two DHS is approximately 5 years.

Since 1998, some DHS have used specific questions relevant to malaria prevention and treatment, including

- antenatal clinic coverage
- delivery unit coverage
- type of antimalarial drugs given, timing, and dosage
- possession of mosquito nets and their use for children less than 5 years old and pregnant women
- use of IPTp by pregnant women
- prevalence of anemia by hemoglobin measurement in children less than 5 years old and pregnant women.

The DHS survey package also includes an optional malaria module, which can be used in all surveys conducted in malarious countries.

Data are available at <http://www.measuredhs.com/>. For more information about DHS, consult <http://www.measuredhs.com> or contact MEASURE DHS+, Macro

⁴ The meaning of “recent” varies by situation. In some cases, where no new programs have been initiated, no initiatives to improve services have been instituted, and the malaria transmission level is considered to be about the same, a 5-year-old survey may provide adequate information.

International Inc., 11785 Beltsville Drive, Suite 300, Calverton MD 20705 USA; tel: 301-572-0456; fax: 301-572-0999; e-mail: measure@orcmacro.com.

2.2.2 Multiple Indicator Cluster Surveys

Multiple Indicator Cluster Surveys (MICS) are also nationally representative household surveys. They use a two-stage cluster sampling design, with an average sample size of around 6,000 households. The questionnaire covers living conditions and household assets, allowing the data to be stratified by such factors as place of residence, education of the mother, and wealth quintile of the household. MICS are conducted approximately every 3 years in about 70 countries worldwide.

This survey also has questions about

- prevalence of fever in the previous 2 weeks
- type of treatment received and place of treatment
- use of any nets and of ITNs by children less than 5 years old.

Data are collected on indicators such as all-cause mortality among children less than 5 years old and coverage of antenatal care.

Survey results and questionnaires are available at <http://www.childinfo.org/>. Like DHS, most MICS are conducted outside the peak malaria season.

2.2.3 Malaria Indicator Survey Package

RBM's Monitoring and Evaluation Reference Group has a package of tools for assessing coverage of key RBM interventions at the household level: coverage of ITNs, antimalarial treatment among children under 5 with fever, and IPTp. It includes defined indicators; questionnaire and data tabulation plans for calculation of indicators; and guidance on conducting surveys, designing sampling frames, and calculating sample sizes. The sample size is usually about 3,000 households, smaller than that required for a DHS or MICS. The MIS should be conducted during the peak malaria season. The MIS package can be accessed at <http://www.rollbackmalaria.org/>

The following table from WHO's World Malaria Report 2008 provides an example of data compiled from recent surveys.

Data from Recent Surveys: Percentage of pregnant women who slept under an insecticide-treated net the night before the survey

Africa	Year	Source	Percentage
Benin	2006	DHS 2006	20.0
Congo	2005	DHS 2005	4.0
Ethiopia	2007	MIS 2007	35.0
Guinea	2005	DHS 2005	1.0
Kenya	2003	DHS 2003	5.0
Malawi	2004	DHS 2004	15.0
Mali	2006	DHS 2006	29.0
Niger	2006	DHS 2006	7.0
Rwanda	2005	DHS 2005	17.0
Senegal	2006	MIS 2006	17.0
Tanzania	2004	DHS 2004-05	16.0
Uganda	2006	DHS 2006	10.0

Zambia	2006	MIS 2006	24.0
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2.3 Designing the Rapid Assessment

The table below links potential information needs with the appropriate assessment tools in this package.

Scenarios, Information, Assessment Tools

Scenario	Information	Tool(s)
Size of problem of malaria in pregnancy	Measures of impact: <ul style="list-style-type: none"> Prevalence of peripheral and placental malaria and anemia Relationship of malaria to LBW and prematurity Illness and adverse pregnancy outcomes due to severe malaria 	1: Antenatal clinic surveys 2: Delivery unit surveys 3: Hospital surveillance of malaria disease
Development of policy and strategy	Sources of care: <ul style="list-style-type: none"> Where pregnant women receive care Antenatal clinic coverage 	<i>Note:</i> No assessment tools will yield this information. DHS and MIS can supply information on source of care; MICS can supply some of this information.
	Prevalence profile: <ul style="list-style-type: none"> Level of prevalence, prevalence by gravidity and locale, symptoms associated with infection 	1: Antenatal clinic surveys 2: Delivery unit surveys 3: Hospital surveillance of malaria
Program implementation	Coverage of interventions <ul style="list-style-type: none"> Percentage of pregnant women reached by program 	<i>Note:</i> No assessment tools will yield this information. DHS and MIS can supply information on source of care; MICS can supply some of this information.
	Facility-dependent aspects of providing interventions: <ul style="list-style-type: none"> Availability of equipment, supplies (including ITNs), medications Staffing patterns; schedule; services Current practices Medications dispensed Health education Relationship between community services (traditional birth attendants⁵) & facility-level staff 	4: Antenatal clinic facility assessment 5: Health-care worker (HCW) observation 6: Individual interviews and focus groups with HCWs 7: Individual interviews and focus groups with midwives ⁶ and traditional birth attendants.
	Client-dependent aspects of offering interventions: <ul style="list-style-type: none"> Sources of information and advice about malaria prevention Barriers to obtaining antenatal care and using recommended interventions 	6: Individual interviews and focus groups with HCWs 7: Individual interviews and focus groups with midwives and traditional birth attendants 8: Antenatal clinic client exit interview 9: Individual interviews and focus groups with pregnant women 10: Individual interviews with key informants
Program impact	Measures of impact: <ul style="list-style-type: none"> Prevalence of peripheral parasitemia and anemia Prevalence of placental and cord 	1: Antenatal clinic surveys 2: Delivery unit surveys 3: Hospital surveillance of malaria disease

⁵ Traditional birth attendant refers to a person without formal training who delivers babies.

⁶ Midwife refers to a person who has professional training in the delivery of babies.

- | |
|--|
| parasitemia
• Severe malaria outcomes
• Low birth weight
• Incidence of prematurity |
|--|

Tools 1, 2, 3, 4, 5, and 8 are quantitative; Tools 6, 7, 9, and 10 are qualitative.

Ideally, if Tool 6, 7, or 9 is selected, both interviews and focus group techniques should be used, as they may provide different data and can also serve to validate data from other techniques ("triangulation"). If both cannot be done, the more appropriate technique should be chosen based on the local situation. See Modules 6, 7, and 9 for each technique's advantages and disadvantages of each technique.

3. Conducting the Rapid Assessment

This chapter provides information about specific activities that are relevant to all assessment instruments: selecting a time period for the assessment; determining a general timetable and budget; building a team; selecting assessment areas and sites and determining sample sizes; selecting and organizing team members; adapting and translating questionnaires; training of the assessment team; and conducting the assessment (including assuring assessment quality and providing information to participants about the survey/informed consent).

3.1 Selecting a Time Period

The following are important considerations for deciding when to conduct the assessment:

- Seasonal patterns of malaria transmission: **It is ideal to maximize the number of cases of malaria parasitemia by attempting to schedule the assessment during periods of high transmission (i.e., during or soon after the rainy season).** Assessments during this time capture the worst-case scenario and are important for planning and advocacy purposes. In addition, data can be collected most efficiently during these periods. However, if prevalence differs markedly by season, it might be preferable to conduct the assessment during both high and low transmission periods. The benefit of obtaining this information would need to be balanced against the additional use of resources required to repeat the assessment.
- Road conditions and facility/community access: All data collection must take place when facilities and communities are accessible by road. Travel can be difficult during the rainy season. In addition, one must confirm that the health facilities that will be included in the assessment will be open and in use during the proposed assessment dates.
- Availability of assessment staff: Assessment staff must be available for the training and during the entire assessment period.

3.2 Determining a Timetable and Budget

The total duration of the assessment, as well as the cost, depends on which, how many, and in what sequence (simultaneously or sequentially) the rapid assessment tools are conducted. It also depends on the number of areas where the assessment is conducted and the number of participants selected. See Modules 1 and 2 for sample survey timetables for the antenatal clinic and delivery unit surveys.

If all tools are to be used, it is recommended that the qualitative components of the assessment (e.g., focus groups, individual interviews) be conducted at the same time as the quantitative component. This could be facilitated by, for example, having a local university or other institution of higher learning conduct the individual and focus group interviews while the MoH conducts the other studies.

It is possible that both national and external sources of funding may be found to help finance the assessment. A sample costing tool is provided in Resource 4 to assist in determining a budget.

3.3. Building and Organizing the Assessment Team

3.3.1 Roles, Responsibilities, and Requirements

Assessment Coordinator

An assessment coordinator is essential for planning and supervising all assessment activities. He or she may do this alone or in conjunction with his or her supervisor. The assessment coordinator is key to building assessment teams that can successfully conduct the assessment. If the assessment will include collection of qualitative data, ideally the assessment coordinator will have had experience in qualitative data collection. If not, a coordinator for that portion of the assessment should be selected and should work closely with the overall assessment coordinator. No activities should occur before an assessment coordinator is selected. Note: If the assessment coordinator will also supervise and conduct qualitative research, he/she will also have the responsibilities listed below for the qualitative data coordinator.

Responsibilities

- Discuss the assessment with health authorities, local partners, and community leaders
- Select assessment sites
- Select site supervisors, interviewers, and laboratorians
- Ensure procurement of assessment equipment and supplies (*See modules for list*)
- Organize and manage the training of site supervisors, interviewers, and laboratorians
- Collect data from facility assessments and health-care worker observations
- Establish quality control and supervisory mechanisms in each assessment site
- Troubleshoot and make adjustments as needed
- Ensure appropriate analysis and report results from the rapid assessment, in conjunction with assessment coordinator of the qualitative component, if different

Requirements

- Have experience working in or have links with the health system
- Be familiar with the local health system and health divisions
- Have experience conducting facility- and community-based surveys
- Have some technical knowledge in the areas of reproductive health and malaria (optimal)
- Be able to troubleshoot and adjust accordingly
- If possible, have experience administering, budgeting, managing public health programs

Qualitative Data Coordinator

Responsibilities

- Discuss the assessment with health authorities, local partners, and community leaders
- Select interviewers, facilitators, recorders
- Organize and manage training of interviewers, facilitators, and recorders
- Revise interview guides as necessary
- Supervise interviewers and data management
- Communicate with facilities before the site visits to organize interviews so as to not disrupt patient care, select key informants, select focus group venues
- Ensure procurement of assessment equipment and supplies (*See modules*)
- Establish quality control and supervisory mechanisms
- Ensure appropriate analysis and report results from the rapid assessment

Requirements

- Have experience working in/have links with the health system
- Be familiar with the local health system and health divisions
- Have knowledge of qualitative methodology (including differences between individual and focus group interviews)
 - Understand elements of qualitative debriefings (See 3.7 and Modules 6, 7, 9, 10)
- Have experience conducting qualitative assessments
- Have skills in qualitative data management (working knowledge of computer programs such as Word, Excel; production of field notes; ability to track data across facilities)
- Have reasonable technical knowledge of reproductive health and malaria (optimal)
- Be able to troubleshoot and adjust accordingly

Laboratory Component Supervisor

A laboratory component supervisor is critical for an assessment that conducts antenatal clinic and/or delivery unit surveys.

Responsibilities

- Ensure control of laboratory procedures in all assessment sites
- Oversee all laboratorians working on the assessment

Requirements

- Have experience working in/have links with the public health system
- Have technical expertise in malaria microscopy (optimally, has several years' experience reading thick and thin blood films)
- Has been trained to read placental blood smears by the time the study starts
- Be competent in the training and management of laboratorians

Site Supervisors, Interviewers, and Laboratorians

Site supervisors, interviewers, and laboratorians should be selected carefully by the persons organizing the assessment. These team members are essential to the success of the rapid assessment. It is important that they be well trained.

Responsibilities

Site supervisors:

- Ensure assessment quality (See 3.7)
- May also assist in administering the questionnaires and in conducting clinical procedures
- Troubleshoot, in consultation with the assessment supervisor

Interviewers:

- Administer questionnaires and conduct all clinical procedures

Laboratorians:

- Conduct all laboratory procedures

Data Management Coordinator

Responsibilities

- Ensure that data are kept securely
- Assist in data analysis

3.3.2 Staffing Approaches for the Assessment Quantitative Component

Depending on which tools are selected for the rapid assessment, the assessment coordinator could use either or both of the following approaches to select assessment team members for the quantitative portion of the assessment (e.g., antenatal clinic survey, delivery unit survey, severe disease surveillance, client exit interview, health-care worker observation, health facility assessment):

- Hire new staff
- Use existing antenatal clinic and delivery staff.

New staff hired specifically for the quantitative portion of the assessment should be organized by teams, with each team composed either of one laboratorian and three interviewers or one laboratorian, two interviewers, and one site supervisor. If existing antenatal clinic and delivery unit staff are used, one of the staff members at each antenatal clinic or delivery unit should be designated as the site supervisor.

The antenatal clinic teams can rotate between antenatal clinics included in the assessment until the desired sample size is obtained. Ideally, for the delivery unit survey one team member will be available 24 hours per day in the delivery unit to promptly process placental samples. It may be helpful to include an additional interviewer for this purpose. If this is not possible, a cooler and icepacks should be available so that placentas can be stored.

Advantages and Disadvantages of Staffing Approaches

Staffing Approach	Advantages	Disadvantages
Hire new staff	<ul style="list-style-type: none"> • Assessment is staff's priority • Payment is simple • Rapid assessment does not compromise delivery of clinical care 	<ul style="list-style-type: none"> • No capacity building of existing staff • Existing staff may resent outsiders if effective linkages to clinic staff not made • May be more expensive • May compromise assessment quality if nonmedical staff do not have sufficient training • May be more difficult to ensure treatment of women with anemia or malaria • MoH may feel less invested in the assessment
Use existing health staff	<ul style="list-style-type: none"> • Builds capacity • Facilitates enrollment • Facilitates clinical treatment when indicated • Builds morale • Ownership of assessment • Buy-in for future interventions 	<ul style="list-style-type: none"> • May overburden busy staff • Assessment work (if paid) may take priority over regular work • Payment issues are delicate • Staff may think that any work requires extra payment • May compromise quality of assessment in busy settings • May be competing with projects going on simultaneously

The choice of whether or not to hire new staff should be guided by

- Consideration of personnel available and able to conduct these activities
- Financial constraints. The project budget may make it difficult to hire outside staff, which is the more expensive option.

If existing staff members make up the assessment team, the following could help show appreciation for their assistance in assuming additional responsibilities outside their normal workload:

- Improve the working environment by supplying equipment, books, and/or teaching materials or by improving the facility (for example, buying teapot and tea supplies, painting walls)
- Invite staff to dissemination activities/presentation of results at the end of the assessment
- Pay a "per diem" for attending assessment training, but not for conducting the assessment
- Provide payment (an "incentive") for the extra work the staff does as part of the assessment
- Provide certificate of participation in study.

See Modules 1-10 for a list of specific personnel needed to conduct each tool.

Qualitative Component

If the assessment includes a qualitative portion, it is important to consider the approach that will be used for managing data collected from individual and focus group interviews (see 4.2). Each approach has implications for the personnel and software needed to manage and analyze the data. New staff may need to be hired (current staff is unlikely to be trained in this type of research), or a university or another institution with expertise in qualitative research may be involved. However, if insufficient resources and opportunities exist, current staff can be provided intensive training. This can be an excellent opportunity to build local/national capacity to conduct qualitative studies. See Resource 2.

Six to eight people are needed to conduct the qualitative portion of the assessment. For individual interviews, the number of staff needed depends on staff experience. An experienced staff member could both interview and record; if more junior or inexperienced staff members are used, individual interviews will require one person to interview and another to record. Focus groups require one person to facilitate (i.e., ask questions) and at least two people to record, if at all possible.

3.4 Selecting Assessment Areas, Sites, and Sample Sizes

3.4.1 Assessment Areas

The objective(s) of the rapid assessment will guide the selection of the assessment area or areas. For example, a country may wish to obtain information on the problem and interventions countrywide, or in one or more geographic regions, or in one or more districts, or in urban versus rural areas.

Whether the assessment focuses on an entire country or only one region of a country, the most important selection criterion is the transmission pattern of malaria. If the transmission pattern differs markedly within the area of interest, an attempt should be made to collect information from subareas with different transmission patterns. The chief concern should be to obtain representative data from the area of

interest. Although an ideal assessment might involve sampling a variety of sites within the country, resources often dictate choosing one site, or a number of sites in a well-defined geographic area such as a district, which are likely to be representative of the general situation of malaria during pregnancy.

3.4.2 Assessment Sites

Quantitative Component

Within the country, region, or district of interest, the following criteria can be used to select specific sites for facility-based surveys, observations, and interviews:

- A sufficiently high volume of antenatal clinic clients (antenatal clinic survey) or facility-based deliveries (delivery unit survey) to ensure that numbers are adequate to reach the desired sample size most expeditiously and within the allotted time for the study
- Facilities with both an antenatal clinic and a delivery unit (for the sake of efficiency in conducting the assessment)
- Ability to gain access to antenatal clinics and delivery units during the assessment
- Representativeness of the facility population (in terms of ethnicity, urban/rural residence, socioeconomic status)
- Geographic area to ensure coverage from different geographic areas. This may be difficult to achieve in reality, as previously noted.

The more facilities involved, the more representative the data. However, the larger the number of facilities selected, the more resources (human, financial, logistic) will be required to conduct the assessment. Thus, those selecting sites should balance the need for representativeness of data with the availability of resources.

Experience with rapid assessments shows that a total of two delivery units and four antenatal clinics from a selected district or region is feasible and reasonably efficient for assessment of burden of disease, but these are not “magic” numbers. The needed sample size and client volume in the assessment area may affect the number of sites selected per region or district. See modules.

Qualitative Component

Participants can be selected from the chosen health facility catchment areas or from a larger number of districts or regions, depending on the budget. If participants are chosen from a broader number of districts or regions, they should be chosen in much the same way that districts or regions selected for the quantitative surveys have been chosen.

Focus groups and individual interviews can be held in health facilities, homes, and community venues, depending on who is being interviewed.

3.4.3 Sample Sizes

Sample sizes for antenatal clinic and delivery unit surveys depend largely on point estimates of key indicators of burden and desired level of accuracy. Sample sizes recommended for other tools derive from experience conducting assessments. Modules 1 and 2 contain more information on how to calculate sample sizes for antenatal clinic and delivery unit surveys.

Summary of Required Sample Sizes, by Tool

Assessment Tool	Sample Size/Notes
1. Antenatal clinic surveys	Sample size will depend on the coordinator's estimate of peripheral parasitemia and 3 rd trimester anemia, as well as the margin of error the coordinator thinks acceptable. See Module 1 for more detail.
2. Delivery unit surveys	Sample size will depend on the coordinator's estimate of placental parasitemia and LBW, as well as the margin of error the coordinator thinks acceptable. See Module 2 for more detail.
3. Hospital surveillance of malaria disease	All ill women admitted to the hospital during the time data are being collected during the antenatal clinic and delivery unit surveys.
4. Antenatal clinic facility assessment	Each of the antenatal clinics selected for an antenatal clinic survey (and may be expanded if this sample is believed to be too small).
5. Health-care worker observation	Observation of approximately 20-25 health-care worker/patient encounters per each antenatal clinic selected for an antenatal clinic survey.
6. Focus groups and individual interviews with health-care workers	Individual interviews are preferable if timing is not an issue. Could interview as many health-care workers as feasible during the assessment period, probably no more than 5-10 per facility, but sometimes as few as 1-2 is all that is possible.
7. Focus groups and individual interviews with midwives and traditional birth attendants	At least one focus group with 5 to 15 participants per facility area. May wish to conduct interviews as well, depending on the available pool of potential participants.
8. Antenatal clinic client exit interview	Approximately 15 per site. Note: Women selected for interviews should be different from the women selected for the antenatal clinic surveys.
9. Focus groups and individual interviews with pregnant women	At least one focus group with 5 to 15 participants per facility. Four to five individual interviews per facility.
10. Individual interviews with key informants	Individual interviews with 2-4 key informants per facility area.

3.5 Adapting, Translating, and Preparing Assessment Materials

Once the assessment teams have been formed, assessment instruments (questionnaires, information sheets/informed consent forms, observation forms, interview guides) and logbooks will need to be prepared. Each module in this packet

contains sample survey materials, which will likely need to be tailored for use in the particular local context. For example, changes may need to be made to reflect the drugs and the drug trade names used in a particular country. Additional questions may need to be added to obtain other variables of interest, for example, such socioeconomic and demographic variables as caste, ethnic group, or family income. One country may wish to exclude pregnant women younger than 15; others may have no lower age limit.

The materials should be reviewed, pretested, and adapted as much as possible prior to assessment training and then again during the training sessions, at which time they may require additional adjustment.

After the survey instruments are adapted, they and the information sheet (or informed consent form if used) should be translated into the national language and the primary language spoken by women in the assessment area, if different. This initial translation should be followed by a back-translation (by individuals who did not produce the original translation) into the national language to check the accuracy of the translation.

If the primary language is not a written language, it will be important to work to achieve correct, consistent phrasing of survey questions and information on the information sheet (or informed consent form). It is important to hold a discussion with all interviewers present to agree on phrasing and to give the interviewers an opportunity to practice. Each participant should still receive a copy of the information sheet.

It is critical to maintain participants' confidentiality according to the laws of the country or jurisdiction. If appropriate to the local situation, questionnaires can be designed with a tear-off identifier page, which can be removed once data entry and validation are complete. The removal of the identifier page ensures that recorded data cannot be linked to the participant.

3.6 Conducting Assessment Training

Whether or not the qualitative and quantitative components are conducted simultaneously largely depends on the tools selected and the availability of assessment team members. In turn, the timing of these components may help determine how and when training is conducted, although ideally training should be done within a few days before the start of the assessment. Training of the teams can occur after the preassessment activities described in the previous section and will take approximately 4-5 days.

If training for both will occur during the same time period, the quantitative and qualitative teams should meet the first day of the training session to receive an overview of the entire assessment. Some topics are relevant to both teams, including providing information/obtaining informed consent, general information on the effect of malaria infection during pregnancy, politics of and sensitivities to conducting an assessment in health-care facilities (if assessment staff is hired from outside the system), and approaching potential participants. The teams can then separate to learn their specific tasks. The training period can also be used to ensure that the assessment tools are linguistically and culturally consistent. After this, ideally, the entire team should be brought back together to review assessment timing, learn who

will work at each facility, and review who will assume supervisory roles. Regardless of when training is conducted, each team should understand what the other teams are doing, the types of data that they are gathering, and the methods they are using. The entire team should be prepared to answer questions about the assessment as a whole.

Quantitative Component

During training, each question on the questionnaire should be reviewed, and team members should be given a chance to practice conducting the questionnaire with other team members and then with clients in local antenatal clinics. Team members should become familiar with how to fill out logbooks. The coordinator should explain why an information sheet (or informed consent) is necessary (see 3.8).

Training will also focus on ensuring that team members can perform the needed clinical procedures including collecting blood using fingersticks, preparing slides, and weighing a newborn. They should practice these skills in a working facility. Because women in the surveys should receive treatment according to national policy, if they are found to be anemic or are suspected or confirmed to have malaria infection, interviewers should be prepared to ensure that women and neonates receive proper treatment. Laboratorians should be trained in how to read peripheral, placental, and umbilical cord blood films. See each module for additional information about training.

Note: Because many countries may choose to conduct both an antenatal clinic and delivery unit survey and because it is more efficient to conduct training for these two simultaneously, this manual describes combined training in Modules 1 and 2, which can be modified, if necessary.

Qualitative Component

During training, qualitative teams should focus on learning and practicing how to interview, as well as how to record notes during an interview. Ideally, several days should be allowed for training. The coordinator or facilitator should review the essential elements of interviewing, particularly recording (i.e., taking notes on) interviews. Recording individual interviews or focus groups, while not difficult, must be done well, as it determines the quality of the data. Team members should be observed role playing and giving mock interviews with people who are not members of the assessment teams. Teams can often practice in local clinics where the assessment will not be conducted to assess the individual team members' strengths and weaknesses. Practice might show that one person is a better focus group facilitator than an interviewer, for example. Team members' positions should closely match their strengths. Consult the Sample Interviewer Training Manual in Resource 2 for additional information about training.

3.7 Assuring Assessment Quality

A quality assurance mechanism for data collection, transport, and storage should be established to ensure that data are of high quality. To oversee quality control, a supervisory system should be in place that ensures that questions, concerns, and technical issues are addressed in a timely manner.

Quantitative Component

The site supervisor (one per team) is responsible for the following:

- Reviewing all questionnaires, enrollment, laboratory, and treatment logbooks (and written consent forms, if used) each day for accuracy and completeness
- Maintaining a daily logbook that shows the identification (ID) numbers of the interviews that were completed during that day, in which facility they were completed, date of interview, and name of interviewer
- Ensuring that each consecutive page of the interview has an ID number in case the pages become separated
- Giving feedback to interviewers regarding accuracy and completeness of questionnaires and logbooks
- Discussing issues and concerns and developing solutions (e.g., completeness of logbooks, inconsistent completion of questionnaires, patient flow, lack of supplies, equipment failures)

The laboratory component supervisor is responsible for:

- Ensuring that adequate reagents and other needed materials are available
- Reviewing laboratory logbooks and ensuring that they are accurate and complete
- Reread a sample (for example, 10%) of all assessment blood films weekly for accurate diagnosis
- Evaluating quality of slides (both blood film preparation and staining), and providing technical support when needed for slide reading

The assessment coordinator also plays an important role in ensuring the quality of the **entire** rapid assessment by:

- Making at least weekly visits to review all logbooks and questionnaires from all assessment teams and giving feedback to site supervisors and the microscopy supervisor as appropriate. The coordinator should transport completed forms and blood films to a secure central location on a weekly basis.
- Establishing a mechanism to distribute and re-stock assessment supplies. During the assessment start-up, the assessment coordinator is responsible for assuring that each assessment site has adequate equipment and supplies for at least 2 weeks of data collection. During the assessment, site supervisors are responsible for inventory of all supplies and equipment throughout the assessment period at each assessment site to assure that data collection is not interrupted.
- Ensuring that adequate copies of antenatal clinic and delivery unit questionnaires are available at each assessment site. During the assessment start-up, the assessment coordinator is responsible for assuring that each assessment site has adequate copies of antenatal clinic and delivery unit questionnaires and informed consent forms (or information sheets) for at least 2 weeks of data collection. During the assessment, site supervisors are responsible for inventory of questionnaires throughout the assessment period and at each assessment site to assure that data collection is not interrupted.
- Ensuring adequate numbers of focus group and interview guides are available.
- Ensuring participant confidentiality.

Qualitative Component

The coordinator for the qualitative part of the assessment (individual and focus group interviews), if different from the overall assessment coordinator, has primary responsibility for that portion of the assessment but should work closely with the overall assessment coordinator.

The qualitative assessment coordinator is responsible for

- Observing groups and interviews periodically to ensure that the facilitators and interviewers are using proper technique, e.g., that they are using questions in the guide but adapting them as necessary in order to elicit the intended responses
- Reviewing all recorded interviews for completeness and accuracy of recording
- Ensuring accurate and consistent use of traditional terms for illnesses, symptoms, and prevention and treatment strategies, including usage and spelling
- Ensuring that the needed information is being obtained by reviewing recorded interviews and focus group notes and adjusting (e.g., adding new questions, making questions more specific) the interview/focus group guides accordingly

At the end of the interview before the respondent leaves, qualitative interviewers who also serve as recorders should examine their data to make sure the information is understandable. During training, they can learn to use standard abbreviations to help them record quickly. In addition, they can use symbols (such as an asterisk in the column) to alert them to a question that they might have for the end of the interview. The interviewers should be trained to look for such symbols and to ask the respondent for clarification. Once the respondent leaves, the interviewer should again review the interview, spelling out abbreviations and making sure the handwriting is legible. If both an interviewer and recorder are involved in the interview, both need to review the data together.

Supervisors should also check interviews at the end of the day, as well as hold a "debriefing." A debriefing helps determine: 1) whether the questions are adequate to obtain the needed data (qualitative methods are iterative; thus, questions can be changed as needed during the assessment), 2) whether people have understood the question (for example: is the misunderstanding a sentence structure, content, or a translation problem?), 3) whether data are similar across facilities or show wide variability, which might require adding questions to understand the variability, and 4) whether expressions in the local language are being translated appropriately. The debriefing should be led by the coordinator or another facilitator. The team listens to what each interviewer has learned, identifies what is common or different, and mutually agrees on what local expressions mean (particularly important when the team is trying to understand local beliefs about malaria and/or drugs during pregnancy). During the debriefings, the coordinator or facilitator should keep notes on the outcomes of each debriefing, explanations for trends seen in the data, and local language terms, as well as the agreed-upon translations.

The supervisor should ensure that each consecutive page of the interview has an ID number in case the pages become separated. The supervisor should also have a logbook for each day that shows the ID numbers of the interviews that were completed during that day, in which facility they were completed, date of interview, and name of interviewer.

3.8 Providing Information about the Survey and Obtaining Informed Consent

Each country's human subjects requirements should be followed in the conduct of the rapid assessment. Some countries may require that a participant give informed consent and sign a form; others may require that each prospective participant simply be given information. The assessment described here is usually classified as program evaluation rather than research and as such, may not require formal institutional review board (IRB) or ethics committee review. However, depending on the modifications to the assessment tools and local rules and regulations, the assessment may require such formal IRB or ethics committee review and approval. Generally, if blood will be collected and stored or kept longer than the local guidelines suggest, documentation of informed consent will probably be required.

If it is decided that participants should be given an information sheet, it should be written in their primary language and include the following information, if applicable:

- Purpose
- Procedures
- Alternatives to participation
- Risks and discomforts
- Potential benefits
- Provisions of confidentiality
- Voluntary participation and right to discontinue without penalty
- Contacts for questions/additional information
- Any other relevant information (e.g., who is conducting the survey, how many people will participate)

If the participants cannot read or they have low literacy skills, the information on the sheet can be read to them. The sheet would then serve as a script for the interviewer. In either case, the participants should be given a copy. If true informed consent is being obtained, then there should be a witness present for those persons who cannot sign and whose consent to participate will be documented with a thumb print. Both the copy retained and the copy given to the participant should be signed. The supervisors should keep a record of the number of refusals and the reasons for refusal. For example, often the women in antenatal clinic do not want to participate in an interview because it would extend the length of their visit.

3.9 Providing Treatment for Malaria and Anemia

In addition to gathering information about a pregnant woman's experience and practices with regard to malaria, the antenatal clinic survey will also gather information on the proportion of women with anemia and malaria. Blood slides for women who are currently or recently (as defined by country guidelines, e.g., within the previous 7 days) febrile should be read promptly. Ideally, such slides would be read the same day. These women should wait to receive their blood results before leaving clinic that day. If the slides are positive, they should receive treatment with the appropriate antimalarial drug, according to national policy. If women are found to be anemic, they should also receive appropriate treatment, according to national policy. If it is determined that a neonate has malaria infection, that neonate should also be treated as outlined in national policy.

4. Data Management and Analysis

This chapter is devoted to the management and analysis of data gathered from the assessment; individual modules contain further guidance.

4.1 Data Management

Quantitative Component

A statistical computer package should be used to enter and analyze the quantitative data from the assessment. Epi Info is available free of charge and has been included in this package (Resource 4). It is also available from the U.S. Centers for Disease Control and Prevention (CDC) Web site (www.cdc.gov/epiinfo). Other packages such as SAS or SPSS may also be used, although they are not available free; thus, their cost should be included in the budget for the assessment.

Ideally two computers should be available for data entry. Since all data should be entered twice to ensure accuracy, two computers could speed the process by allowing simultaneous entry.

Before the rapid assessment begins, the assessment coordinator should identify a data management coordinator with experience in using statistical computer software and managing data entry and analysis activities (see 3.3). Possible candidates for this position include

- Assessment coordinator
- Local program data manager or other local program staff
- National-level program staff
- Outside consultant, if necessary (one of the intended outcomes of the assessment is to develop national capacity; therefore, use of an outside consultant is not ideal).

Step 1: Modify (or create) data entry programs

Epi Info can be used to create data entry files for the assessment instruments. Epi Info's data entry files consist of questionnaire (.QES), checking (.CHK), and record (.REC) files. The checking file (.CHK) should specify valid (allowed) variables for each question as well as skip patterns, which could be defined as sequences of questions asked and omitted in a survey instrument.

Step 2: Test programs

The assessment coordinator should test the data entry files for each questionnaire by entering data from pilot or initial questionnaires. Each file should be tested several times and reviewed to ensure that the data entry files are working correctly.

Step 3: Identify and train data management staff

It is recommended that two people be identified to enter data and trained by the assessment coordinator or data manager; the training should not take more than a few hours.

Step 4: Enter and store data

Data can be entered throughout the data collection period or all at once at the end of data collection. It is strongly recommended that data be entered throughout the time data are being collected. During the process of data entry, problems in questionnaire design or completion can be revealed and corrected. The assessment coordinator is responsible for determining which method is best suited to the setting.

The following suggestions may help improve the process of data entry:

- Find an appropriate pace for data entry. If data entry is attempted too quickly, errors are more likely to occur.
- Enter data from all questionnaires of one type sequentially (e.g., all antenatal clinic questionnaires).
- If Epi Info6 is used, the program will assign a record number. Write that number on the questionnaire.
- Mark each questionnaire with a check or cross after data entry of questionnaire information to indicate that data entry has been completed. Make sure that after the data are double entered, the questionnaires have two checks or crosses.
- Encourage data entry clerks to mark items that appear erroneous with a "post-it" note. Data entry clerks often uncover logical errors in questionnaire design which can be corrected early on. However, data clerks should be encouraged to note errors or problems they encounter **throughout** data entry and notify the assessment coordinator.
- Back up all data files regularly on a diskette or other storage device such as a zip disk or flash card, both during data entry and at the end of the day.
- File questionnaires by type of questionnaire and enrollee's number.

To ensure that all data have been entered accurately, the data management coordinator (or assessment coordinator) should

- Run the data validation program in Epi Info to uncover possible data entry errors. This needs to be done at the end of data entry. Note that questionnaires will need to be available for review during the validation process in order to reconcile discrepancies.
- If .REC files are used, review the file for each questionnaire by running frequencies for each variable, identifying inconsistencies, and investigating possible errors (and then correcting the data file based on the hard copies of the questionnaires). This is best done at the end of data entry.
- Supervise data entry and periodically check quality of data entry by randomly selecting questionnaires for review.

To store data safely

- Store questionnaires (and backed-up data files) in a locked cabinet available only to the assessment coordinator and data management team to ensure participants' confidentiality.
- If the questionnaire was designed with a tear-off identifier page, the page with information identifying the participant should be removed once data entry and validation are complete.

It is critical to maintain participants' confidentiality according to the laws of the country/jurisdiction.

Qualitative Component

Some decisions about the management of qualitative data will need to be made.

- Will the interviews be tape recorded?

- Will the recorders' field notes be expanded to a full transcript of the interviews?
- Will the qualitative data be entered into a computer for analysis?
- What types of software are likely to be useful?

The assessment team may consider at least three approaches for managing data collected from individual and focus group interviews. All have implications for the personnel and software needed to manage and analyze the data. Choosing between the options will involve a trade-off for the level of detail.

- The simplest approach is to record short open-ended responses directly on the interview forms. The responses can later be grouped by hand or coded using relatively limited qualitative analysis software such as CDC EZ - Text (<http://www.cdc.gov/hiv/software/ez-text.htm>). This approach gleans the least detail but may be appropriate when experienced qualitative researchers and data collectors are not available.
- A second approach would be to have the data recorders expand the notes taken during the interview into a structured report of the responses.
- A third would be to tape record⁷ the interview and then have it transcribed word for word.

Expanded field notes and interview transcripts can be managed by a more experienced qualitative researcher and will contain far more detail. However, data in these formats will require much more time for coding and analysis. The analysis can be completed by hand, but when a large number of data are generated, software products like NUDIST, the Ethnograph, or ATLAS.ti can be helpful.

Choosing among these approaches, or choosing another alternative, should be left to the individual responsible for coordinating and analyzing the qualitative data and needs to be decided prior to recruiting and training data collectors.

4.2 Data Analysis

Quantitative Component

The assessment coordinator should work with the assessment and data management teams to develop an analysis plan before the survey begins. This plan should include key indicators that will affect policy and program.

For each quantitative tool included in the package, its respective module specifies outcome variables and samples of tables that are critical for analysis. Additional indicators could be selected and further analyses could be done, but this may not be essential for action. Whatever indicators are selected, there must be a plan for how that information can be used to affect the policy and program.

Two months should be sufficient to enter and analyze data, write the report, and disseminate the results.

⁷ Although tape recorders can capture everything that is said, the tape recorder may malfunction without its being realized, and all data will be lost. Transcribing a 1-hour tape takes 2-3 hours. In addition, if the interviews are held outdoors (which occurs in many facility and home interviews), the tape often picks up ambient noises, which obscure what is said. Focus groups interviews are difficult to listen to, as often, more than one person is speaking at a time. The cost of the tape recorders, tapes, and transcription also need to be considered. For these reasons, it is often preferable to record the interviews and focus groups by hand.

A software program can be used to run the analysis on quantitative data to determine

- Point estimates of the proportion of women who have peripheral parasitemia, anemia, placental parasitemia, and LBW (as well as their 95% confidence intervals)
- Estimated gravidity-specific parasitemia, anemia, and LBW rates
- Frequencies of key variables collected from the facility assessment and antenatal clinic health-care worker observation.

It is useful to generate a table summarizing basic sociodemographic variables. If the assessment involves more than one site, it may be useful to present data by site, with one site per column. Alternatively, if sites are similar, data may be aggregated. Data from antenatal clinics and delivery units should be presented separately.

It is also generally useful to analyze parasitemia, anemia, and LBW by gravidity, using these categories: primigravidae, secundigravidae, and multigravidae.

If there is a functioning malaria prevention program, it may be useful to analyze the data by degree of self-reported adherence to the intervention (e.g., chemoprophylaxis or IPTp). Categories of adherence might be complete, incomplete, or none.

Limitations

The limitations of the antenatal clinic and delivery unit data will affect interpretation of results. Both antenatal clinic and delivery unit surveys use a convenience sample, not a randomly selected sample. Therefore, women attending antenatal clinics and delivering in delivery units are not completely representative of all pregnant women. In countries with high antenatal clinic coverage, the pregnant women surveyed are likely to be more representative of the general population of pregnant women. As is often the case, more women visit antenatal clinics during their pregnancies than deliver in facilities, and so women in the delivery units are usually less representative of all pregnant women. In countries with low coverage, a facility-based rapid assessment will not give a very accurate picture of the burden of malaria in pregnancy nationwide.

Qualitative Component

Regardless of the approach used to record and manage data, analysis of qualitative data ideally begins at the start of data collection, and the supervisor should begin reviewing data as they are collected in order to identify the need to expand or revise the interview/focus group guides to capture detail that might not have been anticipated. Daily debriefing sessions can be used to identify and track themes as they emerge. See 3.7 and Modules 6, 7, 9, and 10 for further discussion of debriefing.

Content analysis of completed qualitative data can be performed by hand or using one of several software tools (see 4.1). Usually one person or several will review all of the data and assign codes to the passages of text that contain each theme.

Content analysis can be performed on qualitative data, with data aggregated into general themes to reflect the consensus of the participants. For example, a question might focus on barriers to care. Responses might include "distance," "need to farm," "lack of money during planting season," "bad relationships with health-care facility staff," "no drugs available at the health-care facility," "being mocked at the facility

for being poor or not dressing well,” and “need to obtain permission from family.” These responses could then be grouped into higher level codes, for example those reflecting facility issues (lack of equipment/drugs, poor provider-patient relationships), financial concerns (need to maintain income, seasonal income sources), and statements about the locus of power within households (need permission). It is often the case that ideas for new codes will occur to researchers while the analysis is under way. The process of qualitative analysis can accommodate this by incorporating new ideas and codes as they emerge. If more than one person is involved in coding text-based data, it is important that the coders apply a common approach and work together closely to ensure that the codes are applied consistently and newly identified themes are incorporated as they are identified.

Generally, qualitative findings are presented in terms of the most typical responses. Occasionally the statements of participants with exceptional views are useful as well. Direct quotes from participants can be a powerful way to illustrate the key themes identified in qualitative studies. It is frequently helpful to quantify some qualitative data to indicate which themes or opinions were stated most frequently. For example, responses to the question “If you are sick during pregnancy, from whom would you seek advice?” might include husband, traditional?? birth attendants, mothers-in-law, elders. Frequency counts can illustrate which categories were mentioned most often. Frequencies derived from qualitative data are purely illustrative and cannot be subjected to statistical tests. If a population-based frequency is desired (e.g., to compare care-seeking preferences across study sites or sub-populations), quantitative surveys are usually a more appropriate approach.

5. Report Preparation and Use of Results

Once data analysis is complete, a report should be promptly drafted, finalized, and disseminated to key stakeholders. It is important that the report reach the appropriate officials and decision makers in the areas of malaria and reproductive health so that the findings of the rapid assessment can promptly be used for action. The presentation and use of results greatly depend on the focus of the assessment. Communications about an assessment designed to determine the burden of malaria during pregnancy would probably be quite different from an assessment designed to determine program impact.

Results of the assessment can be used to provide:

- **Information to guide decisions about whether to recommend IPTp**

Although there is agreement that in areas of stable (or high) transmission, the control package for malaria in pregnancy should include IPTp, there is less agreement about whether IPTp belongs in the control package in areas of unstable (or low) transmission or areas that are epidemic-prone.

One commonly asked question is at (or above) what level of transmission IPTp should be recommended and at (or below) what level IPTp should not be recommended. To date, there has not been a formal cost-effectiveness or cost-benefit analysis to guide policy in this regard, but several factors could be taken into account in decision-making:

- **Prevalence of *P. falciparum* malaria parasitemia.** Studies show that if malaria prevalence is high, IPTp will help prevent malaria's ill effects on the health of pregnant women and babies, and a policy of IPTp should be recommended. However, there have been no studies that have examined the effects of IPTp in areas of low or unstable transmission. If malaria prevalence is low and IPTp were recommended for all pregnant women, it would be given to many women who, because they were not infected, would not benefit. As the prevalence of parasitemia decreases, it becomes less compelling to recommend IPTp. For example, consistent use of IPTp has been shown to bring prevalence rates down to about 5% – 10% in the high and moderate transmission areas where studies have been conducted. One might then argue that a cut-off prevalence of 10% could be used. However, if the prevalence rate was 10% and all women were given IPTp, 90% would receive a drug they did not need. The malaria community needs to address what cut-off to recommend in areas of low prevalence.
- **Effect of malaria parasitemia:** A rapid assessment conducted in Ethiopia found that women in low or unstable or epidemic-prone areas had relatively low rates of peripheral parasitemia (1.8%) and low rates of placental parasitemia (2.5%), but that placental parasitemia was associated with prematurity and a 7-fold increased risk of stillbirths. These findings suggested that routine use of IPTp may be inappropriate given the low prevalence of peripheral and placental parasitemia, but given the strong association with adverse outcomes, malaria had the potential to contribute

substantially to the population-attributable risk of these adverse outcomes if disease prevalence increased, for example, during an epidemic. In this situation, the researchers concluded that the situation should be evaluated during an epidemic to examine prevention and intervention opportunities [19].

- **Presence of symptomatic malaria:** In areas of high transmission, pregnant women who become infected are generally assumed not to have symptoms because they have developed some level of immunity, even though this immunity is somewhat compromised by pregnancy. Despite being asymptomatic, these women and their babies can still be adversely affected by the infection. Therefore, IPTp was developed as a preventive intervention to be given to all women. In areas of low transmission or epidemic-prone areas, pregnant women have little or no immunity and may experience symptoms of malaria infection and become ill. In these areas, IPTp would not necessarily keep a woman parasite-free throughout gestation and thus women could still become very ill, causing harm to themselves and their infants. Therefore, in areas of lower transmission where women may develop severe malaria during pregnancy, IPTp will not prevent severe disease, and prompt and effective case management is still critical. In these settings, the role of case management based on proactive screening for malaria infection of women attending ANC, compared to preventive approaches with IPTp or ITNs remains to be established.
- **Advocacy for policy development and change.** The information gathered can also be used to advocate for resources to change or implement a new policy.
- **Suggestions for improving ANC attendance.** The assessment may discover multiple barriers to women's decisions to attend an antenatal clinic during pregnancy. To address this, more effective information, education, and communication (IEC) campaigns need to be planned and conducted, or structural factors, such as price of care, may need to be addressed.
- **Suggestions for improving service delivery.** Results may indicate, for example, that more focused health-care worker training needs to be provided or that adequate supplies of medications and ITNs need to be made accessible and affordable.
- **A snapshot of the impact of current interventions.** The country may never have evaluated its policy and program, or an evaluation may not have been done recently. Therefore, a rapid assessment may point to the need for routinely offering a different intervention. For example, a rapid assessment in Burkina Faso showed that high coverage with chloroquine chemoprophylaxis (as opposed to IPTp) did not decrease the adverse effects of malaria during pregnancy and that IPTp was needed.
- **Directions for further study.** A rapid assessment may have equivocal findings. For example, a rapid assessment conducted in Ethiopia found that women in low or unstable or epidemic-prone areas had relatively low rates of peripheral parasitemia (1.8%) and low rates of placental parasitemia (2.5%), but that placental parasitemia was associated with prematurity and a 7-fold increased risk of stillbirths. These findings suggested that routine use of IPTp

may be inappropriate given the low prevalence of peripheral and placental parasitemia, but given the association with adverse outcomes, the magnitude of the burden of malaria during pregnancy should be evaluated during an epidemic to examine prevention and intervention opportunities.

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Glossary

Anemia and severe anemia: Conditions in which hemoglobin is less than 11 and 7 grams/deciliter, respectively.

Case management refers to treatment of malaria illness. Case management requires proper diagnosis and prompt access to antimalarial drugs to treat the illness.

Chemoprophylaxis: The prevention of an infectious disease by the use of chemical agents at subtherapeutic doses. Weekly chemoprophylaxis is no longer recommended as the preferred malaria prevention strategy for pregnant women in areas of stable (high) *P. falciparum* transmission.

Fetal loss: Expulsion or delivery of a fetus without evidence of cardiac or respiratory effort, regardless of number of weeks' gestation.

Fever: An axillary temperature $\geq 37.5^{\circ}\text{C}$.

Insecticide-treated mosquito net (ITN): Mosquito nets treated with an effective insecticide to repel or kill mosquitoes.

Intermittent preventive treatment (IPT): The administration of full, curative treatment doses of an effective antimalarial drug during pregnancy in order to reduce placental malaria infection, low birth weight babies, and maternal anemia. WHO no longer recommends weekly chemoprophylaxis (administration of an antimalarial drug in subtherapeutic doses) for several reasons, including poor adherence with a weekly or daily regimen and increasing resistance to the most popular antimalarial drug used in chemoprophylaxis, chloroquine.

Low birth weight: Infants weighing less than 2,500 grams at birth.

Malaria infection: A woman or baby is considered to have a malaria infection if any asexual blood stage parasites are seen on a thick blood smear.

Neonatal death: Death of a live-born infant during the first 28 days of life.

Parasitemia (in peripheral, placental, or umbilical cord blood): A condition in which the blood contains asexual stage malaria parasites.

Premature: Assessed as less than 37 weeks gestation at birth by the Ballard examination.

Small-for-gestational-age (SGA) newborn: Weight for gestational age at birth can be used to categorize infants as having normal or subnormal growth in utero. A newborn can be considered small for gestational age if the birth weight is less than the 10th percentile of weight for gestational age. However, for most rapid assessments, it is not necessary to make this determination. Note: Existing data on weight for gestational age are from industrialized countries.