

Malaria & children

Progress in
intervention
coverage



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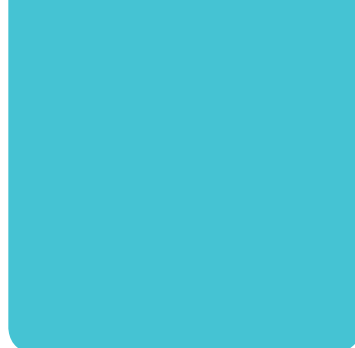
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Foreword

The launch of the Roll Back Malaria Partnership nearly a decade ago began a new phase in the fight against malaria—one that focused on a coordinated global approach to tackling a disease that had been neglected by the world community for too long.

Since then, the world has heeded the call. Global funding has increased more than tenfold over the past decade. Reducing malaria is now a major international target included in the Millennium Development Goals as well as the Roll Back Malaria targets, and governments have committed to reducing the malaria burden.

This report, prepared by UNICEF on behalf of the Roll Back Malaria Partnership, uses recent data to provide a new and more comprehensive assessment of how countries are making key interventions available to meet these commitments.

Since 2000 there has been real progress in scaling up the use of insecticide-treated nets across sub-Saharan Africa. In 16 of the 20 countries for which there are trend data, there has been at least a three-fold increase during this time, although overall levels of use still fall short of global targets.

Challenges to expanding the coverage of antimalarial treatments that have arisen

since 2000 are now being overcome. Over the past three years many countries have rapidly shifted their drug policies to the use of more effective treatment courses, and as a result there has recently been a rise in the purchasing of the newer drugs. These actions, combined with investments in improved distribution systems within countries, make it likely that there will soon be progress in expanding anti-malarial treatment coverage as well.

This is a period of rapid transition in the fight against malaria, particularly for sub-Saharan Africa. The new, more effective tools that have recently become available, such as long-lasting insecticidal nets and artemisinin-based combination therapy, are now making their way to people most in need. Many countries have recently scaled up their malaria control activities or are in the process of doing so as new funding sources are found. Ethiopia, for example, has distributed more than 18 million nets since 2005 and is expected to show much higher coverage rates in its next household survey.

The global commitment to address malaria must be sustained if the Millennium Development Goals malaria targets are to be reached. We remain firmly committed to working together, and with our partners, in order to accelerate progress in the fight against malaria.



Ann M. Veneman
Executive Director
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Executive Director
Roll Back Malaria Partnership



Executive summary

An estimated 3 billion people, almost half the world's population, live in areas where malaria transmission occurs. Malaria is endemic in 107 countries and territories in tropical and subtropical regions, with sub-Saharan Africa hardest hit. Between 350 million and 500 million cases of clinical malaria occur each year, leading to an estimated 1 million deaths. Over 80 per cent of these deaths—or around 800,000 a year—occur among African children under age five.

Attention and funding to combat malaria have significantly increased in recent years. International funding for malaria control has risen more than tenfold over the past decade. At the same time malaria has been included among major international development targets, notably the Millennium Development Goals and the targets set at the 2000 African Summit on Roll Back Malaria in Abuja, Nigeria. For example, one of the eight Millennium Development Goals specifically relates to malaria, AIDS and other infectious diseases, and many of the other Millennium Development Goals, including the goal of reducing child mortality, will be difficult to achieve in malaria-endemic countries without substantially reducing the malaria burden.

This report assesses progress in malaria control and analyses how well countries are making available key interventions that reduce the malaria burden. A particular emphasis is progress across sub-Saharan Africa—whose countries face the greatest malaria burden.

Much progress has been made across sub-Saharan Africa in quickly scaling up insecticide-treated net coverage. All sub-Saharan countries with trend data available showed major progress in expanding insecticide-treated net use among children under age five, with 16 of 20 countries at least tripling coverage since 2000 (figure 1). Despite this progress, though, overall insecticide-treated net use still falls short of global targets.

Since 2004 the number of insecticide-treated mosquito nets produced worldwide has more than doubled—from 30 million to 63 million in 2006, with another large increase expected in 2007. Still, an estimated 130 million to 264 million insecticide-treated nets are currently needed to achieve Roll Back Malaria's 80 per cent coverage target for pregnant women and children under age five at risk of malaria in Africa.

The increase in the production of nets and in resources available has led to a rapid rise in the number of nets procured and distributed within countries. For example,

UNICEF—one of the largest procurers of insecticide-treated nets worldwide—has significantly increased its procurement and distribution in recent years as part of its integrated strategy to improve child survival through accelerated programming efforts. The number of nets procured by UNICEF has more than tripled in only two years—from around 7 million in 2004 to nearly 25 million in 2006 (figure 2). And UNICEF's net procurement is 20 times greater today than in 2000. The Global Fund to Fight AIDS, Tuberculosis and Malaria—a major source of funding for net procurement and distribution—has also greatly

increased support for insecticide-treated nets, with its distribution of nets increasing around thirteenfold in only two years (from 1.35 million in 2004 to 18 million in 2006).

Treatment of malaria among children is moderately high across sub-Saharan Africa, though few countries have expanded treatment coverage since 2000 and many children are still being treated with less effective medicines. But the groundwork has been laid to greatly scale up coverage rates with more effective malaria treatment in the coming years. Nearly all sub-Saharan countries have rapidly shifted their national drug policies to promote more effective treatment with artemisinin-based combination therapies (map 1), with financing and procurement significantly increasing since 2005. These actions, coupled with investments in stronger distribution mechanisms within countries, suggest that many more febrile children will receive prompt and effective malaria treatment in the coming years.

Low artemisinin-based combination therapy coverage is the result of several factors. First, such therapy is more expensive—about 10 times more—than traditional monotherapy, and countries were slow to roll out new medicines until additional resources were secured. Second, a global shortage in the production and supply of artemisinin-based combination therapies restricted countries' ability to quickly implement new national drug policies. Since around 2005, however, both production and funding have been rapidly scaled up (figure 3). The next round of surveys is thus expected to show higher treatment coverage with artemisinin-based combination therapies.

Figure 1 Rapid progress in scaling up insecticide-treated net use across all sub-Saharan African countries with trend data

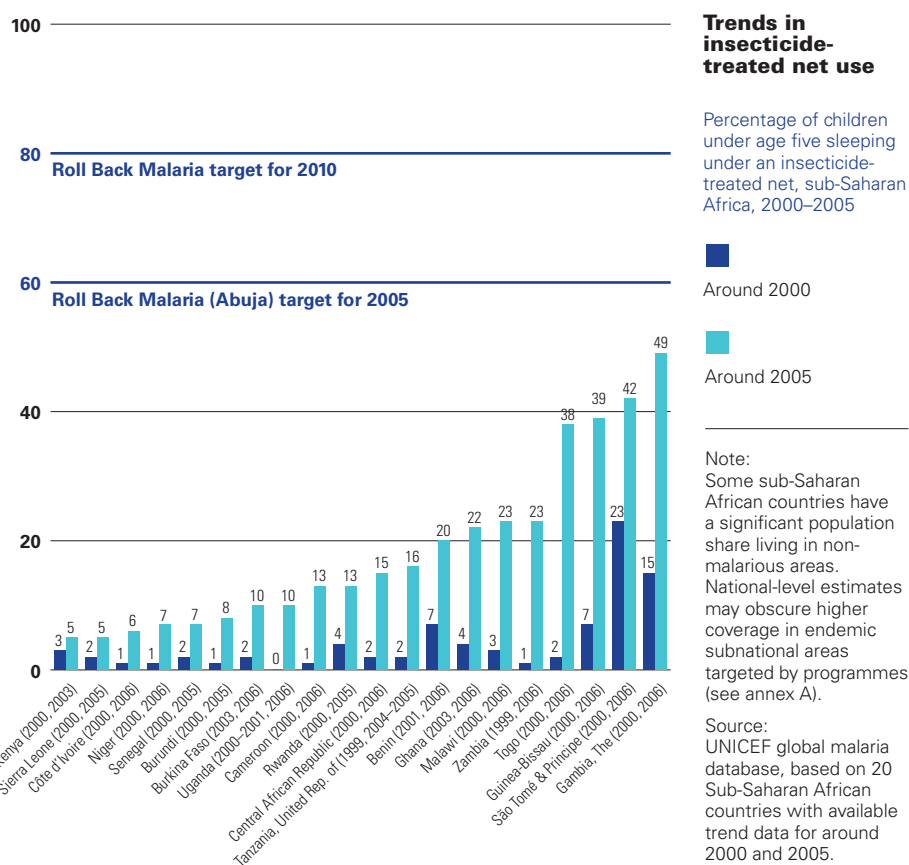


Figure 2 Global mosquito net procurement has been rapidly scaled up

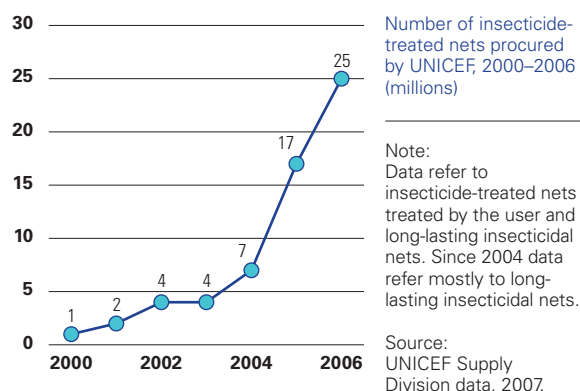
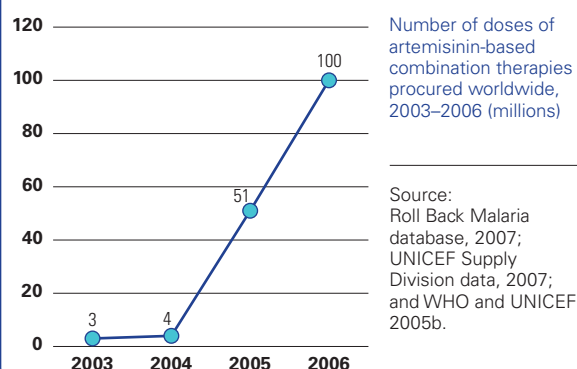


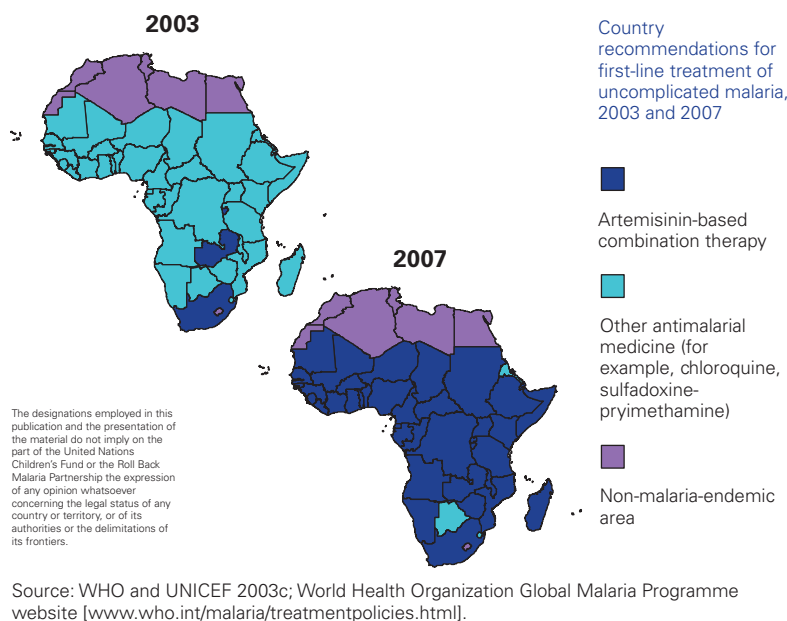
Figure 3 Recent and rapid scale-up in the global procurement of artemisinin-based combination therapies



This report's findings are based on new malaria data that allow for a more comprehensive assessment of progress in malaria control intervention coverage across a large number of countries. In addition, this report comes during a rapid transition in the fight against malaria, when many sub-Saharan countries have only recently scaled up intervention coverage or are in the process of doing so. Therefore, data for some countries may not yet reflect higher coverage rates. (For example, Ethiopia has distributed more than 18 million nets since its last household survey in 2005.) The data in this report should be viewed in the rapidly changing context of efforts to scale up malaria control intervention coverage.

The impressive gains in the fight against malaria across numerous sub-Saharan African countries show that major progress can be achieved—and in a short period of time. Many countries have quickly absorbed sizeable additional resources directed towards combating malaria to accelerate their national malaria programmes. Additional resources have supported new and more effective malaria control interventions, such as long-lasting

Map 1 African countries have rapidly changed drug policies to include more effective drugs



insecticidal nets, and have helped reduce bottlenecks in the supply of key malaria control commodities.

These recent gains create a strong foundation from which countries can work towards achieving global malaria goals and targets. But enhanced commitments and bolder efforts are needed to meet these

ambitious targets. Keys to success include scaling-up malaria intervention coverage through accelerated community-based programming efforts and integrating malaria programming into existing service delivery mechanisms such as the Expanded Programme on Immunisation, child health days and antenatal care services.



The global burden of malaria

Section 1

An estimated 3 billion people, almost half of the world's population, live in areas where malaria transmission occurs.¹ Malaria is endemic in 107 countries and territories in tropical and subtropical regions, but there are substantial geographic disparities in the disease burden. Sub-Saharan Africa is the hardest hit region (map 2).

Warm, humid climates provide ideal conditions for mosquitoes to develop and survive. Furthermore, regions with high average temperatures support the development of the malaria parasite in mosquitoes. And the areas where malaria flourishes often lack resources for adequate malaria control (see Background on malaria).

The human toll of malaria is staggering. Between 350 million and 500 million episodes of clinical malaria occur each year, leading to an estimated 1 million deaths,² most in sub-Saharan Africa and among children under age five. Indeed, malaria is one of the leading killers of children under age five, accounting for almost 1 death in 10 (8 per cent) worldwide—and nearly 1 death in 5 (18 per cent) in sub-Saharan Africa (figure 4).³

These figures do not take into account malaria's indirect impact on child

mortality. Malaria contributes to child malnutrition, an underlying cause in more than half of deaths among children under age five globally. Although the precise causal links are unclear, nutritional status is affected by vomiting and appetite suppression during bouts of malaria and by malaria-related anaemia.⁴

In addition, the overlap between malaria and HIV infection in sub-Saharan Africa should be considered when designing prevention and treatment programmes for those most affected by malaria (box 1).

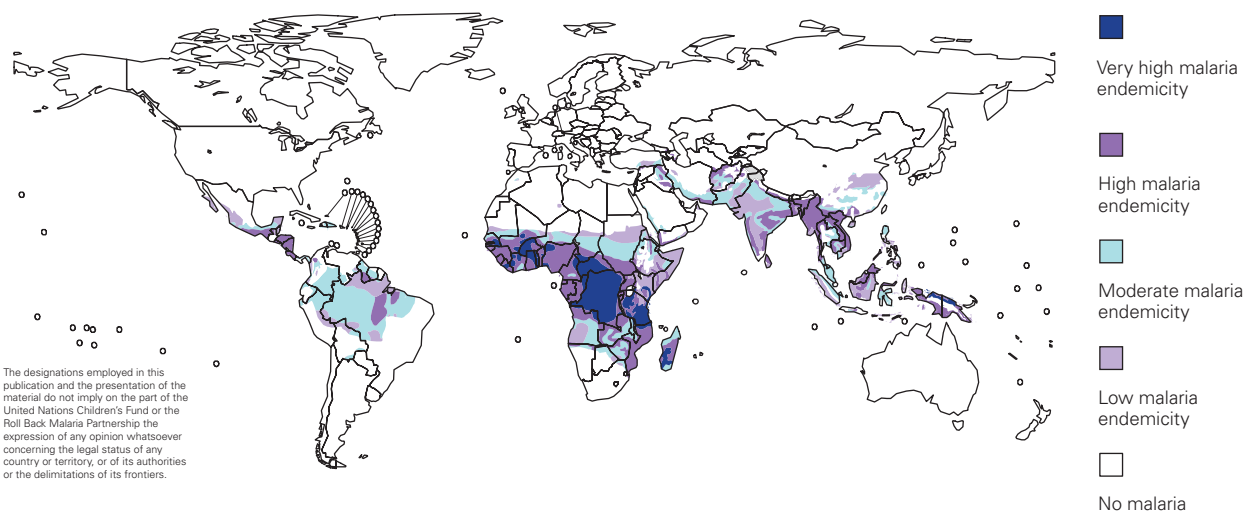
Some 50 million pregnant women a year are exposed to malaria—at least 60 per cent of them in Africa.⁵ Studies in sub-Saharan Africa indicate that 25 per cent of deliveries in areas of stable transmission show evidence of *Plasmodium falciparum* malaria infection in the placenta.⁶ In malaria-endemic areas up to 25 per cent of severe maternal anaemia cases are attributable to malaria, as are nearly 20 per cent of low-birthweight babies.⁷

While sub-Saharan Africa is the region hardest hit, malaria is an important issue in other regions as well. For example, East Asia and the Pacific countries have the highest rates of drug resistance, which has contributed to the resurgence of malaria in many areas, particularly along international borders. Central Asia has seen a recent resurgence in *P. vivax* malaria, and as a result many countries are strengthening surveillance systems and expanding vector control measures. Malaria transmission in Latin America and the Caribbean occurs mainly in countries



1

Map 2 Global malaria distribution and endemicity, 2003



Box 1 The added risks of combined malaria and HIV infection

Studies increasingly suggest a strong interaction between HIV and malaria. HIV suppresses immunity, and thus adults living with HIV in areas of stable transmission face a higher risk of symptomatic malaria infection.¹ HIV infection may also lower the efficacy of malaria treatment. Pregnant women are particularly vulnerable because evidence shows that HIV lessens pregnancy-specific immunity acquired during the first and second pregnancies.² In addition, malaria seems to increase the viral load in HIV-positive people, with potential impacts for progression and transmission of HIV.³

The programmatic implications of the interactions between HIV and malaria include the need for pregnant women in areas where HIV prevalence exceeds 10 per cent to receive additional doses of intermittent preventive treatment, as recommended by the World Health Organization. Recent research shows positive effects from cotrimoxazole prophylaxis given to HIV-infected adults and children on reducing malaria

incidence and possibly disease severity.⁴ For HIV-infected adults the combination of cotrimoxazole, antiretroviral therapy and insecticide-treated nets significantly reduced malaria incidence.⁵

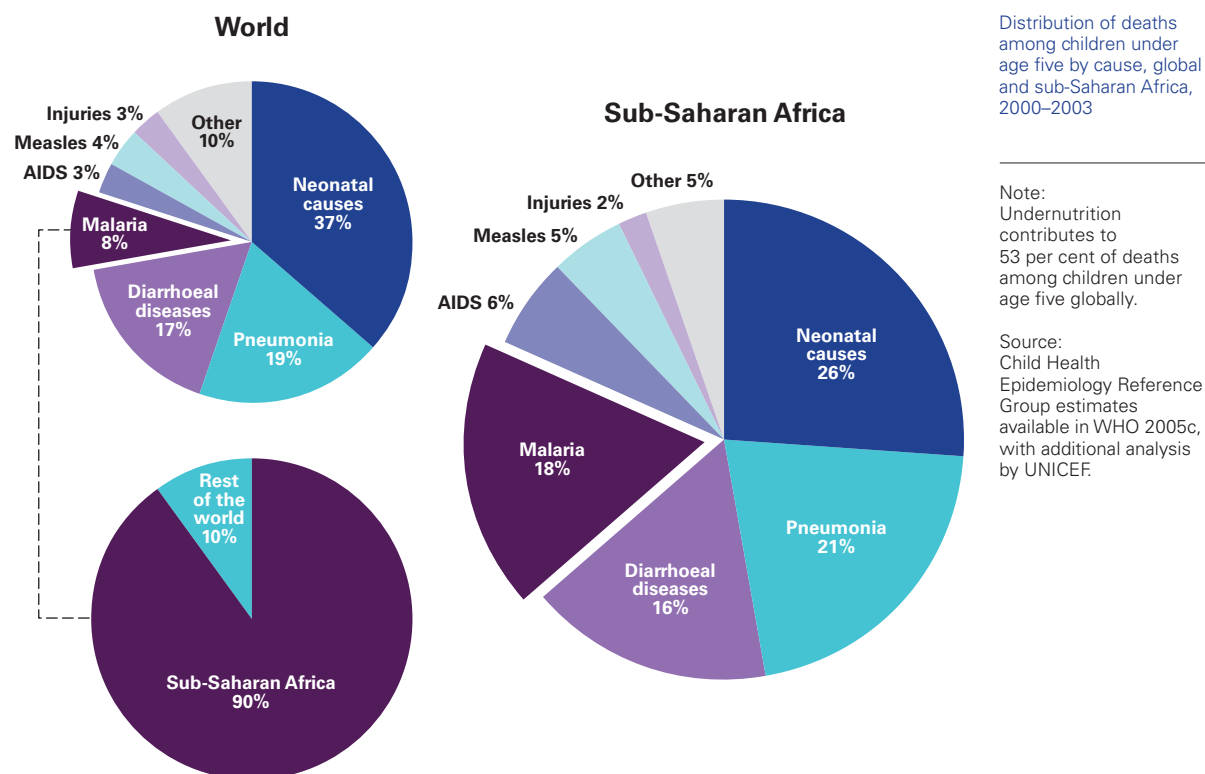
Close collaboration between malaria and HIV programmes is required to ensure that HIV-infected adults and children use cotrimoxazole and insecticide-treated nets and have timely access to effective malaria treatments. Pregnant women living in malaria-endemic areas should, therefore, be encouraged to determine their HIV status during pregnancy. For HIV-positive women cotrimoxazole may be more effective than intermittent preventive treatment.

Notes

1. Whitworth and others 2000.
2. Desai and others 2007.
3. Greenwood and others 2005.
4. Mermin and others 2004.
5. Mermin and others 2006.

Malaria is one of the leading killers of children under age five, accounting for almost 1 death in 10 worldwide—and nearly 1 death in 5 in sub-Saharan Africa

Figure 4 African children suffer the greatest malaria burden



that share the Amazon rainforest, and population movements associated with gold mining and forestry have led to isolated epidemics in these areas.

Given the varying epidemiological patterns of malaria transmission worldwide, efforts to reduce the malaria burden need to be tailored to the local context.

Background on malaria

Where is the burden of malaria greatest?

Sub-Saharan Africa is the region hardest hit by malaria. Most of sub-Saharan Africa comprises highly endemic areas of stable malaria transmission where infection is common and the population can develop some immunity. In these areas children and pregnant women are most at risk of developing severe symptoms or dying from malaria infection. In areas of low, epidemic or unstable malaria transmission, such as highlands and desert fringes, few people have built up natural immunity and thus adults are also at risk of becoming seriously ill with malaria.

What causes malaria?

Malaria is caused by parasites that are transmitted by infected mosquitoes that most often bite at night. The malaria parasites enter the human bloodstream through the bite of an infected female *Anopheles* mosquito. Of the four malaria parasites that affect humans, *Plasmodium falciparum* is the most common in Africa—and the most deadly.

What are the symptoms of malaria?

Malaria typically results in flu-like symptoms that appear 9–14 days after an infectious mosquito bite. Initial symptoms can include headache, fatigue and aches in the muscles and joints, fever, chills, vomiting and diarrhoea; they can quickly progress into severe disease and death. Among young children fever is the most common symptom of malaria.

Why are African children and pregnant women the most vulnerable?

Children under age five are most likely to suffer from the severe effects of malaria because they have not developed sufficient naturally acquired immunity to the parasite. A severe infection can kill a child within hours (see figure).

Malaria during pregnancy can range from an asymptomatic infection to a severe life-threatening illness depending on the epidemiological setting. In areas of stable malaria transmission most adult women have developed enough natural immunity that infection does not usually result in symptoms, even during pregnancy. In such areas the main impact of malaria infection is malaria-related anaemia in the mother and the presence of parasites in the placenta, contributing to low birthweight, a leading cause of impaired development and infant mortality. In areas of unstable malaria transmission women have acquired little immunity and

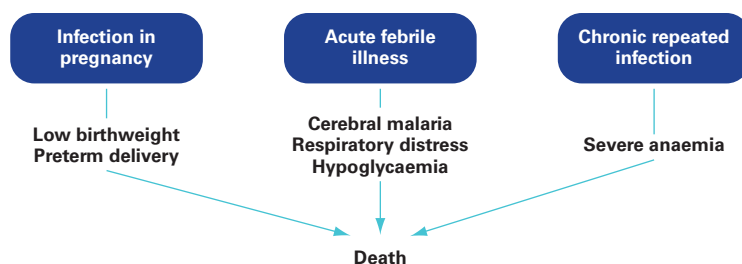
are thus at risk of severe malaria and death.

How is malaria diagnosed?

Prompt and accurate diagnosis is a key component of effective disease management. The 'gold standard' is parasitological diagnosis through microscopic examination of blood smears, although rapid diagnostic tests are a new technology whose use is growing.

In high and moderate malaria transmission areas where infection is common, the World Health Organization recommends that all children under age five with fever be treated with antimalarial medicines based on a clinical diagnosis—or in other words, at the signs and symptoms of the disease. Although parasitological diagnosis is recommended for older children and adults, in the resource-poor settings common in malaria-endemic areas the majority of malaria diagnoses in all age groups remains clinical.¹ Furthermore, even in unstable transmission areas where parasitological

Malaria kills children in three ways



Source: WHO and UNICEF 2003a.

diagnosis is recommended to confirm all suspected cases of malaria regardless of age, the majority of cases are treated based on clinical diagnoses alone.

How is malaria prevented and treated?

The Roll Back Malaria Partnership has focused on four key prevention and treatment interventions:

Insecticide-treated nets.

Insecticide-treated nets are one of the most effective ways to prevent malaria transmission, and studies have shown that regular use can reduce overall under-five mortality rates by about 20 per cent in malaria-endemic areas.² Malaria-infected mosquitoes bite at night, and these nets provide a sleeping individual a physical barrier against the bite of an infected mosquito. In addition, a net treated with insecticide provides much greater protection by repelling or killing mosquitoes that rest on the net—an additional and important protective effect that extends beyond the individual to the community. The protective effect to non-users in the community is difficult to quantify but seems to extend over several hundred metres.³

A mosquito net is classified as an insecticide-treated net if it has been treated with insecticide within the previous 12 months. Long-lasting insecticidal nets, a recent technological innovation, are nets that have been permanently treated with insecticide that lasts for the useful life of a mosquito net, defined as at least 20 washes and at least three

years under field conditions.⁴ WHO now recommends that national malaria control programmes and their partners purchase only long-lasting insecticidal nets.⁵

Indoor residual spraying.

Indoor residual spraying is an effective malaria prevention method in settings where it is epidemiologically and logistically appropriate. Indoor residual spraying involves applying a long-lasting insecticide to the inside of houses and other structures to kill mosquitoes resting on interior walls.

The main source of data on indoor residual spraying coverage is Ministry of Health programme records and documents. However, given the recent interest in scaling up the use of this malaria control strategy, standardized indicators and household data collection methods are being developed for future household surveys.

Prompt and effective treatment.

Prompt and effective treatment of malaria within 24 hours of the onset of symptoms is necessary to prevent life-threatening complications. There are several challenges to providing prompt and effective treatment for malaria in Africa. First, the majority of malaria cases are not seen within the formal health sector.

Second, the resistance of *P. falciparum* parasites to conventional antimalarial monotherapies, such as chloroquine, sulfadoxine-pyrimethamine and amodiaquine, has become widespread, resulting

in new treatment recommendations. The World Health Organization now recommends treating malaria using artemisinin-based combination therapies, which are based on combinations of artemisinin, extracted from the plant *Artemisia annua*, with other effective antimalarial medicines. When combined with other medicines, artemisinin derivatives are highly potent, fast acting and very well tolerated.

Intermittent preventive treatment during pregnancy.

Together with regular insecticide-treated net use, intermittent preventive treatment during pregnancy is key in preventing malaria among pregnant women in endemic areas. Intermittent preventive treatment is not recommended in areas of low or unstable malaria transmission. The treatment consists of at least two doses of an effective antimalarial drug during the second and third trimesters of pregnancy.⁶ This intervention is highly effective in reducing the proportion of women with anaemia and placental malaria infection at delivery. Currently, sulfadoxine-pyrimethamine is considered a safe and appropriate drug for intermittent preventive treatment for pregnant women.⁷

Notes

1. WHO 2004, 2005a, 2006.
2. Lengeler 2004.
3. Hawley and others 2003.
4. WHOPE 2005.
5. WHO 2007.
6. Marchesini and Crawley 2004.
7. Crawley and others 2007; WHO 2005a; Ter Kuile, van Eik, and Filler 2007.



Progress in the fight against malaria

Section 2

This section assesses progress in malaria control and analyses how well countries are making available key interventions that reduce the malaria burden. A particular emphasis is progress across sub-Saharan Africa, whose countries face the greatest malaria burdens.

Large increases in funding and attention have greatly accelerated malaria control activities across sub-Saharan Africa, including the development of new tools. A rapid and unprecedented increase in the supply of insecticide-treated nets over the past three years has boosted insecticide-treated net use rates across sub-Saharan Africa, where all countries with trend data available showed a major increase and 16 of 20 countries at least tripled coverage. Despite this progress, though, overall insecticide-treated net use still falls short of global targets.

Treatment of malaria among children is moderately high across sub-Saharan Africa, though few countries have expanded treatment coverage since 2000, and many children are still being treated with less effective medicines. But the groundwork has been laid to greatly scale up coverage rates with more effective treatment in the coming years. Nearly all sub-Saharan countries have rapidly shifted their national drug policies to promote more effective treatment with artemisinin-based combination therapies, with financing for and

procurement of these drugs increasing since about 2005. These actions, coupled with investments in strengthening distribution mechanisms within countries, suggest that many more febrile children will receive prompt and effective antimalarial treatment in coming years.

This recent momentum in the fight against malaria must continue to achieve global malaria goals. Among them are the main targets of the Roll Back Malaria Partnership, which include reducing the number of malaria cases and deaths by increasing coverage of key malaria control interventions (box 2), and the Millennium Development Goals (box 3).

Progress is analysed for interventions included in the Roll Back Malaria–recommended four-pronged strategy for malaria control:

- Prevention through insecticide-treated net use.
- Prompt and effective treatment of malaria using appropriate anti-malarial medicines.
- Prevention and control of malaria during pregnancy.
- Prevention through vector control using indoor residual spraying in epidemiologically and logistically appropriate settings.⁸

A wealth of new data have recently become available from numerous household surveys conducted over the past few years (map 3). Notably, the UNICEF-supported



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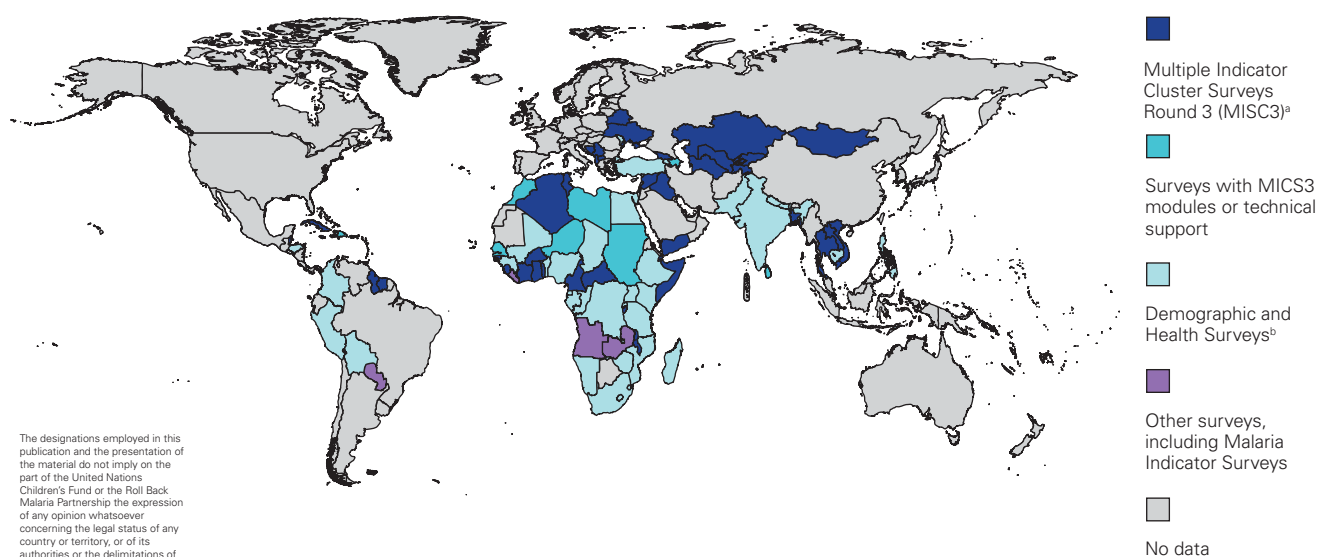
Box 2 The Roll Back Malaria Partnership

The Roll Back Malaria Partnership was established in 1998 to coordinate a global approach to combatting malaria with the overall goal of halving the malaria burden by 2010. The partnership, founded by the World Health Organization, United Nations Children's Fund, the United Nations Development Programme and the World Bank, includes malaria-endemic countries and their development partners, non-governmental and community-based organizations, the private sector, research and academic institutions and international organizations.

The partnership has established a number of working groups to coordinate consensus for key technical and programmatic issues. The Monitoring and Evaluation Reference Group, for example, was

established to advise partners on all aspects of monitoring and evaluation for malaria at the international, regional and national levels. The group provides leadership on technical issues related to monitoring malaria control activities and works to harmonize malaria indicators to ensure consistency and accuracy in reporting. The Monitoring and Evaluation Reference Group and its task forces provided expert guidance in the preparation of previous assessment reports, such as *Africa Malaria Report 2003* (WHO and UNICEF 2003c) and *World Malaria Report 2005* (WHO and UNICEF 2005b), and they have again provided guidance in the assessment presented in this report. More information on the Roll Back Malaria Partnership and its working groups can be found at <http://rbm.who.int>.

Map 3 New malaria data available, 2003–2006



Large increases in funding and attention have greatly accelerated malaria control activities across sub-Saharan Africa

Box 3 Malaria and the Millennium Development Goals

The Millennium Development Goals are a set of eight internationally agreed goals that commit countries to reducing poverty in all its forms by 2015 (see table). Goal 6 focuses on combating HIV/AIDS, malaria and other diseases, and one of its targets is to have halted by 2015 and begun to reverse the incidence of malaria and other major diseases. The specific indicators for monitoring progress towards this target include:

- Indicator 21—Incidence and death rates associated with malaria.¹
- Indicator 22—Proportion of the population in malaria-risk areas using effective malaria prevention and treatment measures, specifically children under age five who sleep under an insecticide-treated mosquito net and children under age five with fever who receive antimalarial treatment.

In addition, it will be difficult to achieve many of the other Millennium Development Goals, including the goal of reducing child mortality, in malaria-endemic countries without substantially reducing the malaria burden.

Note

1. Indicator 21 originally called for monitoring malaria prevalence, but the Roll Back Malaria Monitoring and Evaluation Reference Group recommended monitoring malaria incidence (the number of new cases of clinical infection) in the context of Millennium Development Goals reporting, a change accepted by the Inter-agency Expert Group on MDG Indicators. See box 4 for more information on the challenges of monitoring malaria cases and deaths in sub-Saharan Africa.

Malaria and the Millennium Development Goals

Goal 1	Eradicate extreme poverty and hunger Malaria keeps poor people poor, costing Africa an estimated \$12 billion per year in lost GDP and consuming up to 25 per cent of household income and 40 per cent of government health spending. Malaria also contributes to child malnutrition. While the precise causal links are unclear, nutritional status is affected by vomiting and appetite suppression during bouts of malaria as well as malaria-related anaemia.
Goal 2	Achieve universal primary education Malaria is a leading cause of illness and absenteeism in children and teachers in malarious areas, impairs attendance and learning and can cause lasting neurological damage in children.
Goal 4	Reduce child mortality Malaria is a leading cause of child mortality in Africa, accounting for nearly one death in five among African children under age five.
Goal 5	Improve maternal health Malaria is four times more likely to strike pregnant women than other adults and has life-threatening implications for both mother and child.
Goal 6	Combat HIV/AIDS, malaria and other diseases Malaria control will reduce morbidity and mortality due not only to malaria but to other diseases (for example, people living with HIV/AIDS are at greater risk of contracting malaria).
Goal 8	Global partnership for development The Roll Back Malaria Partnership was established in 1998 to provide a coordinated global approach to combating malaria, bringing together malaria-endemic countries and their development partners, non-governmental and community-based organizations, the private sector, research and academic institutions and international organizations. In addition, public-private partnerships are currently under way to improve access to effective malaria treatment and can serve as a basis for improving access to other essential medicines.

Source: Adapted from Roll Back Malaria 2005.

Multiple Indicator Cluster Surveys were recently conducted in more than 50 countries in 2005–2006—nearly half in malaria-endemic countries. These data, along with recent data

from the U.S. Agency for International Development–supported Demographic and Health Surveys and the Malaria Indicator Surveys, allow for a new and more comprehensive assessment of



M. Halahan/Sumitomo Chemical-Olysat® Net



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progress in malaria control intervention coverage for a large number of countries. The information collected through these household surveys and analysed in this section is based on the recent broad consensus among Roll Back Malaria partners on what is needed for malaria control and how the data should be collected.

Figure 5 Global production of mosquito nets more than doubled in only two years

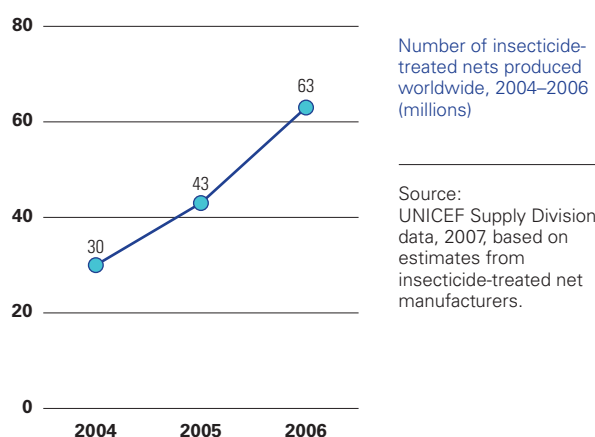
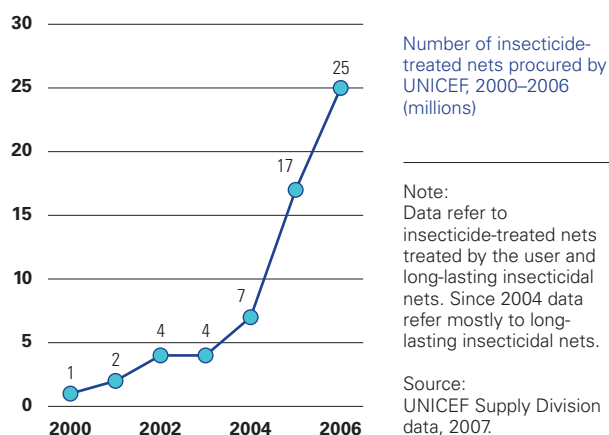


Figure 6 Global mosquito net procurement has been rapidly scaled up



Insecticide-treated nets: supply and use

Supply of insecticide-treated nets

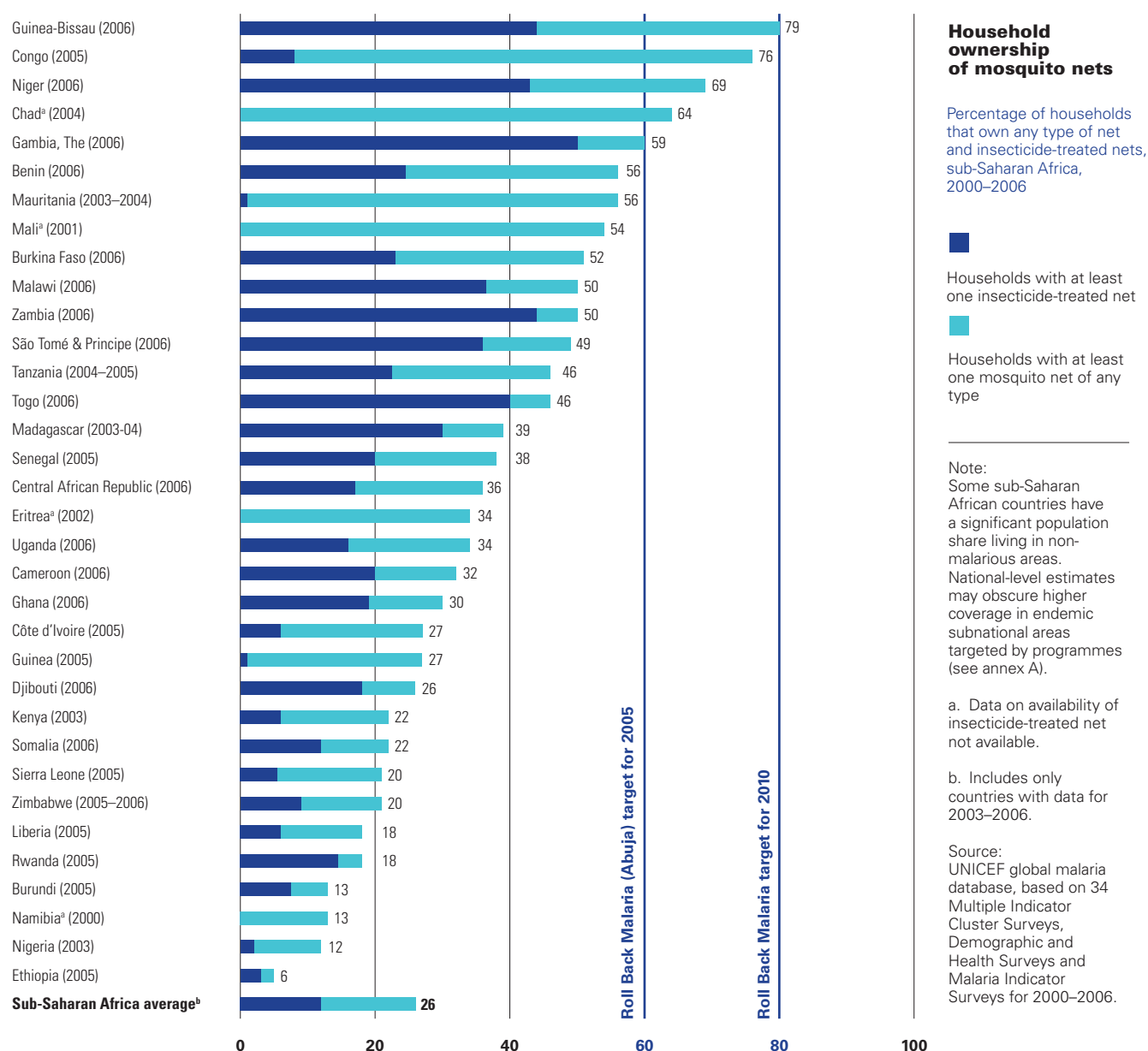
Since 2004 the number of insecticide-treated nets produced worldwide has more than doubled—from 30 million to 63 million in 2006 (figure 5), with another large increase expected by the end of 2007. Still an estimated 130 million to 264 million insecticide-treated nets are needed to achieve Roll Back Malaria's 80 per cent coverage target for pregnant women and children under age five at risk of malaria in Africa.⁹

This increase in the production of nets, coupled with increased resources, has led to a rapid rise in the number of nets procured and distributed within countries. For example, UNICEF—one of the largest procurers of insecticide-treated nets worldwide—has significantly increased its procurement and distribution in recent years as part of its integrated strategy to improve child survival through accelerated programming efforts.¹⁰ The number of nets procured by UNICEF has more than tripled in only two years—from around 7 million in 2004 to nearly 25 million in 2006 (figure 6). And UNICEF's procurement of nets is 20 times greater today than in 2000. The Global Fund to Fight AIDS, Tuberculosis and Malaria—a major source of funding for procurement and distribution of nets—has also greatly increased support for insecticide-treated nets in recent years, with its distribution of nets increasing around thirteenfold in only two years (from 1.35 million in 2004 to 18 million in 2006).¹¹

As these efforts have only recently begun, some countries have not yet conducted household surveys that capture these higher coverage rates. Indeed, for some countries information presented in this report reflects survey data collected prior to major distributions of nets. For example, more than 10 million insecticide-treated nets have been distributed in Kenya since its 2003 Demographic and Health Survey¹²

The number of nets procured by UNICEF has more than tripled in only two years—from around 7 million in 2004 to nearly 25 million in 2006

Figure 7 Household ownership of any type of net is relatively high, but increases are needed in ownership of insecticide-treated nets



and more than 18 million have been distributed in Ethiopia since its 2005 Demographic and Health Survey.¹³ The next round of surveys in

these countries is thus expected to show much higher coverage rates of key malaria control interventions.



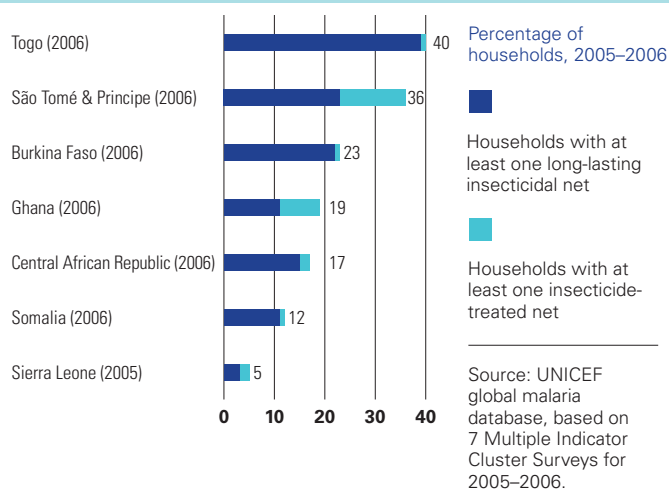
UNICEF/HQ98-0923/Giacome Prozzi



Population Services International/Courtesy of Photoshare

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Figure 8 The majority of insecticide-treated nets owned by households in seven sub-Saharan African countries are long-lasting insecticidal nets



Household ownership of insecticide-treated nets

Across sub-Saharan Africa about one-quarter (26 per cent) of households own at least one mosquito net of any type.¹⁴ Many countries, particularly those with more recent data, have much higher coverage levels, for example, Guinea-Bissau (79 per cent in 2006), Congo (76 per cent in 2005) and Niger (69 per cent in 2006) (figure 7).

The proportion of households across sub-Saharan Africa with at least one insecticide-treated net is lower, at 12 per cent.¹⁵ Again, several countries have recently achieved much higher coverage rates, including The Gambia (50 per cent in 2006), Zambia (44 per cent in 2006), Guinea-Bissau (44 per cent in 2006), Niger (43 per cent in 2006) and Togo (40 per cent in 2006).

Recent years have also seen more focus on distributing long-lasting insecticidal nets, a technological innovation in which the insecticide lasts for the expected life of the net and retreatment

is not required. While survey data on household ownership of long-lasting insecticidal nets are limited, seven sub-Saharan African countries with recent survey data show that more than 80 per cent of nets in households that own at least one insecticide-treated net are long-lasting insecticidal nets (figure 8). Similarly high rates of long-lasting insecticidal net ownership would be expected in many other malaria-endemic countries if data were available.

Countries with high proportions of households with untreated nets can consider implementing a mass treatment campaign, such as those conducted in Malawi and Zambia. In addition, the availability of any net, treated or untreated, indicates a propensity to use nets to avoid mosquito bites and is an opportunity to provide households with long-lasting insecticidal nets to ultimately replace their existing untreated nets.

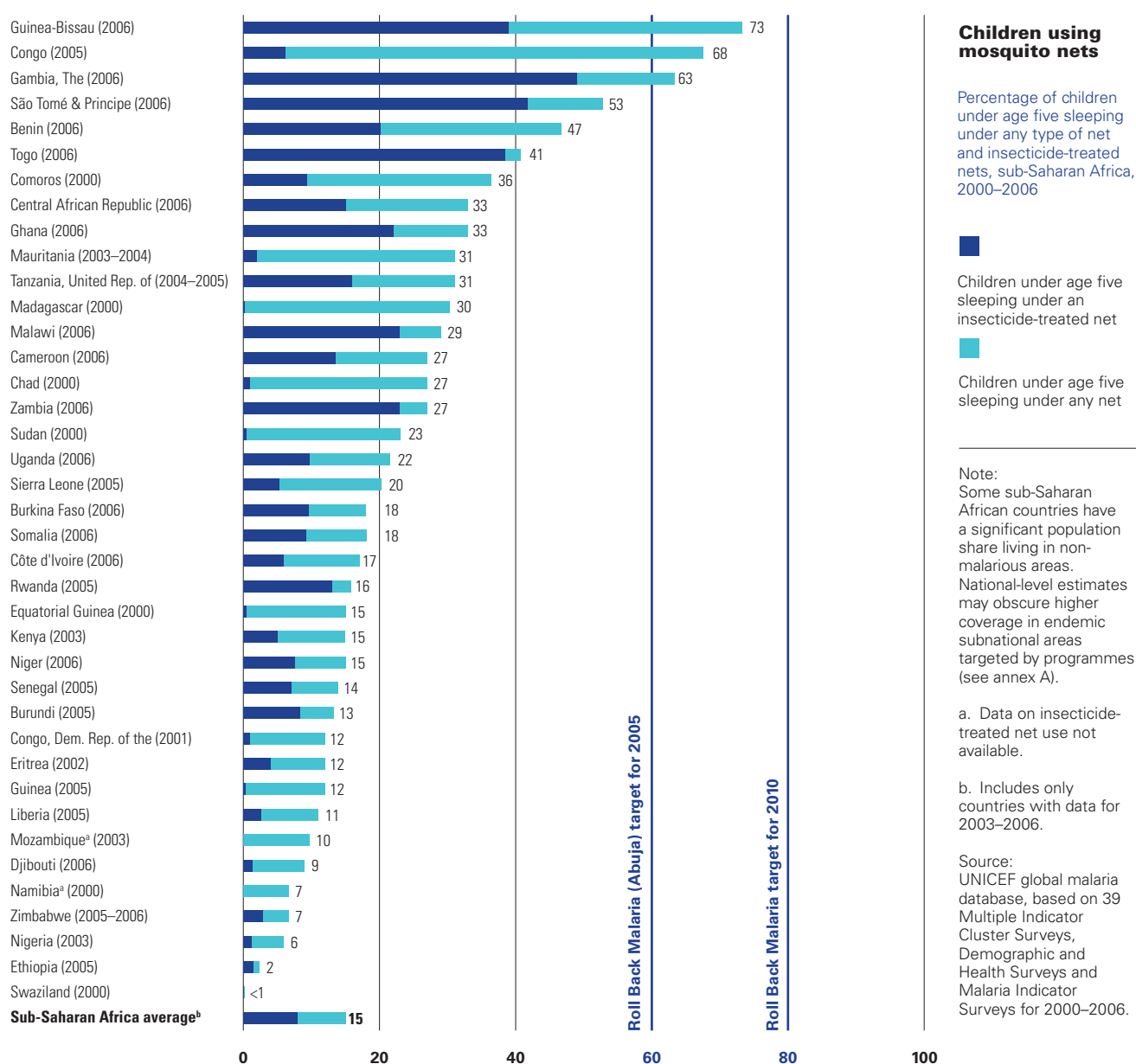
Children under age five sleeping under insecticide-treated nets

Across sub-Saharan Africa 15 per cent of children sleep under any type of mosquito net,¹⁶ with some countries showing much higher coverage rates, including Guinea-Bissau (73 per cent in 2006), Congo (68 per cent in 2005), The Gambia (63 per cent in 2006) and São Tomé and Príncipe (53 per cent in 2006) (figure 9). Several countries with low household use of insecticide-treated nets have a large proportion of their population living in non-malarious areas. National-level estimates as presented in this report may therefore obscure higher coverage levels in endemic subnational areas targeted by national malaria control programmes (see annex A).

The proportion of children across sub-Saharan Africa sleeping under insecticide-treated nets is 8 per cent. However, the regional average for sub-Saharan Africa is driven in part by a few populous countries with low insecticide-treated net coverage, such as Ethiopia, Kenya and Nigeria. Again, the data presented need to be viewed

Although data are limited, more than 80 per cent of nets in households that own at least one insecticide-treated net are long-lasting insecticidal nets

Figure 9 Despite significant progress, sub-Saharan African countries are still falling short of Roll Back Malaria targets for insecticide-treated net use among children under age five



within the rapidly changing context of recent and ongoing efforts to scale up insecticide-treated net coverage in many countries (see section on supply of insecticide-treated nets). For

example, Ethiopia has distributed more than 18 million nets since its last household survey in 2005, and Kenya has distributed more than 10 million since data were last collected in 2003.¹⁷

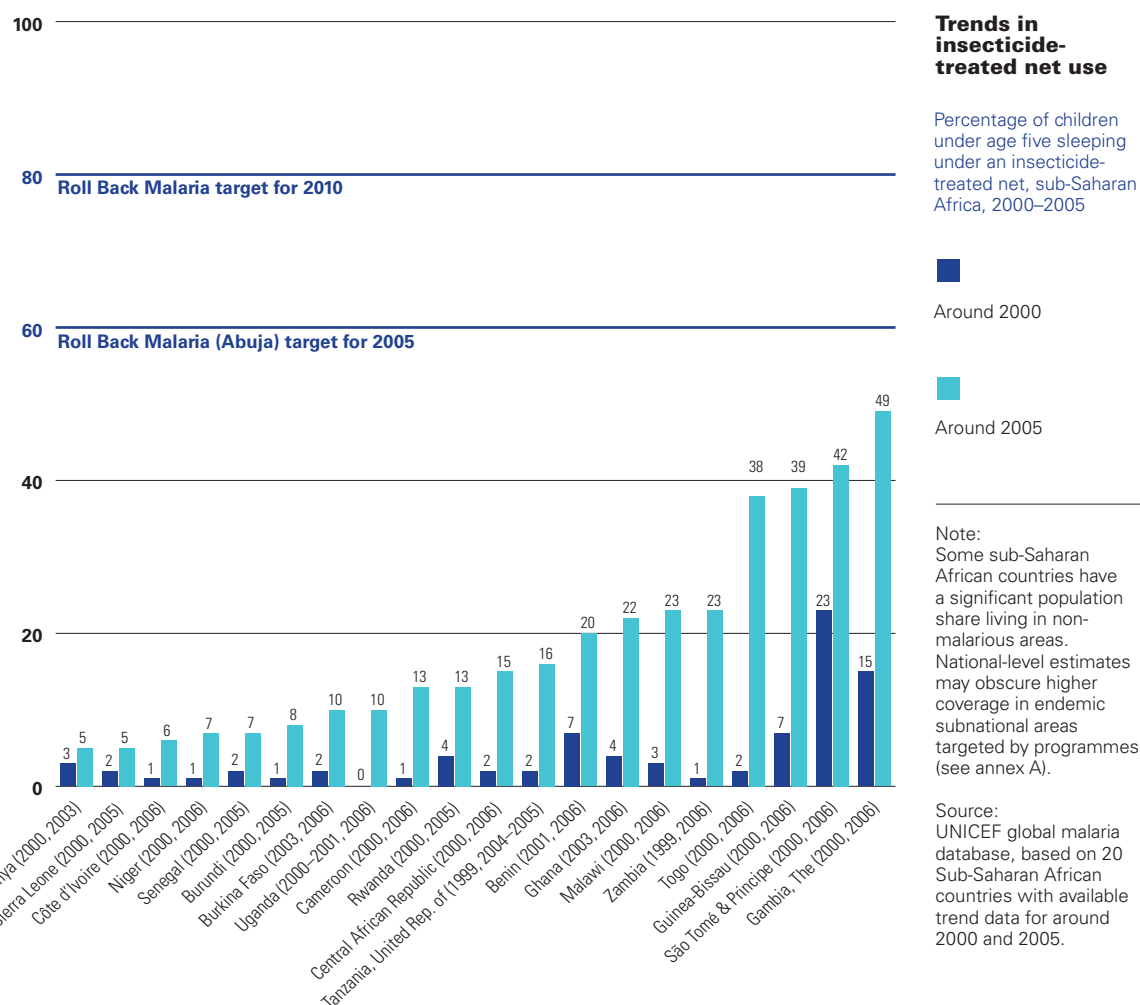


UNICEF/HQ07-0589/Giacomo Prozzi



UNICEF/HQ07-0589/Giacomo Prozzi

Figure 10 Rapid progress in scaling up insecticide-treated net use across all sub-Saharan African countries with trend data



Therefore, insecticide-treated net use in these countries has likely increased significantly, but data are not yet available to document these major gains. Other countries with more recent data show much higher insecticide-treated net use rates for children under age five, including The Gambia (49 per cent in 2006), São Tomé and Príncipe (42 per cent in 2006), Guinea-Bissau (39 per cent in 2006) and Togo (38 per cent in 2006).¹⁸

Significant progress in insecticide-treated net use

Rapid gains have been made in insecticide-treated net use by children across all sub-Saharan African countries with available trend data in a short period of time and from a very low baseline. In fact, 16 of 20 countries with trend data available have at least tripled coverage since 2000 (figure 10). Between 2000 and 2005 the proportion of children sleeping under insecticide-treated nets based on a subset of 20 countries covering nearly half the

Rapid gains have been made in insecticide-treated net use by children across all sub-Saharan African countries with available trend data in a short period of time and from a very low baseline

region's under-five population (excluding Nigeria) increased from 2 per cent to 13 per cent. Despite this major progress, though, overall insecticide-treated net use still falls short of global targets.¹⁹

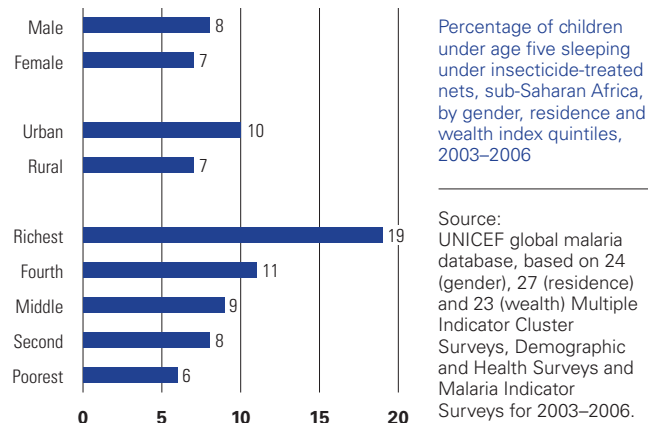
While trend data for around 2000–2005 are available for these countries, large-scale distribution programmes in many countries actually started much more recently than in 2000. Therefore, for most countries these large gains occurred in an even shorter timeframe than the trend analysis implies—less than three years for many countries. For example, insecticide-treated net use in Cameroon remained low at around 1 per cent between 2000 and 2004, with a sharp thirteen-fold increase in coverage between 2004 and 2006, as a result of large-scale distribution efforts (see statistical table 5).

Disparities in insecticide-treated net use

These high coverage rates at the national level, however, often hide important within-country disparities. For example, although boys and girls are equally likely to sleep under an insecticide-treated net, children with the highest risk of malaria—those living in rural areas and in the poorest households—are much less likely. Across sub-Saharan Africa children living in urban areas are around 1.5 times as likely to be sleeping under an insecticide-treated net as those living in rural areas—and children living in the wealthiest households are three times as likely as their poorest counterparts (figure 11).²⁰

Some countries, however, show little difference in the use of insecticide-treated nets by residence or household wealth. For example, 2006 data from Togo show relatively equitable coverage between rural (40 per cent) and urban (36 per cent) children as well as between children living in the poorest (41 per cent) and richest (35 per cent) households. Such coverage likely resulted from Togo's large-scale insecticide-treated net distribution, an integrated part of its child health campaign, which targeted all children throughout

Figure 11 African children living in rural areas and poorest households are less likely to use insecticide-treated nets



the country (see feature on recent successful malaria interventions in sub-Saharan Africa). Further analyses of data are needed to better understand how equitable coverage was achieved in certain countries so that these lessons can be applied to other countries with less equitable coverage.

Malaria treatment coverage

Data collected on antimalarial medicine use refer to all children with fever, whether or not the malaria diagnosis is confirmed, which reflects World Health Organization treatment recommendations for children living in malaria-endemic areas (see Background on malaria). Across sub-Saharan Africa some 34 per cent of children with fever receive antimalarial medicines.²¹ Several countries have much higher treatment rates, some have achieved the Roll Back Malaria (Abuja) target of 60 per cent coverage by 2005, and 11 others have come close, with more than 50 per cent coverage. However, many children in these countries are still using less effective medicines.

In addition, nearly one child in four with fever (23 per cent) in sub-Saharan Africa receives



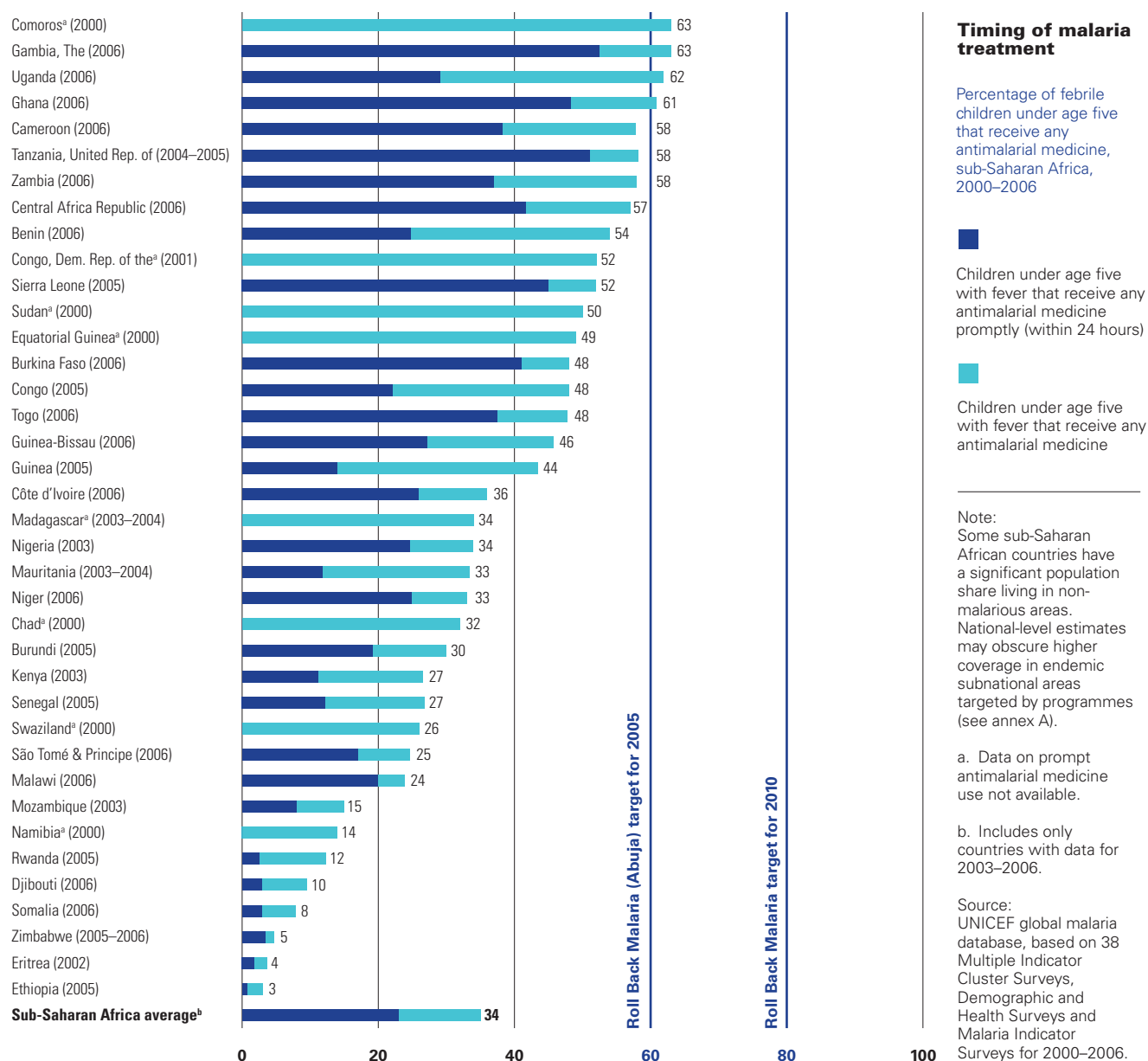
BASF AG Public Health/MENTOR/VOICES/Benost Carpenter



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Figure 12 Only about a third of febrile children receive antimalarial medicines across sub-Saharan Africa—and only 23 per cent receive them within the recommended time period



antimalarial medicines promptly (within 24 hours of the onset of fever).²² This indicates that of the 35 per cent of children in sub-Saharan Africa treated for malaria symptoms about

two-thirds are treated promptly (figure 12). Several countries perform well above this regional average, with around half of all children with fever treated with antimalarial medicines within

Since 2003 nearly all sub-Saharan countries have shifted their national drug policies to highly effective artemisinin-based combination therapies, with financing for and procurement of these drugs increasing since 2005

the recommended time period: The Gambia (52 per cent in 2006), Tanzania (51 per cent in 2005), Ghana (48 per cent in 2006) and Sierra Leone (45 per cent in 2005).

Trends in antimalarial medicine use

The percentage of febrile children receiving anti-malarial medicines declined from 41 per cent in 2000 to 34 per cent in 2005, based on a subset of 22 sub-Saharan countries that had trend data for 2000 and 2005 covering nearly half the region's population of children under age five. However, it appears that these findings may be the result of decreasing chloroquine use among febrile children, which is no longer recommended by the World Health Organization due to widespread resistance and treatment failures. Further analysis of these data is needed to better understand the reasons behind these trends in specific countries.

During this same time period the region entered a major transition period, with national drug policies changing and efforts to improve access to more effective treatments being scaled up. Since 2003 nearly all sub-Saharan countries have shifted their national drug policies to highly effective artemisinin-based combination therapies, with financing for and procurement of these drugs increasing since 2005 (map 4). These actions, along with more investment in delivery systems within countries, suggest that more children with malaria will likely receive prompt and effective treatment in the coming years.

Disparities in malaria treatment within countries

High treatment coverage across a number of countries in sub-Saharan Africa hides important within-country disparities in treatment coverage (figure 13). As with insecticide-treated net coverage, children living in rural areas and the poorest households are more likely to contract malaria—and less likely to receive appropriate treatment. While boys and girls living in sub-Saharan Africa are equally likely to receive

Figure 13 African children with fever living in rural areas and in poorest households are less likely to receive antimalarial medicines

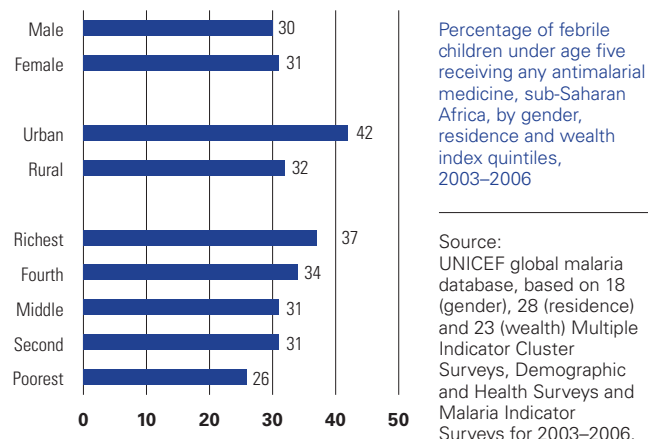
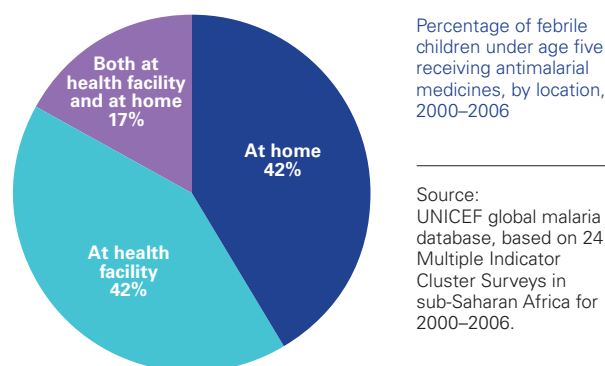


Figure 14 Many African children with fever taking antimalarial medicines receive treatment only at home



malaria treatment for fever, some 42 per cent of febrile children living in urban areas receive anti-malarial medicines compared with 32 per cent of rural children. Similarly, children living in the richest households are about 1.5 times more likely to receive treatment than those in the poorest households.²³



UNICEF/HQ05-141/Christine Nesbitt



UNICEF/HQ09-0847/Roger LaMoigne

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Box 4 Challenges of monitoring malaria cases and deaths in high-burden areas of sub-Saharan Africa

The Millennium Development Goals and the Roll Back Malaria Partnership share a common goal of reducing the number of malaria cases and deaths. But there are significant challenges to monitoring changes in the malaria burden over time. In high-burden African countries with poor access to health care and inadequate disease surveillance systems, major improvements in both the quality of health information systems and access to health services are needed before malaria case and death reporting is likely to be useful for monitoring malaria disease trends.

The Roll Back Malaria Monitoring and Evaluation Reference Group (see box 2) has therefore recommended an emphasis on monitoring trends in all-cause under-five mortality and on tracking progress in malaria control intervention coverage because these interventions have a proven impact on reducing the malaria burden. These data should be collected through high-quality national-level household surveys.

Prevalence

Millennium Development Goal 6 calls for reducing the malaria burden and specifies that “prevalence and death rates associated with malaria” should be used to measure progress towards this target (indicator 21). However, the concept of malaria prevalence is confusing because the term usually refers to parasite infection (“parasite prevalence”) rather than prevalence of clinical malaria episodes (for example, parasitemia and fever). Measurements of parasite prevalence would overreport the true malaria burden in countries with stable malaria transmission rates since parasite infection among older children and adult residents is usually asymptomatic and thus does not lead to clinical illness requiring health care. In addition, in most high-burden countries in sub-Saharan Africa parasite prevalence responds slowly to successful malaria prevention and would therefore by itself not be a suitable indicator for assessing changes in the malaria burden over time. The Roll Back Malaria Monitoring and

Evaluation Reference Group therefore proposed that incidence—or the number of new cases of clinical malaria infection—rather than prevalence be used for Millennium Development Goal reporting, a change to Millennium Development Goal Indicator 21 approved by the Inter-agency Expert Group on MDG Indicators.

Incidence

In most high-burden countries malaria cases notified through national health information systems may greatly underestimate the total number of clinical malaria episodes in the general population since most patients with symptomatic malaria do not seek treatment in formal health facilities. The Roll Back Malaria Monitoring and Evaluation Reference Group has developed a method for better estimating the total incidence of clinical malaria episodes, although country-level estimates derived from this model have not yet been finalized. These model-based incidence estimates are recommended for global reporting for international malaria targets once they are finalized.

Since reported health information systems data remain useful for informing local programmes and as part of disease incidence estimation, countries should continue to report the total number of malaria cases notified through their health information systems for country-level reporting on international malaria targets. The usefulness of health information systems data can be improved by annual assessments of the completeness of reporting and how it changes over time.

Malaria-specific mortality

Monitoring changes in malaria-specific mortality, especially among African children in high-burden areas, is difficult because of weak vital registration and health information systems. This presents an even greater challenge because most deaths occur at home, outside formal health care services. As a result, no one source of information provides timely

Many countries still treat a large proportion of children with fever with less effective traditional monotherapies, such as chloroquine, which are no longer recommended due to increasing levels of resistance and treatment failures

Box 4 (continued)

and robust information for monitoring changes in malaria-specific mortality.

Some efforts are under way to monitor malaria-specific mortality in a few subnational areas, with data collected using other methods, such as verbal autopsies. For example, a standardized verbal autopsy questionnaire and field-operating procedures have recently been developed for use in national surveys, censuses and sentinel sites.¹ However, further work is needed to improve these methodologies, and these methods may present challenges at the national level. Therefore, the Roll Back Malaria Monitoring and Evaluation Reference Group recommends a greater emphasis on monitoring trends in all-cause under-five mortality and tracking the implementation of key malaria control interventions through household surveys.

UNICEF and other partners have developed a mathematical model to predict the impact of a range of child survival interventions (including those for malaria) on mortality among children under age five.² The model links coverage of key child survival interventions with an estimate of each intervention's efficacy. Based on these inputs, the model predicts the proportionate reduction in under-five mortality due to increasing coverage of key child survival interventions (including those for malaria) from a baseline value to a current level. This model is now being incorporated into a user-friendly software package for use at the national and global levels and is expected to become available by the end of 2007.

Notes

1. WHO 2005b; Soleman, Chandramohan, and Shibuya 2006.
2. Jones and others 2003.

Place of treatment

It is important to better understand where children receive treatment for malaria symptoms, especially the share of treatment that takes place at health facilities. Based on 24 sub-Saharan African countries 42 per cent of children taking anti-malarial medicines received treatment at home (figure 14). This large proportion underscores the urgent need to strengthen community-based treatment programmes and overall health systems to improve the coverage of antimalarial medicines in high-burden African countries (box 4). Effective antimalarial medicines must also be reliably available through trained private sector providers.

Treatment by drug type

Nearly all high-burden African countries have seen a rapid and unprecedented change in national drug policies in recent years. In line with World Health Organization recommendations, countries have responded to the decreasing efficacy of monotherapies for treating malaria

by promoting artemisinin-based combination therapy for first-line treatment of uncomplicated malaria, a more effective treatment course (see map 4).

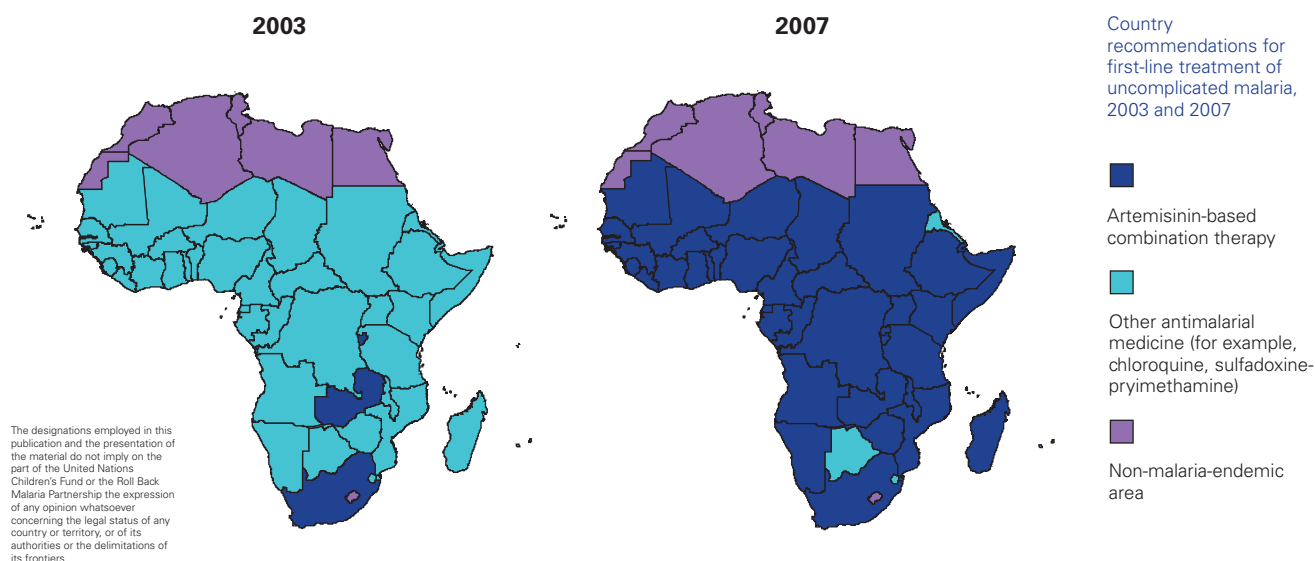
But many countries still treat a large proportion of children with fever with less effective traditional monotherapies, such as chloroquine, which are no longer recommended due to increasing levels of resistance and treatment failures. Across sub-Saharan Africa nearly 60 per cent of febrile children receiving anti-malarial medicines were taking chloroquine at the time of the surveys.²⁴ Thus while Comoros, The Gambia, Ghana and Benin have higher overall treatment rates than Tanzania and Zambia (figure 15), a larger proportion of children in Comoros, The Gambia, Ghana and Benin use chloroquine, a less effective treatment course.

Data on artemisinin-based combination therapy use by febrile children are limited. A subset



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Map 4 African countries have rapidly changed drug policies to include more effective drugs



Source: WHO and UNICEF 2003c; World Health Organization Global Malaria Programme website [www.who.int/malaria/treatmentpolicies.html].

of 14 countries in sub-Saharan Africa with data available between 2004 and 2006 showed artemisinin-based combination therapy use among febrile children of 6 per cent or less, except in Zambia, where coverage climbed to 13 per cent (table 1).

This low artemisinin-based combination therapy coverage is the result of several factors. First, artemisinin-based combination therapy is more expensive—about 10 times more—and many countries were slow to roll out these new medicines until additional resources were secured.²⁵ However, additional resources are now being secured through grants from The Global Fund to fight AIDS, Tuberculosis and Malaria, the World Bank Malaria Booster Programme and the U.S. President's Malaria Initiative, as well as funding through the innovative financing mechanism of UNITAID, the International Drug Purchasing Facility.²⁶ The price of artemisinin-based combination therapy has also declined over the last few years as the medicines have become increasingly available.²⁷

Second, a global shortage in the production and supply of artemisinin-based combination therapies also restricted countries' ability to quickly implement new national drug policies. Since around 2005, however, both production of and funding for artemisinin-based combination therapies have been rapidly scaled up (figure 16). The next round of surveys are thus expected to show higher levels of treatment coverage with artemisinin-based combination therapies.

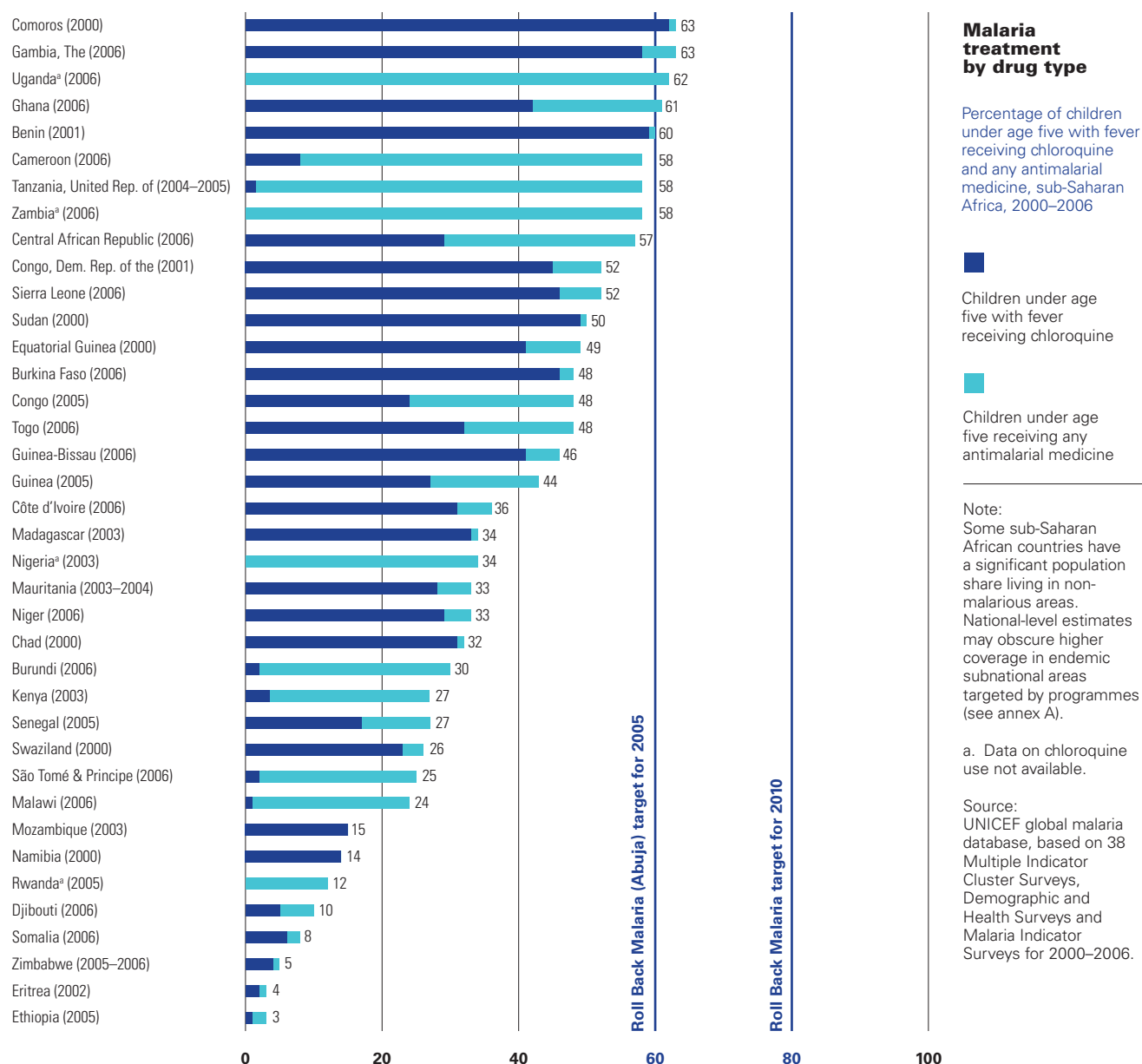
Prevention and control of malaria during pregnancy

Intermittent preventive treatment

Intermittent preventive treatment for pregnant women is a safe and effective way to protect both mother and child from the risks of malaria. Nearly every high-burden sub-Saharan African country has adopted the treatment as part of its national malaria control strategy (map 5). Intermittent preventive treatment for

Since around 2005 both production of and funding for artemisinin-based combination therapies have been rapidly scaled up

Figure 15 Despite relatively high treatment rates, many African children receive less effective drugs



pregnant women is not recommended for countries with a large proportion of their population living in areas with low-intensity malaria transmission, such as Botswana, Burundi, Cape Verde, Comoros, Eritrea, Ethiopia, Mauritania,

South Africa and Swaziland (see annex A). These countries have therefore not included intermittent preventive treatment for pregnant women as part of their national malaria control strategies.



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Table 1 Artemisinin-based combination therapies are just starting to take hold

Country	Percentage of febrile children under age five receiving		Source ^a
	Any antimalarial medicine	Artemisinin-based combination therapy	
Burundi	30	3	MICS 2006
Cameroon	58	2	MICS 2006
Central African Republic	57	3	MICS 2006
Côte d'Ivoire	36	3	MICS 2006
Djibouti	10	<1	MICS 2006
Gambia, The	63	<1	MICS 2006
Ghana	61	4	MICS 2006
Malawi	24	<1	MICS 2006
São Tomé and Príncipe	25	6	MICS 2006
Sierra Leone	52	1	MICS 2006
Somalia	8	1	MICS 2006
Tanzania, United Rep. of	58	2	DHS 2004–2005
Togo	48	1	MICS 2006
Zambia	58	13	MIS 2006

Note: Some sub-Saharan African countries have a significant proportion of their population living in non-malarious areas. National-level estimates may therefore obscure higher coverage levels in endemic subnational areas targeted by national malaria control programs (see annex A).

a. MICS is Multiple Indicator Cluster Survey, DHS is Demographic and Health Survey, and MIS is Malaria Indicator Survey.

Source: UNICEF global malaria database, based on 14 Multiple Indicator Cluster Surveys, Demographic and Health Surveys and Malaria Indicator Surveys in Sub-Saharan Africa for 2004–2006.

A subset of 23 sub-Saharan African countries with data available between 2003 and 2006 shows that coverage of intermittent preventive treatment for pregnant women lags behind coverage of other key malaria control interventions, including insecticide-treated nets and antimalarial medicine (figure 17). However, most countries have only recently adopted intermittent preventive treatment as a recommended treatment for pregnant women, and higher coverage is expected in the next round of surveys. Indeed, some countries have already achieved relatively high coverage, including Zambia (61 per cent in 2006) and Malawi (45 per cent in 2006). This higher coverage is due largely to early adoption and implementation of intermittent preventive treatment as a key part of national malaria control activities.

The potential for scaling up intermittent preventive treatment coverage in malaria-endemic areas is linked closely to the coverage and quality of antenatal care programs available to pregnant women, given that intermittent preventive treatment requires pregnant women to take at least two doses of an effective antimalarial medicine during the second and third trimesters of pregnancy. Across sub-Saharan Africa more than two-thirds (69 per cent) of women were attended to at least once by skilled health personnel (doctor, nurse or midwife) during their pregnancy.²⁸

Despite this high coverage of women receiving antenatal care at least once during their pregnancies, far fewer women receive antenatal care four or more times, which is the World Health Organization recommendation.²⁹ For example, in Kenya 88 per cent of pregnant women receive antenatal care at least once, but only 52 per cent receive it four or more times (2003 Demographic and Health Survey). Likewise, 92 per cent of women in Uganda receive antenatal care at least once, but only 42 per cent receive it four or more times (2000–2001 Demographic and Health Survey). Governments need to ensure that women, particularly those in poor and rural areas who are often at higher risk of contracting malaria, receive quality antenatal care during pregnancy in line with World Health Organization recommendations.

Use of insecticide-treated nets by pregnant women

It is important that pregnant women sleep under insecticide-treated nets to reduce the likelihood of malaria infection during this critical time for the woman and her child's health. However, across sub-Saharan Africa only about 5 per cent of pregnant women ages 15–49 sleep under insecticide-treated nets. Some countries have achieved higher coverage rates, such as Zambia (24 per cent) and Benin (20 per cent), although overall levels remain too low even in these countries.

Coverage of intermittent preventive treatment for pregnant women lags behind coverage of other key malaria control interventions, including insecticide-treated nets and antimalarial medicines

Indoor residual spraying

Indoor residual spraying, an effective prevention method where epidemiologically and logistically appropriate, involves applying long-lasting insecticide to the inside of houses and other structures to kill mosquitoes resting on interior walls, ceilings and other surfaces. Many countries and their Roll Back Malaria partners have recently shown a renewed interest in increasing indoor residual spraying. Efforts are also under way to develop standardized indicators and data collection methodologies for monitoring coverage of indoor residual spraying programmes.

To this end, the Roll Back Malaria Monitoring and Evaluation Reference Group has supported development of a manual of appropriate data collection methods along with a list of core

Figure 16 Recent and rapid scale-up in the global procurement of artemisinin-based combination therapies

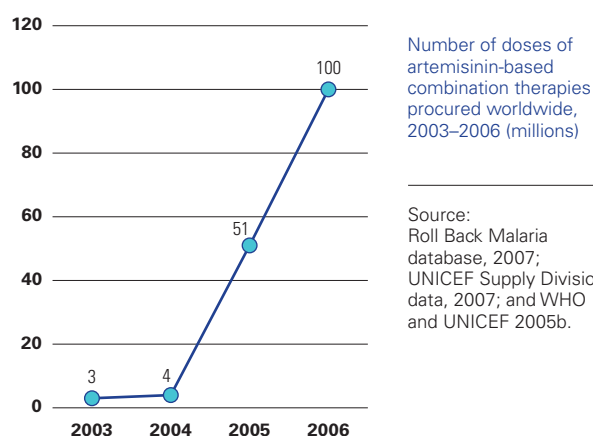
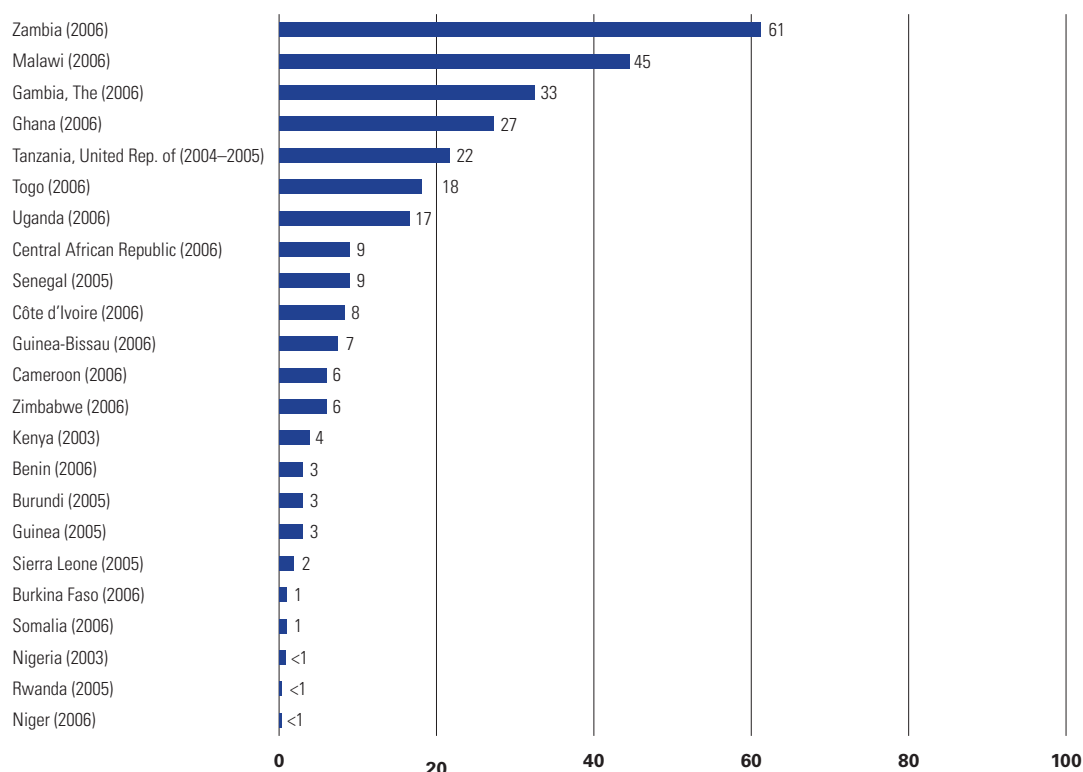


Figure 17 A wealth of new data are available on intermittent preventive treatment for pregnant women



Note:
Some sub-Saharan African countries have a significant population share living in non-malarious areas. National-level estimates may obscure higher coverage in endemic subnational areas targeted by programmes (see annex A).

Source:
UNICEF global malaria database, based on 23 Multiple Indicator Cluster Surveys, Demographic and Health Surveys and Malaria Indicator Surveys for 2003–2006.



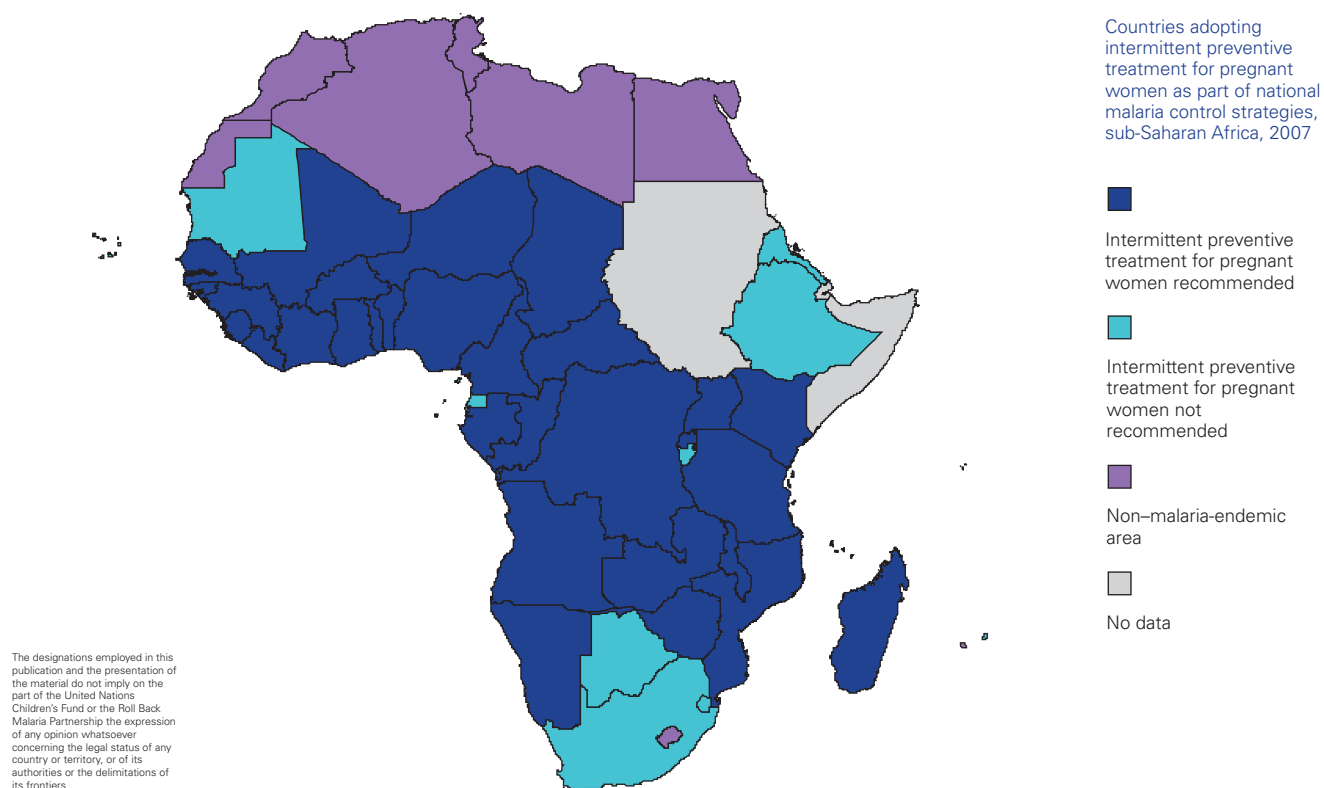
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Map 5 Sub-Saharan African countries have adopted intermittent preventive treatment for pregnant women as part of their national malaria control programmes



Note: Intermittent preventive treatment (for pregnant women) is not recommended for countries with a large proportion of their population living in areas with low-intensity malaria transmission, such as Botswana, Burundi, Cape Verde, Comoros, Eritrea, Ethiopia, Mauritania, South Africa and Swaziland (see annex A). These countries have therefore not included intermittent preventive treatment (for pregnant women) as part of their national malaria control strategies.

Source: World Health Organization Global Malaria Programme website [www.who.int/malaria/treatmentpolicies.html].

indicators for monitoring performance at the programme level as well as for monitoring indoor residual spraying coverage through population-based household surveys (table 2). These indicators will be added to the group's guidance on core indicators for monitoring malaria control intervention coverage by early 2008.³⁰

Interventions delivered through integrated programming

This section looks more closely at countries that have made major gains in scaling up malaria prevention and treatment interventions and

highlights successful strategies from their national malaria control programmes. The data in this report show major progress in many countries, particularly in sub-Saharan Africa, in a short period of time. This section provides examples of how various countries achieved these impressive results.

Attention and funding towards malaria control activities have greatly increased in recent years (box 5)—boosting coverage of key malaria control interventions, notably insecticide-treated nets. In addition, this attention and funding

Countries are now accelerating their national malaria programme activities and integrating malaria control efforts into existing service delivery mechanisms that have relatively high use by target groups

have also contributed to new and more effective interventions (such as long-lasting insecticidal nets) and reduced bottlenecks in the production, procurement and distribution of key commodities for malaria control (box 6). Countries have also been quicker to adopt more successful strategies, including strategies that would have been out of reach with less funding (for example, changing national drug policies to promote more effective, but more expensive, treatment courses).

These additional resources for malaria control are being rapidly absorbed and implemented in many high-burden African countries. These countries are now accelerating their national malaria programme activities and integrating malaria control efforts into existing service delivery mechanisms that have relatively high use by target groups. These integrated programmes not only support the acceleration of scale-up activities but also help improve the quality and increase the use of public health services and help build capacity within the health system itself. Recent efforts to scale up malaria control measures have included collaboration with the Expanded Programme on Immunisation and Integrated Management of Neonatal and Childhood Illness³¹ and incorporation of malaria interventions into child health days and antenatal care services for pregnant women.

Successful examples from sub-Saharan Africa include (see feature):

- Distributing long-lasting insecticidal nets and providing intermittent preventive treatment for pregnant women through antenatal care visits as well as through services to prevent mother-to-child transmission of HIV.

Table 2 Roll Back Malaria core indicators for monitoring progress towards malaria targets

Roll Back Malaria technical strategy	Indicator of population coverage
Vector control via insecticide-treated nets.	Percentage of households with at least one insecticide-treated net.
	Percentage of children under age five who slept under an insecticide-treated net the night prior to the survey.
Prompt access to effective treatment.	Percentage of children under age five with fever in the two weeks prior to the survey who received antimalarial medicines within 24 hours from onset of fever.
Prevention and control of malaria in pregnant women.	Percentage of pregnant women who slept under an insecticide-treated net the night prior to the survey.
	Percentage of women who received intermittent preventive treatment through antenatal visits during their last pregnancy.
Vector control via indoor residual spraying.	Guidance on indicators to be provided by early 2008.

Source: Roll Back Malaria, MEASURE Evaluation, WHO, and UNICEF 2006.

- Distributing long-lasting insecticidal nets with the Expanded Programme on Immunisation through routine vaccination systems alongside measles vaccination campaigns and other integrated child survival programmes such as vitamin A supplementation and deworming.
- Distributing long-lasting insecticidal nets with supportive communication and awareness-raising activities through child health days, which can include multiple interventions such as growth monitoring, immunization, deworming and vitamin A supplementation alongside behaviour change communication.
- Malaria treatment with artemisinin-based combination therapies through health facilities and in the home as part of Integrated Management of Neonatal and Childhood Illness.



UNICEF/HQ07-1148/Giacomo Pirozzi



UNICEF/HQ07-0128/Giacomo Pirozzi



P. Skov/Vestergaard Frandsen

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Box 5 New streams of funding for malaria control

International funding for combating malaria has increased dramatically over the last several years. Key donors are highlighted below.

The Global Fund to Fight AIDS, Tuberculosis and Malaria

The Global Fund was created in 2002 to dramatically increase funding to support integrated approaches to prevention and treatment. The Global Fund is a partnership among governments, multilateral and bilateral organizations, the private sector and communities. Between 2002 and 2007 The Global Fund has committed over \$1.7 billion for malaria programs in more than 76 recipient countries. More information is available at www.theglobalfund.org.

The World Bank's Malaria Control Booster Program

The programme is a 10-year commitment to bringing malaria under control across Africa; it began in September 2005. Over its first phase (2005–2008) 16 projects in 15 countries and one major cross-border region have been approved by the World Bank's board of directors. Together they reflect an eight-fold increase in World Bank funding for malaria control in Africa since 2005, with total commitments of about \$420 million now available for countries to scale up malaria control efforts. The second phase

(2008–2015) is now under design. More information is available at www.worldbank.org/afr/malaria.

The U.S. President's Malaria Initiative

The initiative was established in 2005 with the goal of reducing malaria mortality by 50 per cent in 15 target countries in sub-Saharan Africa. It is a \$1.2 billion five-year initiative (2005–2010) coordinated with national control programmes and other international donors. More information is available at www.pmi.gov.

The Bill and Melinda Gates Foundation

The foundation works to improve health and reduce poverty in developing countries. In 2006 the Gates Foundation committed \$83.5 million in new malaria grants. This funding supports malaria prevention and treatment programmes as well as research and development. More information is available at www.gatesfoundation.org.

A number of other donors, such as UNITAID (the International Drug Purchase Facility), have also contributed to the significant increase in the international funding directed towards malaria control. Other major donors, such as the Canadian International Development Agency, may also direct funds more broadly towards improving child survival, which would include funding for malaria control activities.

New medicines are urgently needed to treat malaria. Today, four new artemisinin-based combination therapies are in the final stages of development and are expected to be available by 2009

Box 6 Promising developments in malaria control

Malaria vaccine research

Recent research indicates that a malaria vaccine may be possible, although significant challenges to its development still remain. The Malaria Vaccine Technology Roadmap is the result of a two-year consultation process between the Malaria Vaccine Initiative, scientists, donors and other stakeholders to coordinate and accelerate vaccine development. The roadmap, launched in December 2006, recommends research goals, development milestones and capacity-building activities.¹ Despite this encouraging progress, it will take at least five more years of development before a vaccine is available, and even then vaccines under development may still lack the efficacy of currently available vaccines against other childhood diseases.

Malaria medicine development

New antimalarial medicines are urgently needed since many traditional and widely used monotherapies have become less effective due to increasing resistance and treatment failures. When the Medicines for Malaria Venture was formed in 2000, virtually no new antimalarial medicines were in the pipeline. Thus the purpose of this new non-profit organization was to discover, develop and deliver new antimalarial medicines through public-private partnerships. Today, thanks in large part to the Medicines for Malaria Venture, four new artemisinin-based combination therapies are in the final stages of development and are expected to be available by 2009. New resources are also becoming available to meet the demand for malaria treatment for those at risk, both through public and private sectors. In addition to resources from The Global Fund to Fight AIDS, Tuberculosis and Malaria, the World Bank, UNITAID (the International

Drug Purchase Facility) and the U.S. President's Malaria Initiative, additional substantial financing for artemisinin-based combination therapies may be possible through a global artemisinin-based combination therapy subsidy, which is currently under consideration by Roll Back Malaria partners.

Intermittent preventive treatment for infants

Recent studies indicate that intermittent preventive treatment may also reduce malaria incidence and its severe consequences among infants in high-burden countries. This research showed reductions in malaria incidence and severe anaemia among infants when sulfadoxine-pyrimethamine or amodiaquine was administered three times before the infant's first birthday, alongside other routine immunizations.² Importantly, since intermittent preventive treatment for infants can be administered during routine vaccinations, an effective delivery system is already in place to rapidly scale up coverage. The Intermittent Preventive Treatment for Infants Consortium was formed in 2003 with funding from the Bill and Melinda Gates Foundation to gather data and guide policy on this new intervention. The consortium includes leading malaria research centres as well as the World Health Organization and UNICEF.³ This promising intervention is still under evaluation and so has not yet been formally recommended as a key intervention strategy. More information is available at www.ipiti-malaria.org.

Notes

1. Brown 2007.
2. Greenwood 2007.
3. Schellenberg, Cisse, and Menendez 2006.

Recent successful malaria interventions in sub-Saharan Africa

Malawi strengthens malaria control, including coverage of intermittent preventive treatment for pregnant women

In 2003 the Government of Malawi initiated one of the largest insecticide-treated net distribution programmes in Africa, targeting pregnant women and children under age five.¹ Efforts to expand insecticide-treated net use have been tremendously successful, increasing the number of children sleeping under insecticide-treated nets sevenfold between 2000 and 2006 (figure 1).

After the 2000 Malawi Demographic and Health Survey revealed unexpectedly low levels of coverage of intermittent preventive treatment for pregnant women, a study determined that a key reason was confusion among antenatal clinic staff about the timing of the administration of the two doses

of sulfadoxine-pyrimethamine, which led to lower prescribing rates. Guidelines were then simplified and communicated to health staff, and Malawi now has one of the highest coverage rates of intermittent preventive treatment for pregnant women among malaria-endemic countries (figure 2).²

Togo's dramatic success in scaling up insecticide-treated net use

Togo made history in December 2004 by conducting the first-ever national insecticide-treated net distribution campaign integrated with other key child survival interventions including deworming and measles immunization. Around 900,000 insecticide-treated nets were distributed free of charge during the integrated child health campaign.³ As a result, Togo's dramatic gains in insecticide-treated net use—including a nineteenfold increase in share of children sleeping under insecticide-treated nets, from 2000 to 2006 (figure 3)—are

among the largest in sub-Saharan Africa. Other countries, including Angola, Democratic Republic of Congo, Ghana, Kenya, Madagascar, Rwanda, Sierra Leone, Uganda and Zambia have also successfully implemented large-scale insecticide-treated net distributions integrated with other child health campaigns.

Education and communication were key elements of the Togo campaign. Before the campaign Red Cross volunteers conducted door-to-door and community mobilization, and after the campaign they visited households to advise families on the proper use of insecticide-treated nets and to provide more vaccinations and additional free nets. An emphasis on behaviour change communication is likely one factor that led to the campaign's success.

Togo's approach to distributing nets free of charge to end-users likely also contributed to the equitable distribution of nets among

Figure 1 Insecticide-treated net use in Malawi is up sevenfold since 2000

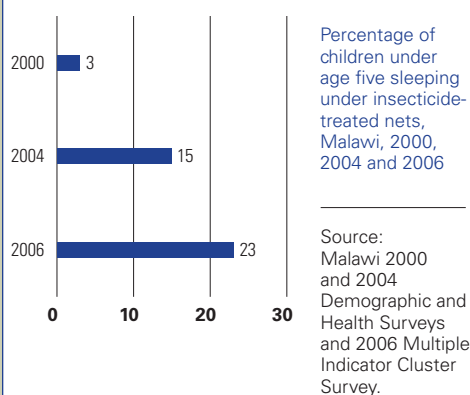


Figure 2 Progress in intermittent preventive treatment for pregnant women in Malawi has been good since 2000

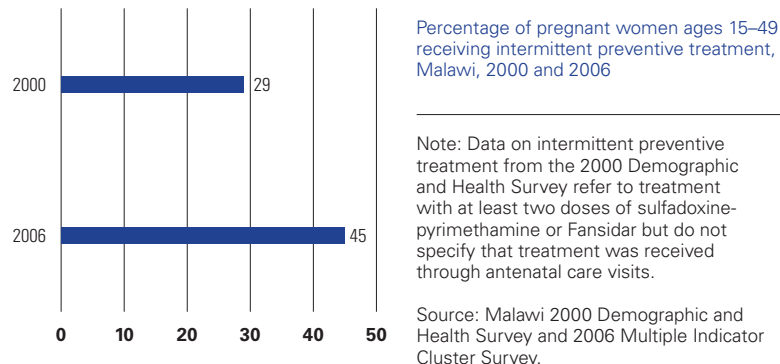
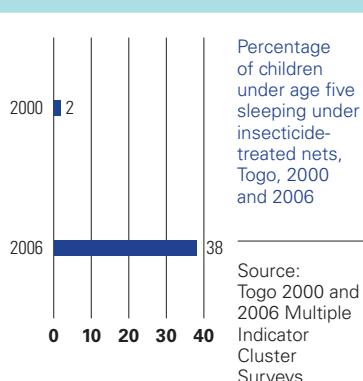


Figure 3 Togo has seen major gains in insecticide-treated net use since 2000



the population. Unlike many other countries, there is little difference in insecticide-treated net use between children living in the richest (35 per cent) and the poorest (41 per cent) households or between children living in urban (36 per cent) and rural (40 per cent) areas.

Ethiopia's government leads the way in coordinating efforts in effective prevention and treatment

Approximately two-thirds of Ethiopia's population lives in malarious areas. An integrated approach has significantly scaled up malaria prevention and control over the last three years. Since the last Demographic and Health Surveys in 2005 more than 18 million nets have been distributed through a variety of integrated delivery strategies.⁴ Among them is the Enhanced Outreach Strategy, which delivers

a set of key child survival interventions to 7 million children in drought-prone districts, including vitamin A, immunizations, supplementary feeding and long-lasting insecticidal nets.⁵ In addition, the Health Extension Programme works at the village level to distribute artemisinin-based combination therapies and insecticide-treated nets and has deployed and trained some 17,500 community health workers to do so, with the expectation of training a total of 30,000 by the end of 2008.⁶ Nearly all households in malarious areas are expected to have at least two nets by the end of 2007.

This large-scale distribution of insecticide-treated nets in Ethiopia occurred after the last Demographic and Health Survey in 2005; coverage estimates presented in this report do not reflect these recent efforts to scale up insecticide-treated net coverage. The next round of surveys is expected to capture these higher coverage rates.

Zambia leads sub-Saharan Africa in artemisinin-based combination therapy use

In Zambia 58 per cent of febrile children are treated with antimalarial medicines (see table)—nearly reaching the Abuja target of 60 per cent by 2005. Zambia was one of the first African countries to adopt artemisinin-based combination therapy as the recommended first-line treatment for uncomplicated malaria, having changed its national treatment policy in 2002.⁷ Since then, Zambia has greatly

Percentage of febrile children under age five receiving malaria treatment by type of antimalarial medicine, Zambia, 2006

Antimalarial medicine	Percentage of febrile children under age five
Any antimalarial medicine	58
Sulfadoxine-pyrimethamine or Fansidar	33
Artemisinin-based combination therapy	13
Quinine	5
Other antimalarial medicine	12

Note: Use rates by type of antimalarial medicines may sum to more than 58 per cent because some febrile children may receive more than one type of medicine to treat a malaria episode.

Source: Zambia 2006 Malaria Indicator Survey.

increased the use of artemisinin-based combination therapies for treating malaria in febrile children under age five. In 2006 Zambia had the highest treatment rates with artemisinin-based combination therapy among African countries, with nearly one child in four treated with antimalarial medicines receiving artemisinin-based combination therapies. While overall artemisinin-based combination therapy coverage is still low in Zambia for reasons discussed earlier, Zambia is expected to further increase its coverage.

Notes

1. Roll Back Malaria and UNICEF 2005.
2. Crawley and others 2007.
3. Mueller and others 2007.
4. Teklehaimanot, Sachs, and Curtis 2007.
5. UNICEF 2007.
6. Government of Ethiopia 2004, 2006.
7. Mudondo and others 2005, WHO and UNICEF 2003a.



Looking forward— key actions to achieve global malaria goals

Section

3

The previous sections show that many countries have rapidly absorbed significant additional resources directed towards malaria control activities and are adopting successful strategies for scaling up malaria control intervention coverage, particularly for insecticide-treated nets. Several new tools developed using these additional resources are making a difference in the fight against malaria (for example, long-lasting insecticidal nets).

The impressive gains made across numerous sub-Saharan African countries in scaling up the coverage of these key malaria control interventions shows that major progress can be achieved and in a short period of time. Despite this progress, though, sub-Saharan African countries are still falling short of global malaria goals. In addition, the limited progress in expanding treatment coverage across sub-Saharan Africa since 2000 and the large proportion of febrile children still being treated with less effective antimalarial medicines underscore the urgent need to strengthen activities that will lead to higher coverage rates with more effective malaria treatment.

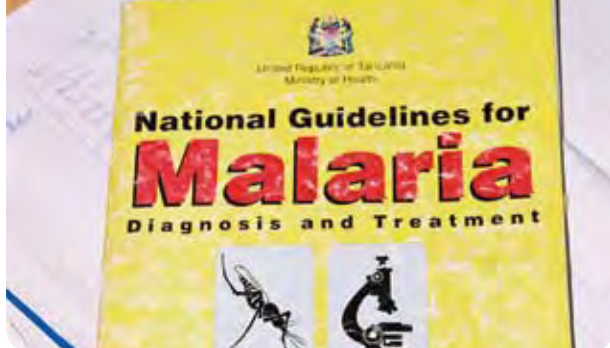
Enhanced commitments and bolder efforts will therefore be needed for countries to meet these ambitious international goals and targets.

Key actions needed to achieve global malaria goals include:

- Further strengthening political and financial commitments.
- Providing clear and timely policy guidance.
- Integrating malaria control into existing maternal and child health programmes.
- Strengthening partnerships and harmonizing efforts.
- Expanding social and behaviour change communication.
- Improving forecasting, procurement and supply chain management for malaria commodities.
- Strengthening monitoring systems for evidence-based programming.

Further strengthening political and financial commitments

The more than tenfold increase in international funding for malaria control over the past decade is a testament to the strong commitment to combating malaria.³² But more resources are still needed to further increase malaria intervention coverage and to achieve global malaria goals. Funding increases would support countries as they roll out more effective



2005 Alfredo L. Ferri/Courtesy of Photoshare



UNICEF/HQ07-0448/Giacomo Prozzi

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tools to combat malaria, such as artemisinin-based combination therapies and long-lasting insecticidal nets. They would also accelerate research into new tools that reduce the malaria burden. At the same time national governments need to continue prioritizing health spending and management in their overall budgets. Indeed, in 2001 African governments pledged to allocate at least 15 per cent of their annual budgets to improving the health sector.³³

Providing clear and timely policy guidance

Clear and timely policy guidance is particularly important given the rapidly expanding knowledge of the epidemiological distribution of malaria, improved understanding of drug resistance patterns and accelerated development of new tools to combat malaria. National strategic plans need to incorporate new information as it becomes available and new strategies based on best practices from other countries. For example, some new strategies include shifting treatment recommendations to expand artemisinin-based combination therapy use through community-based treatment programmes, expanding affordable private sector distribution of these drugs and strengthening community partnerships to improve programme communication and behaviour change activities.

Integrating malaria control into existing maternal and child health programmes

Malaria control can be further strengthened by integrating malaria activities into existing programmes. For example, coordination between national malaria control and reproductive health programmes could be further developed to ensure effective delivery of key interventions to pregnant women, such as intermittent preventive treatment and insecticide-treated nets. The link between malaria and immunization programmes could also be strengthened, and the integration of community-based management of malaria into

the management of other childhood illnesses through Integrated Management of Neonatal and Childhood Illness could be improved. Integrated delivery of interventions helps improve quality of services, build capacity within the health system and increase use of public health services.

In addition, UNICEF, the World Health Organization and other Roll Back Malaria partners have strongly encouraged the rapid increase in the distribution of free or highly subsidized insecticide-treated nets to achieve high rates of coverage for young children and pregnant women in malaria-endemic areas of sub-Saharan Africa.³⁴ WHO recommends full coverage with long-lasting insecticidal nets of all people at risk of malaria in areas targeted for malaria prevention. Where young children and pregnant women are the most vulnerable groups, their protection is the immediate priority while progress is made towards achieving full coverage. To this end, recent studies³⁵ show that integrating mass free distribution insecticide-treated net programmes (“catch up”) to quickly boost coverage in vulnerable populations with programmes that provide nets through routine distribution (“keep up”) will increase insecticide-treated net coverage quickly and sustainably. Until recently these strategies had been used separately, but this new combined approach may be more efficient for achieving and sustaining high net coverage.

Strengthening partnerships and harmonizing efforts

The Roll Back Malaria Partnership was created in 1998 to coordinate a global approach to combating malaria. The partnership has brought together international organizations, national governments, non-governmental and community-based organizations, the private sector and research institutes to harmonize their efforts in the fight against malaria. Creating coalitions and harmonizing actions among partners must continue to ensure effective use of

The impressive gains made across numerous sub-Saharan African countries in scaling up the coverage of key malaria control interventions shows that major progress can be achieved and in a short period of time

resources for malaria control. Current partnerships can be strengthened through the use of a “three ones” approach, whereby countries have one national plan, one coordinating mechanism and one monitoring and evaluation system, supported by all partners and serving as a framework for partner collaboration.

In addition, other partnerships need to be formed and strengthened. For example, public-private partnerships need to expand to provide sustained access to key malaria prevention and treatment measures, such as through UNITAID (the International Drug Purchasing Facility), which aims to make long-term and predictable funding available for procuring artemisinin-based combination therapies, and employer-based schemes that protect workforces from malaria. In addition, a proposed global artemisinin-based combination therapy subsidy is currently under discussion. Partnerships must also extend to the community level because communities have a key role in coordinating action among households and in disseminating information to caregivers and families to improve their access to and use of key malaria control interventions.

Expanding social and behaviour change communication

National, regional and global efforts to scale up malaria control have achieved remarkable success in making insecticide-treated nets and treatment increasingly available to malaria-afflicted populations. A major challenge that remains is changing household knowledge and behaviours to improve access to and use of malaria commodities and services once mosquito nets and antimalarial medicines reach families. A multichannel communication effort, targeting high-risk households with limited literacy and low media access, should inform families on where and when services and commodities are available and provide guidelines on their appropriate use. Families that know how to acquire insecticide-treated nets, that see the

benefit of indoor residual spraying where recommended and that understand the importance of ensuring that children and pregnant women use nets are more likely to acquire and use them accordingly. Similarly, when families know the signs of malaria and how to access treatment, they are more likely to seek out appropriate curative services.

Improving forecasting, procurement and supply chain management for malaria commodities

Bottlenecks in the production and distribution of key malaria commodities, including artemisinin-based combination therapies and long-lasting insecticidal nets, underscore the importance of accurate demand forecasting to ensure timely quality supply. Artemisinin-based combination therapies and long-lasting insecticidal nets, relatively new technologies available in the fight against malaria, constitute an emerging market. As such, demand is still immature and difficult to establish. In the last three years artemisinin-based combination therapies have gone through a rapid cycle of undersupply to oversupply relative to demand. But an oversupply today could lead to another undersupply if farmers of *Artemisia annua*, the plant base of artemisinin, stop cultivating it. Uptake of artemisinin-based combination therapies is still lower than expected, and urgent action is needed to correct the imbalance. The supply of long-lasting insecticidal nets, by contrast, has significantly improved in the last two years and is closer to meeting demand, thanks in large part to coordinated efforts among public and private sector partners to ensure adequate supplies.

Growing attention to demand forecasting should be met with better efforts at the country level to strengthen the supply chain in distribution and stock management so that predictability and reliability are increased in the malaria commodities market, boosting the confidence of both producers and suppliers. Importantly, this will



M. Halahan/Sumitomo Chemical–Olysat® Net



M. Halahan/Sumitomo Chemical–Olysat® Net

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also ensure that important life-saving commodities reach vulnerable groups. As a starting point, national malaria control programmes would also benefit from capacity-building support in planning and carrying out the effective distribution and use of key malaria commodities.

Strengthening monitoring systems for evidence-based programming

As national malaria control programmes continue to accelerate their activities, it will become increasingly important for countries to collect, analyse and report quality data to monitor the progress of quickly evolving programmes and to adjust activities to achieve major programme goals.

To this end, high-burden countries need to regularly collect malaria control intervention coverage data and all-cause under-five mortality estimates using high-quality national-level household surveys. These data should be based on the core indicators and standardized collection methodologies recommended by the Roll Back Malaria

Partnership, including the indicators recently developed to monitor indoor residual spraying (see table 2).³⁶ In addition, overall health information systems and vital registration systems must be strengthened to provide more complete data on the number of malaria cases and deaths and to monitor disease trends. As a start, the usefulness of health information systems data can be improved by annually assessing the completeness of reporting and how it changes over time.

At the program level more work is needed to strengthen monitoring systems that track and evaluate the performance of specific malaria-related programme activities (for example, tracking performance of indoor residual spraying activities through programme records and documents). The Global Fund to Fight AIDS, Tuberculosis and Malaria has developed a toolkit with proposed indicators for monitoring programme performance. The Roll Back Malaria Monitoring and Evaluation Reference Group is also developing a guidance paper to support countries in this effort.

Countries need to collect, analyse and report quality data to monitor the progress of quickly evolving programmes and to adjust activities to achieve major programme goals

Annex A Data used in this report

A broad consensus among Roll Back Malaria partners has been reached on a set of core indicators (see table 2 in the main text) and standardized data collection methods to ensure consistency and harmonization in the malaria information reported across different household surveys.¹ Data on these core indicators have been routinely collected through Multiple Indicator Cluster Surveys and Demographic Health Surveys since 2000 and are included in the recently developed Malaria Indicator Surveys. Results from these and other surveys are maintained in the UNICEF global databases, which are the main source of coverage data used in this report. More information is available at www.childinfo.org.

Multiple Indicator Cluster Surveys are nationally representative, standardized sample surveys to which UNICEF provides financial and technical support. These surveys have been conducted every five years since 1995. Since then nearly 200 surveys have been conducted worldwide, with the latest round in more than 50 countries between 2005 and 2006 and nearly half gathering data on malaria. This was the second round of surveys to include a malaria module in endemic countries, and the results have allowed for an analysis of trends in malaria intervention coverage in a large number of countries. More information is available at www.childinfo.org.

Demographic and Health Surveys are nationally representative, standardized household surveys that are usually conducted every five years with funding from the U.S. Agency for International Development. These surveys are designed to collect a variety of data on a broad range of demographic and health issues and to be comparable over time and across countries. A malaria module has been included in malaria-endemic countries since 2000, though data on malaria

prevention and treatment have been collected since 1998. More information is available at www.measuredhs.com.

Malaria Indicator Surveys were developed in 2004 by Roll Back Malaria Monitoring and Evaluation Reference Group partners to supplement the malaria data collected through Demographic Health Surveys and Multiple Indicator Cluster Surveys. The Malaria Indicator Surveys are designed to be relatively quick and easy to conduct and can be implemented at the national or subnational level. In addition to the standard set of core malaria indicators, these household surveys also provide other key malaria information, such as parasite infection prevalence and anaemia prevalence. More information is available at www.rollbackmalaria.org.

In addition, the AIDS Indicator Surveys funded by the U.S. Agency for International Development have included a harmonized malaria module in their questionnaires, though these household surveys collect data primarily on household availability of insecticide-treated nets and any types of nets. More information is available at www.measuredhs.com.

Cause-specific mortality

Data on malaria-specific mortality were based on the work of the Child Health Epidemiology Reference Group, which was established in 2001 to estimate the distribution of deaths among children under age five by cause. The reference group is coordinated by the World Health Organization's Department of Child and Adolescent Health and Development and supported by its Evidence and Information for Policy Cluster, with financial support from the Bill and Melinda Gates Foundation. The group has used various methods, including single-cause and multicausal proportionate mortality modules. It should be noted that the distribution of under-five deaths by cause refers to the primary cause of death.

Malaria intervention coverage data

UNICEF headquarters maintains a global database on key malaria prevention and treatment indicators. Data are derived largely from national-level household surveys, notably the UNICEF-supported Multiple Indicator Cluster Surveys, Demographic and Health Surveys supported by the U.S. Agency for International Development and Malaria Indicator Surveys. The latest available estimates from this database are published annually in UNICEF's *The State of the World's Children* report and are available at www.childinfo.org.

Insecticide-treated nets. In the Multiple Indicator Cluster Surveys information on mosquito net ownership is collected in the household questionnaire. For each net that the household owns, information is collected on the brand of net and, for conventional nets, how recently the net was treated with insecticide. In the child questionnaire, which is administered for all children under age five living in the household, the caregiver is asked whether the child slept under a mosquito net the previous night, and, if so, information about the type of net is obtained.

In Demographic and Health Surveys and Malaria Indicator Surveys data are obtained at the household level. A net registry is used to list all mosquito nets in the household, and detailed information is collected for each one, including the brand, and for conventional nets, how recently the net was treated with insecticide. For each net the specific household members who slept under the net the previous night are recorded. Together with information from other parts of the survey (including age and, in Demographic and Health Surveys, pregnancy status of women), core insecticide-treated net indicators can be calculated.²

Prompt access to effective treatment. Mothers or caregivers of children under age five are asked whether each of their children suffered from a

fever during the two weeks preceding the survey. If so, they are asked what, if anything, was given to treat the fever and how soon after the onset of fever the treatment was initiated. Because the question on treatment is open-ended, a full range of answers can be captured. During analysis malaria treatment can be categorized into first-line and second-line treatment according to national policy. Information is also obtained regarding the source of the medicines and whether the child was taken to a facility for treatment.

Intermittent preventive treatment during pregnancy.

This information is collected from all women of reproductive age who gave birth during the two years preceding the survey. The respondent is asked whether she took any antimalarial medicine for prevention during her last pregnancy and whether these medicines were received during antenatal care visits. If so, information is collected on the type of drug and how many times it was taken.

Interpreting malaria intervention coverage data from household surveys

The interpretation of malaria intervention coverage estimates derived from national-level household surveys must take into account two important issues. First, most national-level household surveys, including Multiple Indicator Cluster Surveys and Demographic and Health Surveys, are conducted during the dry season for important logistical reasons. Therefore, estimates of malaria intervention coverage do not reflect coverage during the period of peak malaria transmission, which is assumed to be higher for some indicators (such as, insecticide-treated net use). But coverage estimates for some indicators, such as household availability of insecticide-treated nets, would not be expected to vary markedly by season. Further analysis of these data is needed to better understand the relationship between survey timing and intervention coverage.

Second, some countries have significant non-malarious areas within their borders. Therefore, estimates of intervention coverage at the national level, as presented in this report, may obscure much higher coverage levels in endemic subnational areas that have been targeted by national malaria control programmes. Sub-Saharan African countries included in this report that have a significant proportion of their population living

in areas with no malaria transmission (for example, at least 10 per cent of the population living in non-malarious areas) include Botswana, Burundi, Cape Verde, Ethiopia, Kenya, Namibia, Rwanda and South Africa (table A1). In addition, malaria control programmes in other countries with large areas of low-intensity transmission, such as Eritrea, Madagascar and Zimbabwe, often target these unstable areas with indoor residual

Table A1 Population distribution in sub-Saharan African countries by malaria transmission intensity, 2000 (per cent)

Country or territory	Proportion of population living in areas of		
	High intensity transmission ^a	Low intensity transmission ^b	No malaria transmission ^c
Angola	46	53	1
Benin	100	0	0
Botswana	13	26	61
Burkina Faso	100	0	0
Burundi	21	64	15
Cameroon	74	24	2
Cape Verde ^d	0	54	46
Central African Republic	100	0	0
Chad	86	14	0
Comoros	0	100	0
Congo	100	0	0
Congo, Dem. Rep. of the	85	10	6
Côte d'Ivoire	100	0	0
Djibouti	0	100	0
Equatorial Guinea	97	2	1
Eritrea	16	83	1
Ethiopia	14	50	36
Gabon	96	0	4
Gambia, The	100	0	0
Ghana	98	2	0
Guinea	99	1	0
Guinea-Bissau	100	0	0
Kenya	21	57	22

Country or territory	Proportion of population living in areas of		
	High intensity transmission ^a	Low intensity transmission ^b	No malaria transmission ^c
Liberia	100	0	0
Madagascar	60	36	4
Malawi	77	22	1
Mali	90	10	0
Mauritania	41	59	0
Mozambique	96	4	0
Namibia	8	76	17
Niger	89	11	0
Nigeria	99	1	0
Rwanda	7	60	33
São Tomé and Príncipe ^d	100	0	0
Senegal	97	3	0
Sierra Leone	100	0	0
Somalia	3	96	1
South Africa	15	27	58
Sudan	56	42	1
Swaziland	69	27	3
Tanzania, United Rep. of	75	21	4
Togo	100	0	0
Uganda	73	20	7
Zambia	83	16	1
Zimbabwe	54	45	1

Note: Values may not sum to 100 due to rounding.


a. Based on Mapping Malaria Risk in Africa index of 0.75 or more.

b. Based on Mapping Malaria Risk in Africa index of greater than 0 and less than 0.75.

c. Based on Mapping Malaria Risk in Africa index of 0.

d. Based on estimates from published references because Mapping Malaria Risk in Africa index is not available.

Source: Rowe and others 2006. Based on Mapping Malaria Risk in Africa project estimates of climate suitability for malaria transmission.



spraying rather than insecticide-treated nets, and therefore national figures for insecticide-treated net use may be similarly masked.

Progress in malaria intervention coverage is generally monitored at the national level rather than among subnational at-risk populations. There are two important reasons for relying on national-level estimates of malaria intervention coverage, as this report does. First, for many countries it is difficult to accurately define at-risk areas within countries and subsequently identify households surveyed within those areas since surveys do not always geo-code the households or villages where survey interviews occur. The figures presented in table

A1 reflect estimates based on a climate model and have limited validity for some countries. Second, survey sample sizes must be large enough to offer meaningful results for subnational malarious areas. This is often difficult, particularly for Demographic and Health Surveys and Multiple Indicator Cluster Surveys, because sample sizes have not been specifically designed to obtain estimates for populations at risk of malaria.

Notes

1. Roll Back Malaria, MEASURE Evaluation, WHO, and UNICEF 2006.
2. Roll Back Malaria, MEASURE Evaluation, WHO, and UNICEF 2006.

Annex B Regional groupings

Regional estimates presented in this report are calculated using data from the countries and territories as grouped below.

Sub-Saharan Africa

Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Democratic Republic of the Congo, Côte d'Ivoire, Equatorial Guinea, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, São Tomé and Príncipe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Swaziland, United Republic of Tanzania, Togo, Uganda, Zambia, Zimbabwe.

Middle East and North Africa

Algeria, Bahrain, Djibouti, Egypt, Islamic Republic of Iran, Iraq, Jordan, Kuwait, Lebanon, Libyan Arab Jamahiriya, Morocco, Occupied Palestinian Territory, Oman, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, Yemen.

South Asia

Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka.

East Asia and Pacific

Brunei Darussalam, Cambodia, China, Cook Islands, Fiji, Indonesia, Kiribati, Democratic People's Republic of Korea, Republic of Korea, Lao People's Democratic Republic, Malaysia, Marshall Islands, Federated States of Micronesia, Mongolia, Myanmar, Nauru, Niue, Palau, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Islands, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, Viet Nam.

Latin America and Caribbean

Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Bolivarian Republic of Venezuela.

Central and Eastern Europe and the Commonwealth of Independent States

Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Montenegro, Romania, Russian Federation, Serbia, Tajikistan, the former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Ukraine, Uzbekistan.

Industrialized countries

Andorra, Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Holy See, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States.

Developing countries

Afghanistan, Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belize, Benin, Bhutan, Bolivia, Botswana, Brazil, Brunei Darussalam, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Democratic Republic of the Congo, Cook Islands, Costa Rica, Côte d'Ivoire, Cuba, Cyprus, Djibouti, Dominica, Dominican



Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Ethiopia, Fiji, Gabon, The Gambia, Georgia, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, India, Indonesia, Islamic Republic of Iran, Iraq, Israel, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Democratic People's Rep. of Korea, Rep. of Korea, Kuwait, Kyrgyzstan, Lao People's Democratic Republic, Lebanon, Lesotho, Liberia, Libyan Arab Jamahiriya, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Islands, Mauritania, Mauritius, Mexico, Federated States of Micronesia, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, Nicaragua, Niger, Nigeria, Niue, Occupied Palestinian Territory, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Qatar, Rwanda, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, São Tomé and Príncipe, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Singapore, Solomon Islands, Somalia, South Africa, Sri Lanka, Sudan, Suriname,


Swaziland, Syrian Arab Republic, Tajikistan, United Republic of Tanzania, Thailand, Timor-Leste, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Tuvalu, Uganda, United Arab Emirates, Uruguay, Uzbekistan, Vanuatu, Bolivarian Republic of Venezuela, Viet Nam, Yemen, Zambia, Zimbabwe.

Least developed countries

Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, The Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Samoa, São Tomé and Príncipe, Senegal, Sierra Leone, Solomon Islands, Somalia, Sudan, United Republic of Tanzania, Timor-Leste, Togo, Tuvalu, Uganda, Vanuatu, Yemen, Zambia.

Notes

1. Hay and others 2004.
2. WHO and UNICEF 2005b.
3. WHO 2005c, with additional analysis by UNICEF.
4. Bates and others 2004.
5. Crawley and others 2007.
6. Desai and others 2007.
7. Desai and others 2007.
8. Since renewed efforts to implement indoor residual spraying for malaria control have only recently taken hold, data on coverage of this intervention are limited and therefore not included in this report. Standardized indicators and household survey collection methods are being developed for possible inclusion in future surveys.
9. Miller and others 2007.
10. Other insecticide-treated net procurers include Population Services International, the World Health Organization, the International Red Cross organizations (for example, the Canadian Red Cross and American Red Cross), the United Nations Development Programme and malaria-endemic countries through their national procurement mechanisms.
11. GFATM 2007.
12. PSI 2006.
13. Teklehaimanot, Sachs, and Curtis 2007.
14. Regional estimate for sub-Saharan Africa is based on 30 countries with data during 2003–2006, covering 77 per cent of the region's population.
15. Regional estimate for sub-Saharan Africa is based on 28 countries with data during 2003–2006, covering 73 per cent of the region's population.
16. Regional estimate for sub-Saharan Africa is based on 29 countries with data during 2003–2006, covering 76 per cent of the region's under-five population.
17. Teklehaimanot 2007; PSI 2006.
18. Regional estimate for sub-Saharan Africa is based on 28 countries with data during 2003–2006, covering 73 per cent of the region's under-five population.
19. This analysis does not include Nigeria and Ethiopia because baseline data are not available for 2000. Both are populous countries with low insecticide-treated net coverage. Excluding them from the trend analysis, which is based on the subset of 20 countries across sub-Saharan Africa (excluding Nigeria) with trend data (covering nearly half the region's population), leads to a slightly higher coverage figure for 2005 than the regional estimate presented in statistical table 1, which is based on the latest available data for all countries during 2003–2006.
20. The regional analysis of disparities in insecticide-treated net coverage is based on a subset of sub-Saharan African countries with data disaggregated by gender (24 countries, covering 66 per cent of the region's under-five population), residence (27 countries, covering 75 per cent) and wealth (23 countries, covering 47 per cent).
21. Regional estimate for sub-Saharan Africa is based on 29 countries with data during 2003–2006, covering 78 per cent of the region's under-five population.
22. Regional estimate for sub-Saharan Africa is based on 28 countries with data during 2003–2006, covering 76 per cent of the region's under-five population.
23. The regional analysis of malaria treatment disparities is based on a subset of sub-Saharan African countries with data disaggregated by gender (18 countries, covering 53 per cent of the region's under-five population) residence (28 countries, covering 77 per cent) and wealth (23 countries, covering 47 per cent).
24. The regional analysis of malaria treatment by drug type is based on 33 sub-Saharan African countries with data available during 2000–2006, covering 64 per cent of the region's under-five population.
25. Malenga and others 2005.

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26. Gazsi 2007.
 27. Novartis International 2006.
 28. Regional estimate for sub-Saharan Africa is based on 111 countries with data during 2000–2006, covering 95 per cent of the region's population of women ages 15–49. Data are from UNICEF databases.
 29. WHO and UNICEF 2003.
 30. Roll Back Malaria, MEASURE Evaluation, WHO, and UNICEF 2006.
 31. For more information on the Integrated Management of Neonatal and Childhood Illnesses project, see UNICEF and WHO 1998.
 32. APPMG 2007.
 33. African Summit on HIV/AIDS, Tuberculosis and Other Related Infectious Diseases 2001.
 34. WHO and UNICEF 2005a.
 35. Grabowski, Nobiya, and Selanikio 2007.
 36. Roll Back Malaria, MEASURE Evaluation, WHO, and UNICEF 2006.

References

- African Summit on HIV/AIDS, Tuberculosis and Other Related Infectious Diseases. 2001. "Abuja Declaration on HIV/AIDS, Tuberculosis and Other Related Infectious Diseases." 24–27 April, Abuja.
- APPMG (All Party Parliamentary Malaria Group). 2007. *Financing Mechanisms for Malaria*. U.K. House of Commons, London. [www.appmg-malaria.org.uk]. June 2007.
- Bates, I., C. Fenton, J. Gruber, and others. 2004. "Vulnerability to Malaria, Tuberculosis, and HIV/AIDS Infection and Disease. Part 1: Determinants Operating at Individual and Household Level." *The Lancet Infectious Diseases*, 4(5): 271–72.
- Brown, H. 2007. "New Optimism over Malaria Vaccine Research." *The Lancet Infectious Diseases* 7(2): 84.
- Crawley, J. J. Hill, J. Yartey, and others. 2007. "From Evidence to Action? Challenges to Policy Change and Programme Delivery for Malaria in Pregnancy." *The Lancet Infectious Diseases* 7(2): 145–55.
- Desai, M., F.O. ter Kuile, F. Nosten, and others. 2007. "Epidemiology and Burden of Malaria in Pregnancy." *The Lancet Infectious Diseases* 7(2): 93–104.
- Ethiopia, Government of. 2004. "Insecticide-Treated Nets (ITNs): National Strategic Plan for Going to Scale with Coverage and Utilization in Ethiopia, 2004–2007." Ministry of Health, Addis Ababa.
- . 2006. "Global Alliance for Vaccines and Immunization (GAVI) Health System Strengthening (HSS): Country Proposal." Addis Ababa.
- Gazsi, Méline. 2007. *UNITAID: United to Treat Those in Need*. Paris. [www.diplomatie.gouv.fr/en/france-priorities_1/development_2108/innovative-ways-to-fund-development_2109/unitaid-united-to-treat-those-in-need_8850.html]. June 2007.
- GFATM (The Global Fund to Fight AIDS, Tuberculosis and Malaria). 2007. *Partners in Impact: Results Report*. Geneva.
- Grabowski, M., T. Nobiya, and J. Selanikio. 2007. "Sustained High Coverage of Insecticide-Treated Bednets through Combined Catch-Up and Keep-Up Strategies." *Tropical Medicine and International Health* 12(7): 815–22.
- Greenwood, B.M. 2007. "Intermittent Preventive Antimalarial Treatment in Infants." *Clinical Infectious Diseases* 45(1): 26–28.
- Greenwood, B.M., K. Bojang, C. Whitty, and others. 2005. "Malaria." *The Lancet* 365(9469): 1487–98.
- Hawley, W., P. Phillips-Howard, F.O. Ter Kuile, and others. 2003. "Community-Wide Effects of Permethrin-Treated Bed nets on Child Mortality and Malaria Morbidity in Western Kenya." *American Journal of Tropical Medicine and Hygiene* 68 (Supplement 4): 121–27.
- Hay, S., C. Guerra, A. Tatem, and others. 2004. "The Global Distribution and Population at Risk of Malaria: Past, Present, and Future." *The Lancet Infectious Diseases* 4(6): 327–36.
- Jones, G., R. Steketee, R. Black, and others. 2003. "How Many Child Deaths Can We Prevent This Year?" *The Lancet* 362(9377): 65–71.
- Lengeler, C. 2004. "Insecticide-Treated Bed Nets and Curtains for Preventing Malaria." Cochrane Database of Systematic Reviews. Issue 2, Oxford, U.K. [http://rbm.who.int/partnership/wg/wg_itn/docs/Cochrane_reviewITNs2004.pdf]. June 2007.
- Malenga, G., A. Palmer, S. Staedke, and others. 2005. "Antimalarial Treatment with Artemisinin Combination Therapy in Africa." *British Medical Journal* 331: 706–07.
- Marchesini, P., and J. Crawley. 2004. "Reducing the Burden of Malaria in Pregnancy." Roll Back Malaria, Geneva. [www.who.int/malaria/rbm/Attachment/20040713/MeraJan2003.pdf]. August 2007.
- Mermin, J., J. Lule, J.P. Ekwaru, and others. 2004. "Effect of Co-Trimoxazole Prophylaxis

- on Morbidity, Mortality, CD4-Cell Count, and Viral Load in HIV Infection in Rural Uganda." *The Lancet* 364(9443): 1428–34.
- Mermin, J., J.P. Ekwaru, C.A. Liechty, and others. 2006. "Effect of Co-Trimoxazole Prophylaxis, Antiretroviral Therapy, and Insecticide-Treated Bednets on the Frequency of Malaria in HIV-1 Infected Adults in Uganda: A Prospective Cohort Study." *The Lancet* 367(9518): 1256–61.
- Miller, J.M., E.L. Korenromp, B.L. Nahlen, and others. 2007. "Estimating the Number of Insecticide-Treated Nets Required by African Households to Reach Continent-Wide Malaria Coverage Targets." *Journal of the American Medical Association* 297(20): 2241–50.
- Mudondo, C., P. Chanda, M. Ndhlovu, and others. 2005. "Artemisinin-Based Combination Therapy in Zambia: From Policy Change to Implementation." World Health Organization, Geneva. [http://rbm.who.int/docs/zambia_act_deploying.pdf]. June 2007.
- Mueller, D.H., V. Wiseman, D. Bakusa, and others. 2007. "Economic Evaluation of the Togo Integrated Child Health Campaign 2004." Republic of Togo Ministry of Health, Lomé, and London School of Hygiene and Tropical Medicine.
- Novartis International. 2006. "Novartis Announces Initiative to Improve Access to State-of-the-Art Anti-Malarial Treatment Coartem." Media Release, 29 September, Basel, Switzerland.
- PSI (Population Services International). 2006. "Mosquito Net Coverage of Vulnerable Groups Reaches 50% in Kenya." Nairobi. [www.psi.org/malaria/pubs/Kenya-ITN-program.pdf]. June 2007.
- Roll Back Malaria. 2005. "RBM Global Strategic Plan 2005–2015." Geneva. [www.rollbackmalaria.org/forumV/docs/gsp_en.pdf]. June 2007.
- Roll Back Malaria and UNICEF (United Nations Children's Fund). 2005. "New Hope against Malaria: Four Country Successes." UNICEF Eastern and Southern Africa Regional Office, Nairobi.
- Roll Back Malaria, MEASURE Evaluation, WHO (World Health Organization), and UNICEF (United Nations Children's Fund). 2006. "Guidelines for Core Population Coverage Indicators for Roll Back Malaria: To Be Obtained from Household Surveys." MEASURE Evaluation: Calverton, Md.
- Rowe, A.K., S.Y. Rowe, R.W. Snow, and others. 2006. "Estimates of the Burden of Mortality Directly Attributable to Malaria for Children under Five Years of Age in Africa for the Year 2000." Final report for the Child Health Epidemiology Reference Group. World Health Organization, Geneva. [http://rbm.who.int/partnership/wg/wg_monitoring/docs/CHERG_final_report.pdf]. March 2006.
- Schellenberg, D., B. Cisse, and C. Menendez. 2006. "The IPTi Consortium: Research for Policy and Action." *Trends in Parasitology* 22(7): 296–300.
- Soleman, N., D. Chandramohan, and K. Shibuya. 2006. "Verbal Autopsy: Current Practices and Challenges." *Bulletin of the World Health Organization* 84(3): 239–45. [www.who.int/bulletin/volumes/84/3/239.pdf]. July 2007.
- Teklehaimanot, A., J.D. Sachs, and C. Curtis. 2007. "Malaria Control Needs Mass Distribution of Insecticidal Bednets." *The Lancet* 369(9580): 2143–46.
- Ter Kuile, F.O., A.M. van Eik, and S.J. Filler. 2007. "Effect of Sulfadoxine-Pyrimethamine Resistance on the Efficacy of Intermittent Preventive Therapy for Malaria Control During Pregnancy." *Journal of the American Medical Association* 297: 2603–16.
- UNICEF (United Nations Children's Fund). 2007. "Ethiopia." In *UNICEF Humanitarian Action Report 2007*. New York. [www.unicef.org/har07/files/countrychap_Ethiopia.pdf]. June 2007.
- UNICEF (United Nations Children's Fund) and WHO (World Health Organization). 1998.

- “Improving Family and Community Practices: A Component of the IMCI Strategy.” Geneva.
- Whitworth J., D. Morgan, M. Quigley, and others. 2000. “Effect of HIV-1 and Increasing Immunosuppression on Malaria Parasitaemia and Clinical Episodes in Adults in Rural Uganda: A Cohort Study.” *The Lancet* 356(9235): 1051–56.
- WHO (World Health Organization). 2004. “The Role of Laboratory Diagnosis to Support Malaria Disease Management: Focus on the Use of Rapid Diagnostic Tests in Areas of High Transmission.” Technical Consultation, Geneva.
- . 2005a. “Malaria Control Today: Current WHO Recommendations.” Working Document, Geneva.
- . 2005b. “WHO Technical Consultation on Verbal Autopsy Tools.” Geneva. [www.who.int/healthinfo/statistics/mort_verbalautopsy.pdf]. July 2007.
- . 2005c. *World Health Report 2005: Make Every Mother and Child Count*. Geneva.
- . 2006. *Guidelines for the Treatment of Malaria*. Geneva. [www.who.int/malaria/docs/TreatmentGuidelines2006.pdf]. June 2007.
- WHO 2007. “Insecticide-treated Mosquito Nets: A WHO Position Statement.” Geneva.
- WHOPES (World Health Organization Pesticide Evaluation Scheme). 2005. *Guidelines for Laboratory and Field Testing of Long-Lasting Insecticidal Mosquito Nets*. WHO/CDS/WHOPES/GCDPP/2005.11. World Health Organization, Geneva.
- WHO (World Health Organization) and UNICEF (United Nations Children’s Fund). 2003a. *Africa Malaria Report 2003*. Geneva.
- . 2003b. *Antenatal Care in Developing Countries: Promises, Achievements and Missed Opportunities*. Geneva.
- . 2003c. *World Malaria Report 2003*. Geneva.
- . 2005a. “Joint Statement: Protecting Vulnerable Groups in Malaria-Endemic Areas in Africa through Accelerated Deployment of Insecticide-Treated Nets.” Geneva.
- . 2005b. *World Malaria Report 2005*. Geneva.

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Demographics and key malaria control indicators

Country or territory	Under-five mortality rate (per 1,000 live births) 2005	Number of under-five deaths (thousands) 2005	Number of under-five children (thousands) 2005	Percentage of households		Percentage of children under age five		Percentage of children under age five with fever		Percentage of pregnant women	
				With at least one mosquito net of any type 2003–2006 ^a	With at least one insecticide-treated mosquito net 2003–2006 ^a	Sleeping under any mosquito net 2003–2006 ^a	Sleeping under an insecticide-treated mosquito net 2003–2006 ^a	Receiving antimalarial medicines 2003–2006 ^a	Receiving antimalarial medicines on same or next day 2003–2006 ^a	Receiving intermittent preventive treatment 2003–2006 ^a	Sleeping under an insecticide-treated mosquito net 2000–2006 ^a
Afghanistan	257	370	5,535	—	5 ^b	—	—	—	—	—	—
Albania	18	1	253	—	—	—	—	—	—	—	—
Algeria	39	27	3,160	—	—	—	—	—	—	—	—
Andorra	3	0	3	—	—	—	—	—	—	—	—
Angola	260	199	2,974	—	—	—	—	—	—	—	—
Antigua and Barbuda	12	0	8	—	—	—	—	—	—	—	—
Argentina	18	12	3,340	—	—	—	—	—	—	—	—
Armenia	29	1	162	—	—	—	—	—	—	—	—
Australia	6	2	1,253	—	—	—	—	—	—	—	—
Austria	5	0	384	—	—	—	—	—	—	—	—
Azerbaijan	89	12	602	—	—	12 ^b	1 ^b	1 ^b	—	—	—
Bahamas	15	0	30	—	—	—	—	—	—	—	—
Bahrain	11	0	65	—	—	—	—	—	—	—	—
Bangladesh	73	274	17,399	—	—	—	—	—	—	—	—
Barbados	12	0	16	—	—	—	—	—	—	—	—
Belarus	12	1	449	—	—	—	—	—	—	—	—
Belgium	5	1	563	—	—	—	—	—	—	—	—
Belize	17	0	34	—	—	—	—	—	—	—	—
Benin	150	52	1,441	56	25	47	20	54	25	3	20
Bhutan	75	5	293	—	—	—	—	—	—	—	—
Bolivia	65	17	1,239	—	—	—	—	—	—	—	—
Bosnia and Herzegovina	15	1	186	—	—	—	—	—	—	—	—
Botswana	120	5	218	—	—	—	—	—	—	—	—
Brazil	33	123	18,024	—	—	—	—	—	—	—	—
Brunei Darussalam	9	0	40	—	—	—	—	—	—	—	—
Bulgaria	15	1	335	—	—	—	—	—	—	—	—
Burkina Faso	191	118	2,459	52	23	18	10	48	41	1	3
Burundi	190	66	1,326	13	8	13	8	30	19	3	—
Cambodia	143	61	1,835	96	5	88	4	0	—	—	4
Cameroon	149	84	2,453	32	20	27	13	58	38	6	1
Canada	6	2	1,698	—	—	—	—	—	—	—	—
Cape Verde	35	1	72	—	—	—	—	—	—	—	—
Central African Republic	193	29	640	36	17	33	15	57	42	9	—
Chad	208	98	1,867	64	—	27 ^b	1 ^b	32 ^b	—	—	—
Chile	10	2	1,237	—	—	—	—	—	—	—	—
China	27	467	84,483	—	—	—	—	—	—	—	—
Colombia	21	20	4,726	31 ^b	3 ^b	24 ^b	—	—	—	—	—
Comoros	71	2	127	—	—	36 ^b	9 ^b	63 ^b	—	—	—
Congo	108	19	750	76	8	68	6	48	22	—	4
Congo, Dem. Rep. of the	205	589	11,209	—	—	12 ^b	1 ^b	52 ^b	—	—	—
Cook Islands	20	0	2	—	—	—	—	—	—	—	—
Costa Rica	12	1	393	—	—	—	—	—	—	—	—
Côte d'Ivoire	195	130	2,773	27	6	17	6	36	26	8	—
Croatia	7	0	207	—	—	—	—	—	—	—	—
Cuba	7	1	682	—	—	—	—	—	—	—	—

Demographics and key malaria control indicators

Country or territory	Under-five mortality rate (per 1,000 live births) 2005	Number of under-five deaths (thousands) 2005	Number of under-five children (thousands) 2005	Percentage of households		Percentage of children under age five		Percentage of children under age five with fever		Percentage of pregnant women	
				With at least one mosquito net of any type 2003–2006 ^a	With at least one insecticide-treated mosquito net 2003–2006 ^a	Sleeping under any mosquito net 2003–2006 ^a	Sleeping under an insecticide-treated mosquito net 2003–2006 ^a	Receiving antimalarial medicines 2003–2006 ^a	Receiving antimalarial medicines on same or next day 2003–2006 ^a	Receiving intermittent preventive treatment 2003–2006 ^a	Sleeping under an insecticide-treated mosquito net 2000–2006 ^a
Cyprus	5	0	49	—	—	—	—	—	—	—	—
Czech Republic	4	0	453	—	—	—	—	—	—	—	—
Denmark	5	0	326	—	—	—	—	—	—	—	—
Djibouti	133	4	120	26	18	9	1	10	3	—	—
Dominica	15	0	7	—	—	—	—	—	—	—	—
Dominican Republic	31	7	1,003	—	—	—	—	—	—	—	—
Ecuador	25	7	1,445	—	—	—	—	—	—	—	—
Egypt	33	63	8,933	—	—	—	—	—	—	—	—
El Salvador	27	4	805	—	—	—	—	—	—	—	—
Equatorial Guinea	205	5	88	—	—	15 ^b	1 ^b	49 ^b	—	—	—
Eritrea	78	13	759	34 ^b	—	12 ^b	4 ^b	4 ^b	2 ^b	—	3 ^b
Estonia	7	0	64	—	—	—	—	—	—	—	—
Ethiopia	164	509	13,063	6	3	2	2	3	1	—	1
Fiji	18	0	92	—	—	—	—	—	—	—	—
Finland	4	0	279	—	—	—	—	—	—	—	—
France	5	4	3,727	—	—	—	—	—	—	—	—
Gabon	91	4	193	—	—	—	—	—	—	—	—
Gambia, The	137	7	231	59	50	63	49	63	52	33	—
Georgia	45	2	242	—	—	—	—	—	—	—	—
Germany	5	3	3,545	—	—	—	—	—	—	—	—
Ghana	112	76	3,102	30	19	33	22	61	48	27	3
Greece	5	1	514	—	—	—	—	—	—	—	—
Grenada	21	0	10	—	—	—	—	—	—	—	—
Guatemala	43	19	2,020	—	—	6 ^b	1 ^b	—	—	—	—
Guinea	150	58	1,590	27	1	12	0	44	14	3	0
Guinea-Bissau	200	16	310	79	44	73	39	46	27	7	—
Guyana	63	1	75	—	—	—	—	—	—	—	—
Haiti	120	31	1,147	6	—	—	—	5	—	—	—
Holy See	—	—	—	—	—	—	—	—	—	—	—
Honduras	40	8	979	—	—	—	—	1	—	—	—
Hungary	8	1	477	—	—	—	—	—	—	—	—
Iceland	3	0	21	—	—	—	—	—	—	—	—
India	74	1,919	120,011	36	—	—	—	12 ^b	—	—	—
Indonesia	36	162	21,571	—	—	32 ^b	0 ^b	1	—	—	—
Iran, Islamic Rep. of	36	49	6,035	—	—	—	—	—	—	—	—
Iraq	125	122	4,322	—	—	7 ^b	0 ^b	1 ^b	—	—	—
Ireland	6	0	303	—	—	—	—	—	—	—	—
Israel	6	1	666	—	—	—	—	—	—	—	—
Italy	4	2	2,662	—	—	—	—	—	—	—	—
Jamaica	20	1	258	—	—	—	—	—	—	—	—
Japan	4	5	5,871	—	—	—	—	—	—	—	—
Jordan	26	4	732	—	—	—	—	—	—	—	—
Kazakhstan	73	17	1,075	—	—	—	—	—	—	—	—
Kenya	120	163	5,736	22	6	15	5	27	11	4	4
Kiribati	65	0	12	—	—	—	—	—	—	—	—

Country or territory	Under-five mortality rate (per 1,000 live births) 2005	Number of under-five deaths (thousands) 2005	Number of under-five children (thousands) 2005	Percentage of households		Percentage of children under age five		Percentage of children under age five with fever		Percentage of pregnant women	
				With at least one mosquito net of any type 2003–2006 ^a	With at least one insecticide-treated mosquito net 2003–2006 ^a	Sleeping under any mosquito net 2003–2006 ^a	Sleeping under an insecticide-treated mosquito net 2003–2006 ^a	Receiving antimalarial medicines 2003–2006 ^a	Receiving antimalarial medicines on same or next day 2003–2006 ^a	Receiving intermittent preventive treatment 2003–2006 ^a	Sleeping under an insecticide-treated mosquito net 2000–2006 ^a
Korea, Dem. People's Rep. of	55	19	1,723	—	—	—	—	—	—	—	—
Korea, Rep. of	5	2	2,412	—	—	—	—	—	—	—	—
Kuwait	11	1	241	—	—	—	—	—	—	—	—
Kyrgyzstan	67	8	541	—	—	—	—	—	—	—	—
Lao People's Dem. Rep.	79	16	895	—	—	82 ^b	18 ^b	9 ^b	—	—	—
Latvia	11	0	101	—	—	—	—	—	—	—	—
Lebanon	30	2	322	—	—	—	—	—	—	—	—
Lesotho	132	7	231	—	—	—	—	—	—	—	—
Liberia	235	39	631	18	6	11	3	—	—	—	—
Libyan Arab Jamahiriya	19	3	636	—	—	—	—	—	—	—	—
Liechtenstein	4	0	2	—	—	—	—	—	—	—	—
Lithuania	9	0	150	—	—	—	—	—	—	—	—
Luxembourg	5	0	29	—	—	—	—	—	—	—	—
Macedonia, TFYR	17	0	117	—	—	—	—	—	—	—	—
Madagascar	119	85	3,106	39	—	30 ^b	0 ^b	34	—	—	—
Malawi	125	69	2,340	50	36	29	23	24	20	45	15
Malaysia	12	7	2,734	—	—	—	—	—	—	—	—
Maldives	42	0	46	—	—	—	—	—	—	—	—
Mali	218	144	2,602	54 ^b	—	—	—	—	—	—	—
Malta	6	0	20	—	—	—	—	—	—	—	—
Marshall Islands	58	0	7	—	—	—	—	—	—	—	—
Mauritania	125	16	526	56	1	31	2	33	12	—	—
Mauritius	15	0	98	—	—	—	—	—	—	—	—
Mexico	27	59	10,857	—	—	—	—	—	—	—	—
Micronesia, Fed. Sts. of	42	0	16	—	—	—	—	—	—	—	—
Moldova	16	1	207	—	—	—	—	—	—	—	—
Monaco	5	0	2	—	—	—	—	—	—	—	—
Mongolia	49	3	270	—	—	—	—	—	—	—	—
Montenegro	—	—	—	—	—	—	—	—	—	—	—
Morocco	40	29	3,378	—	—	—	—	—	—	—	—
Mozambique	145	112	3,291	—	—	10	—	15	8	—	—
Myanmar	105	102	4,657	—	—	—	—	—	—	—	—
Namibia	62	3	268	13 ^b	—	7 ^b	—	14 ^b	—	—	—
Nauru	30	0	2	—	—	—	—	—	—	—	—
Nepal	74	58	3,639	—	—	—	—	—	—	—	—
Netherlands	5	1	973	—	—	—	—	—	—	—	—
New Zealand	6	0	274	—	—	—	—	—	—	—	—
Nicaragua	37	6	731	42 ^b	—	—	—	2 ^b	—	—	—
Niger	256	192	2,851	69	43	15	7	33	25	0	7
Nigeria	194	1,043	22,257	12	2	6	1	34	25	1	1
Niue	—	—	0	—	—	—	—	—	—	—	—
Norway	4	0	283	—	—	—	—	—	—	—	—
Occupied Palestinian Territory	23	3	646	—	—	—	—	—	—	—	—
Oman	12	1	301	—	—	—	—	—	—	—	—
Pakistan	99	473	21,115	—	—	—	—	—	—	—	—

Demographics and key malaria control indicators

Country or territory	Under-five mortality rate (per 1,000 live births) 2005	Number of under-five deaths (thousands) 2005	Number of under-five children (thousands) 2005	Percentage of households		Percentage of children under age five		Percentage of children under age five with fever		Percentage of pregnant women	
				With at least one mosquito net of any type 2003–2006 ^a	With at least one insecticide-treated mosquito net 2003–2006 ^a	Sleeping under any mosquito net 2003–2006 ^a	Sleeping under an insecticide-treated mosquito net 2003–2006 ^a	Receiving antimalarial medicines 2003–2006 ^a	Receiving antimalarial medicines on same or next day 2003–2006 ^a	Receiving intermittent preventive treatment 2003–2006 ^a	Sleeping under an insecticide-treated mosquito net 2000–2006 ^a
Palau	11	0	2	—	—	—	—	—	—	—	—
Panama	24	2	343	—	—	—	—	—	—	—	—
Papua New Guinea	74	13	815	—	—	—	—	—	—	—	—
Paraguay	23	4	825	—	—	—	—	—	—	—	—
Peru	27	17	2,997	—	—	—	—	—	—	—	—
Philippines	33	67	9,863	—	—	—	—	—	—	—	—
Poland	7	3	1,811	—	—	—	—	—	—	—	—
Portugal	5	1	561	—	—	—	—	—	—	—	—
Qatar	21	0	67	—	—	—	—	—	—	—	—
Romania	19	4	1,054	—	—	—	—	—	—	—	—
Russian Federation	18	28	7,225	—	—	—	—	—	—	—	—
Rwanda	203	76	1,500	18	15	16	13	12	3	0	17
Saint Kitts and Nevis	20	0	4	—	—	—	—	—	—	—	—
Saint Lucia	14	0	14	—	—	—	—	—	—	—	—
Saint Vincent and Grenadines	20	0	12	—	—	—	—	—	—	—	—
Samoa	29	0	26	—	—	—	—	—	—	—	—
San Marino	3	0	1	—	—	—	—	—	—	—	—
São Tomé and Príncipe	118	1	23	49	36	53	42	25	17	—	—
Saudi Arabia	26	17	3,200	—	—	—	—	—	—	—	—
Senegal	136	58	1,845	38	20	14	7	27	12	9	9
Serbia	—	—	—	—	—	—	—	—	—	—	—
Seychelles	13	0	14	—	—	—	—	—	—	—	—
Sierra Leone	282	71	958	20	5	20	5	52	45	2	—
Singapore	3	0	216	—	—	—	—	—	—	—	—
Slovakia	8	0	255	—	—	—	—	—	—	—	—
Slovenia	4	0	86	—	—	—	—	—	—	—	—
Solomon Islands	29	0	72	—	—	—	—	—	—	—	—
Somalia	225	82	1,482	22	12	18	9	8	3	1	—
South Africa	68	74	5,223	—	—	—	—	—	—	—	—
Spain	5	2	2,217	—	—	—	—	—	—	—	—
Sri Lanka	14	5	1,628	—	—	—	—	—	—	—	—
Sudan	90	105	5,216	—	—	23 ^b	0 ^b	50 ^b	—	—	—
Suriname	39	0	45	—	—	77 ^b	3 ^b	—	—	—	—
Swaziland	160	5	136	—	—	0 ^b	0 ^b	26 ^b	—	—	—
Sweden	4	0	488	—	—	—	—	—	—	—	—
Switzerland	5	0	353	—	—	—	—	—	—	—	—
Syrian Arab Republic	15	8	2,526	—	—	—	—	—	—	—	—
Tajikistan	71	13	834	5	2	2	1	2	1	—	—
Tanzania, United Rep. of	122	172	6,045	46	23	31	16	58	51	22	16
Thailand	21	21	5,012	—	—	—	—	—	—	—	—
Timor-Leste	61	3	179	—	—	48 ^b	8 ^b	47 ^b	—	—	—
Togo	139	33	1,014	46	40	41	38	48	38	18	—
Tonga	24	0	12	—	—	—	—	—	—	—	—
Trinidad and Tobago	19	0	90	—	—	—	—	—	—	—	—
Tunisia	24	4	806	—	—	—	—	—	—	—	—

Country or territory	Under-five mortality rate (per 1,000 live births) 2005	Number of under-five deaths (thousands) 2005	Number of under-five children (thousands) 2005	Percentage of households		Percentage of children under age five		Percentage of children under age five with fever		Percentage of pregnant women	
				With at least one mosquito net of any type 2003–2006 ^a	With at least one insecticide-treated mosquito net 2003–2006 ^a	Sleeping under any mosquito net 2003–2006 ^a	Sleeping under an insecticide-treated mosquito net 2003–2006 ^a	Receiving antimalarial medicines 2003–2006 ^a	Receiving antimalarial medicines on same or next day 2003–2006 ^a	Receiving intermittent preventive treatment 2003–2006 ^a	Sleeping under an insecticide-treated mosquito net 2000–2006 ^a
Turkey	29	44	7,212	—	—	—	—	—	—	—	—
Turkmenistan	104	11	488	—	—	—	—	—	—	—	—
Tuvalu	38	0	1	—	—	—	—	—	—	—	—
Uganda	136	200	5,970	34	16	22	10	62	29	17	10
Ukraine	17	7	1,924	—	—	—	—	—	—	—	—
United Arab Emirates	9	1	337	—	—	—	—	—	—	—	—
United Kingdom	6	4	3,367	—	—	—	—	—	—	—	—
United States	7	29	20,408	—	—	—	—	—	—	—	—
Uruguay	15	1	282	—	—	—	—	—	—	—	—
Uzbekistan	68	42	2,841	—	—	—	—	—	—	—	—
Vanuatu	38	0	30	—	—	—	—	—	—	—	—
Venezuela, Bolivarian Rep. of	21	12	2,860	—	—	—	—	—	—	—	—
Viet Nam	19	31	7,969	97	19	94	5	3	2	—	15
Yemen	102	86	3,668	—	—	—	—	—	—	—	—
Zambia	182	86	2,011	50	44	27	23	58	37	61	24
Zimbabwe	132	51	1,752	20	9	7	3	5	3	6	3
Regional groupings											
Sub-Saharan Africa	169	4,853	119,555	26	12	15	8	34	23	9	5
Eastern and Southern Africa	146	1,982	57,670	25	13	15	9	28	17	18	8
Western and Central Africa	190	2,877	61,885	27	11	16	7	40	28	4	3
Middle East and North Africa	54	526	44,711	—	—	—	—	—	—	—	—
South Asia	84	3,114	169,666	36	—	—	—	—	—	—	—
East Asia and the Pacific	33	984	144,948	—	—	—	—	—	—	—	—
Latin America and the Caribbean	31	361	56,538	—	—	—	—	—	—	—	—
CEE/CIS	35	196	26,562	—	—	—	—	—	—	—	—
Industrialized countries	6	65	54,239	—	—	—	—	—	—	—	—
Developing countries	83	9,971	550,130	—	—	—	—	—	—	—	—
Least developed countries	153	4,323	119,352	—	—	—	—	—	—	—	—
World	76	10,142	616,219	—	—	—	—	—	—	—	—

— not available.

^a. Data are for most recent year available during the period specified.^b. Data refer to years or periods other than those specified.

Household availability of at least one mosquito net of any type, by background characteristics

Country	Year	Percentage of households with at least one mosquito net of any type								Source ^a
		Total	Residence		Wealth index quintile					
			Urban	Rural	Poorest	Second	Middle	Fourth	Richest	
Benin	2001	40	49	35	—	—	—	—	—	DHS 2001
Benin	2006	56	66	50	—	—	—	—	—	DHS 2006 (Preliminary report)
Burkina Faso	2003	40	46	39	34	40	37	39	52	DHS 2003
Burkina Faso	2006	52	65	47	37	44	48	53	72	MICS 2006
Burundi	2005	13	49	11	7	8	11	14	28	MICS 2005
Cambodia	2005	96	95	96	91	95	98	99	97	DHS 2005
Cameroon	2004	20	24	17	15	19	20	25	22	DHS 2004
Cameroon	2006	32	33	30	34	28	29	38	31	MICS 2006
Central African Republic	2006	36	54	26	15	26	35	53	71	MICS 2006
Chad	2004	64	77	61	—	—	—	—	—	DHS 2004
Colombia	2000	31	31	32	—	—	—	—	—	DHS 2000
Congo	2005	76	82	68	63	72	76	83	85	DHS 2005
Côte d'Ivoire	2005	20	17	23	18	29	19	15	19	AIS 2005
Côte d'Ivoire	2006	27	22	31	26	29	31	25	24	MICS 2006
Djibouti	2006	26	26	22	—	—	—	—	—	MICS 2006
Eritrea	2002	34	28	37	—	—	—	—	—	DHS 2002
Ethiopia	2000	1	3	1	—	—	—	—	—	DHS 2000
Ethiopia	2005	6	11	5	5	3	4	5	11	DHS 2005
Gambia, The	2006	59	49	70	78	74	60	54	38	MICS 2006
Ghana	2003	18	10	24	28	24	17	12	11	DHS 2003
Ghana	2006	30	21	37	41	33	28	26	24	MICS 2006
Guinea	2005	27	28	27	18	28	30	30	28	DHS 2005
Guinea-Bissau	2006	79	82	78	74	79	80	83	81	MICS 2006
Haiti	2005–2006	6	11	4	0	2	5	8	16	DHS 2005
India	2005–2006	36	32	37	—	—	—	—	—	DHS 2005–2006
Kenya	2003	22	38	17	11	11	14	24	39	DHS 2003
Liberia	2005	18	—	—	—	—	—	—	—	MIS 2005
Madagascar	2003–2004	39	44	37	43	38	41	38	36	DHS 2003–2004
Malawi	2000	13	32	10	—	—	—	—	—	DHS 2000
Malawi	2004	42	56	39	20	32	39	53	72	DHS 2004
Malawi	2006	50	72	47	33	40	51	54	72	MICS 2006
Mali	2001	54	58	53	—	—	—	—	—	DHS 2001
Mauritania	2000–2001	56	40	67	—	—	—	—	—	DHS 2000–2001
Mauritania	2003–2004	56	43	66	—	—	—	—	—	DHS 2003–2004
Namibia	2000	13	11	15	—	—	—	—	—	DHS 2000
Nicaragua	2001	42	46	37	—	—	—	—	—	DHS 2001
Niger	2006	69	76	68	65	61	71	72	78	DHS 2006
Nigeria	2003	12	5	16	23	16	11	8	3	DHS 2003
Rwanda	2000	7	30	3	—	—	—	—	—	DHS 2000
Rwanda	2005	18	40	14	6	14	12	18	45	DHS 2005
São Tomé and Príncipe	2003	43	—	—	—	—	—	—	—	National Malaria Program 2003
São Tomé and Príncipe	2006	49	58	37	32	39	50	62	70	MICS 2006
Senegal	2005	38	32	44	40	44	45	32	30	DHS 2005
Sierra Leone	2005	20	15	22	14	18	27	25	18	MICS 2005
Somalia	2006	22	27	20 ^b	13	15	27	30	28	MICS 2006
Tajikistan	2005	5	2	6	5	6	6	6	2	MICS 2005
Tanzania, United Rep. of	1999	30	57	21	—	—	—	—	—	DHS 1999

Country	Year	Percentage of households with at least one mosquito net of any type								Source ^a
		Total	Residence		Wealth index quintile					
			Urban	Rural	Poorest	Second	Middle	Fourth	Richest	
Tanzania, United Rep. of	2000–2001	37	67	28	—	—	—	—	—	National Statistics Office 2000–2001
Tanzania, United Rep. of	2004–2005	46	74	36	27	32	37	50	82	DHS 2004–2005
Togo	2006	46	44	47	43	48	45	43	50	MICS 2006
Uganda	2000–2001	13	33	9	—	—	—	—	—	DHS 2000–2001
Uganda	2004–2005	26	60	20	—	—	—	—	—	AIS 2004–2005
Uganda	2006	34	61	29	—	—	—	—	—	DHS 2006 (Preliminary report)
Viet Nam	2005	97	90	99	99	99	99	98	91	AIS 2005
Viet Nam	2006	97	92	99	98	100	100	99	90	MICS 2006
Zambia	2001–2002	27	35	23	—	—	—	—	—	DHS 2001–2002
Zambia	2006	50	51	50	44	53	60	61	58	MIS 2006
Zimbabwe	1999	10	—	—	—	—	—	—	—	DHS 1999
Zimbabwe	2005–2006	20	34	13	9	11	11	23	45	DHS 2005–2006

— not available.

a. DHS is Demographic and Health Survey, MICS is Multiple Indicator Cluster Survey, MIS is Malaria Indicator Survey and AIS is AIDS Indicator Survey.

b. Data are for non-urban areas, including rural and nomad populations.

Household availability of at least one insecticide-treated mosquito net, by background characteristics

Country	Year	Percentage of households with at least one insecticide-treated mosquito net								Source ^a
		Total	Residence		Wealth index quintile					
			Urban	Rural	Poorest	Second	Middle	Fourth	Richest	
Benin	2006	25	29	21	—	—	—	—	—	DHS 2006 (Preliminary report)
Burkina Faso	2003	5	12	3	2	2	2	4	13	DHS 2003
Burkina Faso	2006	23	45	15	8	13	14	24	52	MICS 2006
Burundi	2005	8	34	6	4	5	6	7	19	MICS 2005
Cambodia	2005	5	2	5	9	6	4	2	1	DHS 2005
Cameroon	2004	1	2	1	1	1	1	2	3	DHS 2004
Cameroon	2006	20	20	20	22	18	19	21	21	MICS 2006
Central African Republic	2006	17	27	12	7	11	17	26	34	MICS 2006
Colombia	2000	3	3	4	—	—	—	—	—	DHS 2000
Congo	2005	8	8	8	6	7	7	8	13	DHS 2005
Côte d'Ivoire	2005	3	3	2	0	2	3	2	6	AIS 2005
Côte d'Ivoire	2006	6	6	6	5	5	8	5	8	MICS 2006
Djibouti	2006	18	18	12	—	—	—	—	—	MICS 2006
Ethiopia	2000	0	0	0	—	—	—	—	—	DHS 2000
Ethiopia	2005	3	5	3	3	2	3	3	6	DHS 2005
Gambia, The	2006	50	13	38	45	37	26	18	9	MICS 2006
Ghana	2003	3	2	4	7	2	2	2	4	DHS 2003
Ghana	2006	19	15	22	19	20	17	18	20	MICS 2006
Guinea	2005	1	1	0	0	0	0	1	1	DHS 2005
Guinea-Bissau	2006	44	35	49	45	47	52	42	33	MICS 2006
Kenya	2003	6	11	4	3	3	4	6	12	DHS 2003
Liberia	2005	6	—	—	—	—	—	—	—	MIS 2005
Malawi	2004	27	41	25	11	19	25	36	52	DHS 2004
Malawi	2006	36	56	34	22	29	37	40	56	MICS 2006
Mauritania	2003–2004	1	1	1	—	—	—	—	—	DHS 2003–2004
Niger	2006	43	37	44	44	40	45	43	42	DHS 2006
Nigeria	2003	2	1	3	5	1	2	2	1	DHS 2003
Rwanda	2005	15	32	12	5	11	9	15	37	DHS 2005
São Tomé and Príncipe	2006	36	44	25	22	27	36	47	53	MICS 2006
Senegal	2005	20	18	22	21	20	23	19	18	DHS 2005
Sierra Leone	2005	5	5	5	3	4	6	6	7	MICS 2005
Somalia	2006	12	16	10 ^b	6	8	14	18	16	MICS 2006
Tajikistan	2005	2	0	3	4	3	2	2	0	MICS 2005
Tanzania, United Rep. of	1999	1	—	—	—	—	—	—	—	DHS 1999
Tanzania, United Rep. of	2004–2005	23	47	14	6	10	15	22	56	DHS 2004–2005
Togo	2006	40	37	42	39	44	39	37	42	MICS 2006
Uganda	2006	16	26	14	—	—	—	—	—	DHS 2006 (Preliminary report)
Viet Nam	2005	12	5	14	24	13	10	9	6	AIS 2005
Viet Nam	2006	19	5	23	40	19	15	13	7	MICS 2006
Zambia	2001–2002	14	16	12	—	—	—	—	—	DHS 2001–2002
Zambia	2006	44	45	44	38	48	56	54	51	MIS 2006
Zimbabwe	2005–2006	9	11	7	5	8	6	8	15	DHS 2005–2006

— not available.

a. DHS is Demographic and Health Survey, MICS is Multiple Indicator Cluster Survey, MIS is Malaria Indicator Survey and AIS is AIDS Indicator Survey

b. Data are for non-urban areas, including rural and nomad populations.

Children sleeping under any type of mosquito net, by background characteristics

		Percentage of children under age five sleeping under any type of mosquito net										Source ^a
		Total	Gender		Residence		Wealth index quintile					
			Male	Female	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	
Country	Year	Total	Male	Female	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	Source ^a
Azerbaijan	2000	12	13	12	7	18	17	20	9	5	5	MICS 2000
Benin	2001	32	32	32	43	27	—	—	—	—	—	DHS 2001
Benin	2006	47	—	—	56	42	—	—	—	—	—	DHS 2006
Burkina Faso	2003	20	20	20	23	19	22	19	17	16	26	DHS 2003
Burkina Faso	2006	18	18	18	33	14	11	14	13	23	34	MICS 2006
Burundi	2000	3	3	3	28	1	0	1	1	2	9	MICS 2000
Burundi	2005	13	13	14	51	12	8	9	11	13	27	MICS 2005
Cambodia	2005	88	88	88	82	89	82	88	94	96	85	DHS 2005
Cameroon	2000	11	11	11	18	9	7	10	9	15	19	MICS 2000
Cameroon	2004	12	11	12	17	7	4	9	12	18	18	DHS 2004
Cameroon	2006	27	27	26	32	22	15	24	26	35	37	MICS 2006
Central African Republic	2000	31	31	31	48	20	19	17	23	41	59	MICS 2000
Central African Republic	2006	33	33	33	52	22	11	22	29	47	64	MICS 2006
Chad	2000	27	27	27	58	19	23	14	20	32	50	MICS 2000
Colombia	2000	24	—	—	23	26	—	—	—	—	—	DHS 2000
Comoros	2000	36	37	36	57	31	23	26	33	41	61	MICS 2000
Congo	2005	68	69	66	77	60	55	63	67	82	79	DHS 2005
Congo, Dem. Rep. of the	2001	12	12	12	15	10	7	14	10	10	19	MICS 2001
Côte d'Ivoire	2000	10	10	9	12	8	7	8	13	11	10	MICS 2000
Côte d'Ivoire	2003–2004	14	15	14	16	11	—	—	—	—	—	Enquête Nutrition et Mortalité 2003–2004
Côte d'Ivoire	2006	17	16	18	16	18	17	16	18	18	17	MICS 2006
Djibouti	2006	9	9	9	9	8	—	—	—	—	—	MICS 2006
Equatorial Guinea	2000	15	17	14	30	10	7	9	23	16	27	MICS 2000
Eritrea	2002	12	12	12	14	11	—	—	—	—	—	DHS 2002
Ethiopia	2005	2	2	2	9	2	2	1	2	2	6	DHS 2005
Gambia, The	2000	42	43	41	36	46	45	46	45	38	33	MICS 2000
Gambia, The	2006	63	63	64	55	68	68	74	65	60	44	MICS 2006
Ghana	2003	15	15	14	9	18	17	17	16	11	10	DHS 2003
Ghana	2006	33	33	32	22	38	41	35	29	29	26	MICS 2006
Guatemala	1999	6	—	—	—	—	—	—	—	—	—	MICS 1999
Guinea	2005	12	12	12	16	11	6	13	13	14	18	DHS 2005
Guinea-Bissau	2000	67	67	67	75	64	61	63	67	71	75	MICS 2000
Guinea-Bissau	2006	73	74	73	80	71	71	68	70	79	82	MICS 2006
Indonesia	2000	32	32	32	23	38	—	—	—	—	—	MICS 2000
Iraq	2000	7	7	8	7	8	—	—	—	—	—	MICS 2000
Kenya	2000	16	16	17	35	10	7	9	9	19	43	MICS 2000
Kenya	2003	15	15	14	33	11	6	7	11	18	35	DHS 2003
Lao People's Dem. Rep.	2000	82	83	82	97	78	73	82	83	86	91	MICS 2000
Liberia	2005	11	—	—	—	—	—	—	—	—	—	MIS 2005
Madagascar	2000	30	30	31	32	30	28	38	30	23	32	MICS 2000
Malawi	2000	8	—	—	21	6	—	—	—	—	—	DHS 2000
Malawi	2004	20	19	21	39	17	10	13	18	22	43	DHS 2004
Malawi	2006	29	29	29	52	26	18	24	28	30	49	MICS 2006
Mauritania	2003–2004	31	31	31	26	35	—	—	—	—	—	DHS 2003–2004
Mozambique	2003	10	—	—	16	7	—	—	—	—	—	DHS 2003 (National report)
Namibia	2000	7	—	—	5	8	—	—	—	—	—	DHS 2000
Niger	2000	17	17	16	36	14	13	8	16	14	33	MICS 2000

Children sleeping under any type of mosquito net, by background characteristics

Country	Year	Percentage of children under age five sleeping under any type of mosquito net										Source ^a
		Total	Gender		Residence		Wealth index quintile					
			Male	Female	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	
Niger	2006	15	15	15	32	12	11	13	12	14	28	DHS 2006
Nigeria	2003	6	6	6	4	7	—	—	—	—	—	DHS 2003
Rwanda	2000	6	6	6	28	2	1	1	1	10	38	MICS 2000
Rwanda	2000	6	—	—	27	2	—	—	—	—	—	DHS 2000
Rwanda	2005	16	16	16	33	13	6	13	10	16	37	DHS 2005
São Tomé and Príncipe	2000	43	42	42	60	27	31	15	26	26	48	MICS 2000
São Tomé and Príncipe	2003	52	—	—	—	—	—	—	—	—	—	National Malaria Program 2003
São Tomé and Príncipe	2006	53	53	53	62	41	39	42	50	65	75	MICS 2006
Senegal	2000	15	15	16	13	16	16	20	16	11	12	MICS 2000
Senegal	2005	14	14	14	14	14	8	16	22	14	10	DHS 2005
Sierra Leone	2000	15	16	14	13	16	16	16	15	15	14	MICS 2000
Sierra Leone	2005	20	21	20	15	22	14	19	27	22	19	MICS 2005
Somalia	2006	18	18	18	25	14 ^b	8	11	19	27	26	MICS 2006
Sudan	2000	23	23	23	26	21	18	23	27	24	23	MICS 2000
Suriname	2000	77	75	78	—	—	—	—	—	—	—	MICS 2000
Swaziland	2000	0	0	0	0	0	0	0	0	0	1	MICS 2000
Tajikistan	2005	2	2	1	1	2	2	2	1	2	1	MICS 2005
Tanzania, United Rep. of	1999	21	—	—	48	13	—	—	—	—	—	DHS 1999
Tanzania, United Rep. of	2004–2005	31	32	31	63	24	15	21	25	37	71	DHS 2004–2005
Timor-Leste	2002	48	48	47	75	39	26	33	46	59	77	MICS 2002
Togo	2000	15	15	14	19	13	11	12	13	16	26	MICS 2000
Togo	2006	41	43	39	39	42	42	42	43	38	40	MICS 2006
Uganda	2000–2001	7	—	—	21	6	—	—	—	—	—	DHS 2000–01
Uganda	2006	22	—	—	50	18	—	—	—	—	—	DHS 2006 (Preliminary report)
Viet Nam	2000	96	96	96	94	96	92	99	99	99	93	MICS 2000
Viet Nam	2005	95	96	94	89	96	94	96	98	97	92	AIS 2005
Viet Nam	2006	94	95	95	88	95	93	96	97	98	85	MICS 2006
Zambia	1999	6	6	6	9	5	4	3	5	7	12	MICS 2000
Zambia	2001–2002	16	17	16	22	14	—	—	—	—	—	DHS 2001–2002
Zambia	2006	27	28	25	31	24	23	30	35	31	47	MIS 2006
Zimbabwe	1999	3	—	—	—	—	—	—	—	—	—	DHS 1999
Zimbabwe	2005–2006	7	7	7	16	3	3	2	3	11	19	DHS 2005–2006

— not available.

a. MICS is Multiple Indicator Cluster Survey, DHS is Demographic and Health Survey, MIS is Malaria Indicator Survey and AIS is AIDS Indicator Survey

b. Data are for non-urban areas, including rural and nomad populations.

Children sleeping under insecticide-treated mosquito nets, by background characteristics

Country	Year	Percentage of children under age five sleeping under an insecticide-treated mosquito net										Source ^a
		Total	Gender		Residence		Wealth index quintile					
			Male	Female	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	
Azerbaijan	2000	1	2	1	1	2	2	2	2	0	1	MICS 2000
Benin	2001	7	7	8	14	4	—	—	—	—	—	DHS 2001–2002
Benin	2006	20	—	—	25	18	—	—	—	—	—	DHS 2006 (Preliminary report)
Burkina Faso	2003	2	1	2	5	1	1	0	1	2	6	DHS 2003
Burkina Faso	2006	10	10	9	24	6	4	6	6	9	26	MICS 2006
Burundi	2000	1	1	1	15	0	0	1	0	1	5	MICS 2000
Burundi	2005	8	8	9	40	7	5	5	6	8	19	MICS 2005
Cambodia	2005	4	4	4	2	5	8	5	4	1	1	DHS 2005
Cameroon	2000	1	1	1	3	1	1	0	1	3	3	MICS 2000
Cameroon	2004	1	1	1	2	0	0	1	0	2	2	DHS 2004
Cameroon	2006	13	13	13	14	12	9	13	13	15	18	MICS 2006
Central African Republic	2000	2	1	2	2	1	1	1	1	2	3	MICS 2000
Central African Republic	2006	15	15	15	24	10	5	10	16	20	28	MICS 2006
Chad	2000	1	1	1	1	0	0	0	0	0	2	MICS 2000
Comoros	2000	9	9	9	17	7	5	6	7	9	20	MICS 2000
Congo	2005	6	6	6	6	6	4	6	6	5	9	DHS 2005
Congo, Dem. Rep. of the	2001	1	1	1	2	0	0	0	0	0	3	MICS 2000
Côte d'Ivoire	2000	1	1	1	2	1	0	1	2	1	2	MICS 2000
Côte d'Ivoire	2003–2004	4	—	—	5	2	—	—	—	—	—	Enquête Nutrition et Mortalité 2003–2004
Côte d'Ivoire	2006	6	5	6	8	4	2	5	6	8	12	MICS 2006
Djibouti	2006	1	1	1	1	1	—	—	—	—	—	MICS 2006
Equatorial Guinea	2000	1	1	1	3	0	0	0	2	1	3	MICS 2000
Eritrea	2002	4	4	4	5	4	—	—	—	—	—	DHS 2002
Ethiopia	2005	2	2	1	4	1	1	1	1	2	3	DHS 2005
Gambia, The	2000	15	14	15	7	19	18	21	14	11	7	MICS 2000
Gambia, The	2006	49	49	50	38	55	54	63	50	45	30	MICS 2006
Ghana	2003	4	4	4	4	4	6	2	2	3	5	DHS 2003
Ghana	2006	22	22	22	16	25	24	22	19	21	22	MICS 2006
Guatemala	1999	1	—	—	—	—	—	—	—	—	—	MICS 1999
Guinea	2005	0	0	0	1	0	0	0	0	0	1	DHS 2005
Guinea-Bissau	2000	7	8	7	19	3	2	3	4	9	23	MICS 2000
Guinea-Bissau	2006	39	39	39	32	42	40	38	44	40	30	MICS 2006
Indonesia	2000	0	0	0	0	0	—	—	—	—	—	MICS 2000
Iraq	2000	0	0	0	0	0	—	—	—	—	—	MICS 2000
Kenya	2000	3	3	3	4	3	2	3	3	3	4	MICS 2000
Kenya	2003	5	5	4	10	4	1	2	5	5	12	DHS 2003
Lao People's Dem. Rep.	2000	18	18	18	11	20	15	22	17	18	17	MICS 2000
Liberia	2005	3	—	—	—	—	—	—	—	—	—	MIS 2005
Madagascar	2000	0	0	0	0	0	0	0	0	0	0	MICS 2000
Malawi	2000	3	—	—	12	2	—	—	—	—	—	DHS 2000
Malawi	2004	15	14	15	30	12	6	9	12	17	34	DHS 2004
Malawi	2006	23	23	23	43	21	13	19	23	24	41	MICS 2006
Mauritania	2003–2004	2	3	2	2	2	—	—	—	—	—	DHS 2003–2004
Niger	2000	1	1	1	4	1	0	0	1	0	4	MICS 2000
Niger	2006	7	8	7	15	6	5	7	6	6	14	DHS 2006
Nigeria	2003	1	1	1	1	1	—	—	—	—	—	DHS 2003
Rwanda	2000	4	—	—	21	1	—	—	—	—	—	DHS 2000

Children sleeping under insecticide-treated mosquito nets, by background characteristics

Country	Year	Percentage of children under age five sleeping under an insecticide-treated mosquito net										Source ^a
		Total	Gender		Residence		Wealth index quintile					
			Male	Female	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	
Rwanda	2000	5	5	5	24	2	0	1	1	8	32	MICS 2000
Rwanda	2005	13	13	14	26	11	5	11	8	14	31	DHS 2005
São Tomé and Príncipe	2000	23	21	23	32	14	10	20	24	23	40	MICS 2000
São Tomé and Príncipe	2003	50	—	—	—	—	—	—	—	—	—	National Malaria Program 2003
São Tomé and Príncipe	2006	42	42	42	51	29	29	33	36	53	63	MICS 2006
Senegal	2000	2	2	2	2	2	1	2	2	2	1	MICS 2000
Senegal	2005	7	7	7	7	7	4	7	11	8	6	DHS 2005
Sierra Leone	2000	2	2	1	4	1	0	0	1	2	5	MICS 2000
Sierra Leone	2005	5	5	5	5	5	4	4	6	6	8	MICS 2005
Somalia	2006	9	9	9	15	6 ^b	2	6	9	15	14	MICS 2006
Sudan	2000	0	0	1	1	0	0	0	1	1	1	MICS 2000
Suriname	2000	3	2	3	—	—	—	—	—	—	—	MICS 2000
Swaziland	2000	0	0	0	0	0	0	0	0	0	0	MICS 2000
Tajikistan	2005	1	2	1	0	2	2	2	0	2	1	MICS 2005
Tanzania, United Rep. of	1999	2	—	—	5	1	—	—	—	—	—	DHS 1999
Tanzania, United Rep. of	2004–2005	16	16	16	40	10	4	6	12	19	49	DHS 2004–2005
Timor-Leste	2002	8	8	8	12	6	4	5	9	14	7	MICS 2002
Togo	2000	2	2	2	4	1	1	0	1	2	7	MICS 2000
Togo	2006	38	40	37	36	40	41	41	41	35	35	MICS 2006
Uganda	2000–2001	0	—	—	1	0	—	—	—	—	—	DHS 2000–2001
Uganda	2006	10	—	—	21	8	—	—	—	—	—	DHS 2006 (Preliminary report)
Viet Nam	2000	16	14	17	4	19	27	15	11	12	4	MICS 2000
Viet Nam	2005	13	12	14	3	15	25	15	9	8	5	AIS 2005
Viet Nam	2006	5	5	5	12	3	6	3	1	2	14	MICS 2006
Zambia	1999	1	1	1	2	1	0	0	1	1	3	MICS 1999
Zambia	2001–2002	7	6	7	8	6	—	—	—	—	—	DHS 2001–2002
Zambia	2006	23	24	21	26	21	19	25	32	26	40	MIS 2006
Zimbabwe	2005–2006	3	—	—	5	2	2	2	2	4	6	DHS 2005–2006

— not available.

a. MICS is Multiple Indicator Cluster Survey, DHS is Demographic and Health Survey, MIS is Malaria Indicator Survey and AIS is AIDS Indicator Survey

b. Data are for non-urban areas, including rural and nomad populations.

Children with fever receiving any antimalarial medicine, by background characteristics

Country	Year	Percentage of febrile children under age five receiving any antimalarial medicine										Source ^a
		Total	Gender		Residence		Wealth index quintile					
			Male	Female	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	
Azerbaijan	2000	1	1	0	1	1	0	0	3	2	0	MICS 2000
Benin	2001	60	59	62	62	60	—	—	—	—	—	DHS 2001
Benin	2006	54	—	—	57	53	—	—	—	—	—	DHS 2006 (Preliminary report)
Burkina Faso	1993	32	33	30	39	31	—	—	—	—	—	DHS 1993
Burkina Faso	2003	50	—	—	60	48	37	45	50	59	63	DHS 2003
Burkina Faso	2006	48	49	47	70	42	36	42	39	58	70	MICS 2006
Burundi	2000	31	30	33	42	31	24	34	30	29	37	MICS 2000
Burundi	2005	30	33	27	28	30	30	30	29	31	29	MICS 2005
Cambodia	2005	0	—	—	1	0	0	0	0	1	0	DHS 2005
Cameroon	2000	66	67	65	71	64	59	67	61	77	71	MICS 2000
Cameroon	2004	53	—	—	59	48	42	46	57	61	61	DHS 2004
Cameroon	2006	58	57	58	69	50	33	54	65	68	75	MICS 2006
Central African Republic	2000	69	69	69	76	65	59	65	72	75	79	MICS 2000
Central African Republic	2006	57	59	54	68	47	38	45	57	67	73	MICS 2006
Chad	2000	32	31	33	41	30	21	34	30	34	41	MICS 2000
Comoros	2000	63	62	63	65	62	51	68	61	68	66	MICS 2000
Congo	2005	48	—	—	42	52	52	48	53	42	42	DHS 2005
Congo, Dem. Rep. of the	2001	52	52	52	63	47	44	47	52	54	66	MICS 2000
Côte d'Ivoire	2000	58	57	58	69	50	42	54	61	73	70	MICS 2000
Côte d'Ivoire	2006	36	36	36	45	32	28	29	39	43	57	MICS 2006
Djibouti	2006	10	—	—	10	0	—	—	—	—	—	MICS 2006
Equatorial Guinea	2000	49	47	50	55	43	44	45	54	49	53	MICS 2000
Eritrea	2002	4	4	3	4	4	2	3	4	6	2	DHS 2002
Ethiopia	2000	3	—	—	—	—	—	—	—	—	—	DHS 2000
Ethiopia	2005	3	3	3	4	3	1	3	4	4	6	DHS 2005
Gambia, The	2000	55	60	51	58	54	55	56	57	58	47	MICS 2000
Gambia, The	2006	63	61	64	59	65	61	63	63	65	61	MICS 2006
Ghana	1998	61	61	61	60	61	—	—	—	—	—	DHS 1998
Ghana	2003	63	62	64	65	61	59	55	65	77	58	DHS 2003
Ghana	2006	61	60	62	69	57	49	55	63	71	81	MICS 2006
Guinea	2005	44	—	—	52	42	35	42	41	55	52	DHS 2005
Guinea-Bissau	2000	58	58	59	72	52	44	56	57	62	77	MICS 2000
Guinea-Bissau	2006	46	46	46	60	39	28	40	44	57	66	MICS 2006
Haiti	2000	12	13	11	7	13	—	—	—	—	—	DHS 2000
Haiti	2005–2006	5	—	—	7	4	2	6	7	3	9	DHS 2005–2006
Honduras	2005–2006	1	1	1	1	0	0	0	1	0	1	DHS 2005–2006
India	2000	12	—	—	14	10	—	—	—	—	—	MICS 2000
Indonesia	2000	4	4	5	6	4	—	—	—	—	—	MICS 2000
Indonesia	2002–2003	1	—	—	1	1	—	—	—	—	—	DHS 2002–2003
Iraq	2000	1	1	2	1	2	—	—	—	—	—	MICS 2000
Kenya	1998	40	40	41	35	42	—	—	—	—	—	DHS 1998
Kenya	2000	65	66	63	64	65	64	63	64	62	76	MICS 2000
Kenya	2003	27	28	26	22	28	28	32	29	25	18	DHS 2003
Lao People's Dem. Rep.	2000	9	8	10	2	11	8	14	10	2	11	MICS 2000
Madagascar	2000	61	59	62	62	61	66	56	64	58	53	MICS 2000
Madagascar	2003–2004	34	—	—	36	34	—	—	—	—	—	DHS 2003–2004
Malawi	2000	27	—	—	34	26	—	—	—	—	—	DHS 2000

Children with fever receiving any antimalarial medicine, by background characteristics

Country	Year	Percentage of febrile children under age five receiving any antimalarial medicine										Source ^a
		Total	Gender		Residence		Wealth index quintile					
			Male	Female	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	
Malawi	2004	28	29	28	42	27	23	26	26	33	40	DHS 2004
Malawi	2006	24	24	24	30	23	19	23	25	26	29	MICS 2006
Mauritania	2003–2004	33	34	33	27	38	—	—	—	—	—	DHS 2003–2004
Mozambique	2003	15	—	—	13	16	—	—	—	—	—	DHS 2003 (National report)
Namibia	2000	14	15	14	6	19	—	—	—	—	—	DHS 2000
Nicaragua	2001	2	—	—	1	3	—	—	—	—	—	DHS 2001
Niger	2000	48	49	47	59	47	42	43	49	48	65	MICS 2000
Niger	2006	33	—	—	45	31	26	38	30	32	42	DHS 2006
Nigeria	2003	34	33	35	39	32	—	—	—	—	—	DHS 2003
Rwanda	2000	13	15	11	21	12	9	10	12	16	30	MICS 2000
Rwanda	2000	9	—	—	12	9	—	—	—	—	—	DHS 2000
Rwanda	2005	12	—	—	11	13	12	13	11	13	13	DHS 2005
São Tomé and Príncipe	2000	61	62	61	62	61	61	52	59	63	62	MICS 2000
São Tomé and Príncipe	2006	25	19	31	22	28	31	20	34	19	17	MICS 2006
Senegal	2000	36	35	38	53	30	25	30	33	55	56	MICS 2000
Senegal	2005	27	—	—	34	22	20	22	26	33	36	DHS 2005
Sierra Leone	2000	61	61	60	61	61	53	59	64	65	64	MICS 2000
Sierra Leone	2005	52	52	52	58	50	49	44	49	59	64	MICS 2005
Somalia	2006	8	10	6	14	6 ^b	4	7	6	16	12	MICS 2006
Sudan	2000	50	52	49	61	42	32	41	55	61	75	MICS 2000
Swaziland	2000	26	27	24	28	27	35	16	28	28	19	MICS 2000
Tajikistan	2005	2	1	4	1	2	3	2	0	2	1	MICS 2005
Tanzania, United Rep. of	1999	53	54	52	62	52	—	—	—	—	—	DHS 1999
Tanzania, United Rep. of	2004–2005	58	—	—	65	57	48	61	57	62	67	DHS 2004–2005
Timor-Leste	2002	47	47	48	56	45	44	41	48	49	61	MICS 2002
Togo	2000	60	60	60	62	59	57	58	61	61	70	MICS 2000
Togo	2006	48	47	49	57	43	36	42	49	52	67	MICS 2006
Uganda	2006	62	—	—	58	62	—	—	—	—	—	DHS 2006 (Preliminary report)
Viet Nam	2000	7	7	6	10	6	8	7	3	6	10	MICS 2000
Viet Nam	2006	3	2	4	2	3	6	1	3	2	0	MICS 2006
Zambia	1999	58	58	58	58	58	53	50	67	57	66	MICS 2000
Zambia	2001–2002	52	53	51	49	53	—	—	—	—	—	DHS 2001–2002
Zambia	2006	58	59	57	74	55	56	64	—	—	—	MIS 2006
Zimbabwe	2005–2006	5	—	—	1	6	7	6	5	3	1	DHS 2005–2006

— not available.

a. MICS is Multiple Indicator Cluster Survey, DHS is Demographic and Health Survey, MIS is Malaria Indicator Survey and AIS is AIDS Indicator Survey.

b. Data are for non-urban areas, including rural and nomad populations.

Children with fever receiving any antimalarial medicine promptly, by background characteristics

		Percentage of febrile children under age five receiving any antimalarial medicine promptly										
		Total	Gender		Residence		Wealth index quintile					
			Male	Female	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	
Country	Year											Source ^a
Benin	2006	25	—	—	31	22	—	—	—	—	—	DHS 2006 (Preliminary report)
Burkina Faso	2003	35	—	—	47	33	23	29	34	46	47	DHS 2003
Burkina Faso	2006	41	42	40	61	36	29	36	32	49	64	MICS 2006
Burundi	2005	19	21	17	22	19	15	18	22	22	20	MICS 2005
Cameroon	2004	40	—	—	46	34	27	32	43	50	48	DHS 2004
Cameroon	2006	38	38	39	53	29	14	30	43	57	54	MICS 2006
Central African Republic	2006	42	43	40	48	36	26	33	45	49	52	MICS 2006
Congo	2005	22	—	—	20	23	25	18	26	20	20	DHS 2005
Côte d'Ivoire	2006	26	25	27	32	23	20	21	31	27	41	MICS 2006
Djibouti	2006	3	2	4	3	0	—	—	—	—	—	MICS 2006
Eritrea	2002	2	2	1	2	2	0	2	3	3	1	DHS 2002
Ethiopia	2005	1	1	1	2	1	0	1	0	1	2	DHS 2005
Gambia, The	2006	52	50	55	54	52	48	50	52	56	57	MICS 2006
Ghana	2003	44	43	46	49	41	38	36	47	56	49	DHS 2003
Ghana	2006	48	48	48	58	44	37	38	52	62	72	MICS 2006
Guinea	2005	14	—	—	22	12	8	11	15	16	27	DHS 2005
Guinea-Bissau	2006	27	26	29	47	18	8	21	22	39	54	MICS 2006
Kenya	2003	11	12	10	8	12	11	12	12	12	8	DHS 2003
Malawi	2004	23	23	23	37	21	16	22	19	28	34	DHS 2004
Malawi	2006	20	20	20	24	20	17	19	20	21	25	MICS 2006
Mauritania	2003–2004	12	13	10	9	13	—	—	—	—	—	DHS 2003–2004
Mozambique	2003	8	—	—	6	9	—	—	—	—	—	DHS 2003 (National report)
Niger	2006	25	—	—	34	23	19	28	24	23	34	DHS 2006
Nigeria	2003	25	23	26	30	23	—	—	—	—	—	DHS 2003
Rwanda	2005	3	—	—	1	3	2	2	3	2	3	DHS 2005
São Tomé and Príncipe	2006	17	11	24	17	16	18	14	27	13	13	MICS 2006
Senegal	2005	12	—	—	16	10	7	10	13	17	16	DHS 2005
Sierra Leone	2005	45	46	44	49	44	45	35	42	52	55	MICS 2005
Somalia	2006	3	3	3	7	1 ^b	0	2	2	6	9	MICS 2006
Tajikistan	2005	1	1	2	0	2	3	0	0	2	0	MICS 2005
Tanzania, United Rep. of	2004–2005	51	—	—	57	50	43	54	51	54	55	DHS 2004–2005
Togo	2006	38	36	39	49	32	28	31	34	45	57	MICS 2006
Uganda	2006	29			26	29	—	—	—	—	—	DHS 2006 (Preliminary report)
Viet Nam	2006	2	1	4	2	2	5	1	3	2	0	MICS 2006
Zambia	2001–2002	37	37	36	36	37	—	—	—	—	—	DHS 2001–2002
Zambia	2006	37	39	35	49	35	36	41	—	—	—	MIS 2006
Zimbabwe	2005–2006	3	—	—	1	5	5	5	4	1	1	DHS 2005–2006

— not available.

Note: Receiving an antimalarial medicine promptly means receiving it within 24 hours of the onset of symptoms.

a. DHS is Demographic and Health Survey, MICS is Multiple Indicator Cluster Survey, MIS is Malaria Indicator Survey and AIS is AIDS Indicator Survey.

b. Data are for non-urban areas, including rural and nomad populations.

Children with fever receiving any antimalarial medicine, by drug type

		Percentage of febrile children under age five treated with												Source ^d
		Antimalarial medicines							Non-antimalarial medicines					
		Any anti-malarial medicine ^a	Chloro-quine	SP/ Fansidar ^b	ACT ^c	Amodia-quine	Quinine	Other	Aspirin	Ibuprofen	Para-cetamol	Other	Don't know	
Country	Year													
Azerbaijan	2000	1	0	—	—	—	—	1	—	—	38	24	3	MICS 2000
Benin	2001	60	59	1	—	2	—	—	25	—	47	31	5	DHS 2001
Burkina Faso	2003	50	48	0	—	1	1	—	—	—	—	—	—	DHS 2003
Burkina Faso	2006	48	46	0	—	3	0	2	4	1	45	6	4	MICS 2006
Burundi	2000	31	23	2	—	—	6	—	—	—	15	8	5	MICS 2000
Burundi	2006	30	2	2	3	4	21	1	4	1	21	9	12	MICS 2006
Cameroon	2000	66	48	1	—	—	22	4	—	—	51	45	5	MICS 2000
Cameroon	2004	53	20	1	—	12	23	—	—	—	—	—	—	DHS 2004
Cameroon	2006	58	8	2	2	14	30	11	6	1	54	20	4	MICS 2006
Central African Republic	2000	69	66	0	—	—	4	7	—	—	71	30	0	MICS 2000
Central African Republic	2006	57	29	4	3	5	25	9	8	2	57	20	1	MICS 2006
Chad	2000	32	31	1	—	—	—	—	—	—	56	8	1	MICS 2000
Comoros	2000	63	62	4	—	—	—	—	—	—	64	12	2	MICS 2000
Congo	2005	48	24	1	—	6	5	8	—	—	—	—	—	DHS 2005
Congo, Dem. Rep. of the	2001	52	45	1	—	—	10	—	—	—	61	29	4	MICS 2001
Côte d'Ivoire	2000	58	56	3	—	—	—	—	—	—	32	25	2	MICS 2000
Côte d'Ivoire	2006	36	31	2	3	—	—	3	—	—	30	11	2	MICS 2006
Djibouti	2006	10	5	4	0	2	3	3	23	8	37	11	13	MICS 2006
Equatorial Guinea	2000	49	41	—	—	—	19	—	—	—	82	28	3	MICS 2000
Eritrea	2002	4	2	1	—	—	1	—	—	—	—	—	—	DHS 2002
Ethiopia	2000	3	2	1	—	—	1	—	8	1	—	11	2	DHS 2000
Ethiopia	2005	3	1	1	—	—	1	0	—	—	—	—	—	DHS 2005
Gabon	2000	—	39	—	—	—	16	41	—	—	—	31	1	DHS 2000
Gambia, The	2000	55	55	3	—	—	—	—	—	—	61	13	4	MICS 2000
Gambia, The	2006	63	58	13	0	2	3	3	3	1	65	9	2	MICS 2006
Ghana	2003	63	59	0	—	2	2	—	—	—	—	—	—	DHS 2003
Ghana	2006	61	42	1	4	14	1	4	2	2	77	18	2	MICS 2006
Guinea	2005	44	27	1	—	1	16	—	—	—	—	—	—	DHS 2005
Guinea-Bissau	2000	58	58	3	—	—	—	—	—	—	67	19	2	MICS 2000
Guinea-Bissau	2006	46	41	2	—	4	3	6	15	2	38	10	2	MICS 2006
Haiti	2000	12	12	—	—	—	—	—	29	2	11	15	9	DHS 2000
Indonesia	2000	4	3	0	—	—	—	1	—	—	35	33	28	MICS 2000
Indonesia	2002–2003	1	1	0	—	—	—	—	4	1	47	76	15	DHS 2002–2003
Iraq	2000	1	1	0	—	—	0	0	—	—	64	33	3	MICS 2000
Kenya	2000	65	44	26	—	—	—	—	—	—	69	27	1	MICS 2000
Kenya	2003	27	3	11	—	10	4	—	48	—	—	22	—	DHS 2003
Lao People's Dem. Rep.	2000	9	9	0	—	—	—	—	—	—	32	11	3	MICS 2000
Madagascar	2000	61	30	1	—	—	34	—	—	—	53	44	4	MICS 2000
Madagascar	2003	34	33	1	—	—	—	—	36	22	—	—	—	DHS 2003
Malawi	2000	27	1	23	—	20	—	3	—	—	—	—	1	DHS 2000
Malawi	2004	28	1	23	—	39	45	0	—	—	—	—	—	DHS 2004
Malawi	2006	24	1	20	0	0	3	1	33	1	48	12	1	MICS 2006
Mali	2001	—	38	—	—	20	—	—	—	—	14	27	—	DHS 2001
Mauritania	2003–2004	33	28	1	—	2	—	6	—	—	—	—	—	DHS 2003–2004
Mozambique	2003	15	15	11	—	—	11	—	7	—	8	2	—	DHS 2003 (National report)

Country	Year	Percentage of febrile children under age five treated with												Source ^d
		Antimalarial medicines							Non-antimalarial medicines					
		Any anti-malarial medicine ^a	Chloro-quine	SP/Fansidar ^b	ACT ^c	Amodia-quine	Quinine	Other	Aspirin	Ibuprofen	Para-cetamol	Other	Don't know	
Namibia	2000	14	14	—	—	—	—	—	—	—	—	22	—	DHS 2000
Nicaragua	2001	2	2	0	—	—	—	—	6	1	81	20	1	DHS 2001
Niger	2000	48	48	0	—	—	—	—	30	—	15	19	2	MICS 2000
Niger	2006	33	29	1	—	1	4	—	—	—	—	—	—	DHS 2006
Rwanda	2000	9	5	1	—	—	3	—	—	—	—	—	—	DHS 2000
Rwanda	2000	13	7	2	—	—	4	—	—	—	11	15	40	MICS 2000
Rwanda	2005	12	—	4	—	6	5	—	—	—	—	—	—	DHS 2005
São Tomé and Príncipe	2000	61	61	1	—	—	—	—	—	—	76	0	2	MICS 2000
São Tomé and Príncipe	2006	25	2	1	6	12	3	1	5	2	75	10	1	MICS 2006
Senegal	2000	36	36	1	—	—	6	—	—	—	49	19	4	MICS 2000
Senegal	2005	27	17	1	—	8	2	—	—	—	—	—	—	DHS 2005
Sierra Leone	2000	61	60	4	—	—	—	—	—	—	66	43	7	MICS 2000
Sierra Leone	2006	52	46	1	1	2	5	4	21	2	68	25	7	MICS 2006
Somalia	2006	8	6	2	1	0	0	0	4	0	5	1	1	MICS 2006
Sudan	2000	50	49	1	—	—	—	—	—	—	12	11	1	MICS 2000
Swaziland	2000	26	23	6	—	—	—	—	—	—	59	0	4	MICS 2000
Tajikistan	2005	2	0	0	0	0	0	1	16	0	73	11	3	MICS 2005
Tanzania, United Rep. of	2004–2005	58	2	24	2	22	12	—	—	—	—	—	—	DHS 2004–2005
Timor-Leste	2002	47	43	12	—	—	3	12	—	—	66	11	1	MICS 2002
Togo	2000	60	59	3	—	—	—	—	—	—	65	39	2	MICS 2000
Togo	2006	48	32	3	1	6	9	8	3	1	54	26	3	MICS 2006
Viet Nam	2000	7	4	1	—	—	2	—	—	—	50	24	21	MICS 2000
Viet Nam	2006	3	0	2	0	0	0	0	3	1	38	33	21	MICS 2006
Zambia	1999	58	56	2	—	—	2	—	—	—	60	2	18	MICS 1999
Zambia	2001–2002	52	50	2	—	—	2	—	—	—	—	62	2	DHS 2001–2002
Zambia	2006	58	—	33	13	—	5	12	—	—	—	—	—	MIS 2006
Zimbabwe	2005–2006	5	4	1	—	—	0	—	—	—	—	—	—	DHS 2005–2006

— not available.

a. Values may not equal the sum of the values by type of antimalarial medicine because children may have taken more than one antimalarial medicine to treat a malaria episode.

b. Sulfadoxine-pyrimethamine/Fansidar.

c. Artemisinin-based combination therapy.

d. DHS is Demographic and Health Survey, MICS is Multiple Indicator Cluster Survey and MIS is Malaria Indicator Survey.

Pregnant women receiving intermittent preventive treatment, by background characteristics

Country	Year	Percentage of pregnant women ages 15–49 receiving intermittent preventive treatment								Source ^a
		Total	Residence		Wealth index quintile					
			Urban	Rural	Poorest	Second	Middle	Fourth	Richest	
Benin	2006	3	3	2	—	—	—	—	—	DHS 2006 (Preliminary report)
Burkina Faso	2006	1	2	1	2	1	1	1	2	MICS 2006
Cameroon	2006	6	8	4	4	3	7	7	10	MICS 2006
Central African Republic	2006	9	15	5	2	4	7	14	19	MICS 2006
Côte d'Ivoire	2006	8	10	7	7	7	6	11	11	MICS 2006
Gambia, The	2006	33	31	34	30	33	31	35	34	MICS 2006
Ghana	2003	1	1	1	1	1	1	1	1	DHS 2003
Ghana	2006	27	35	24	23	21	25	33	41	MICS 2006
Guinea	2005	3	8	1	1	1	2	2	11	DHS 2005
Guinea Bissau	2006	7	9	7	4	6	8	12	9	MICS 2006
Kenya	2003	4	4	4	3	5	5	3	4	DHS 2003
Malawi	2004	43	51	42	39	38	44	44	54	DHS 2004
Malawi	2006	45	52	44	40	42	45	46	52	MICS 2006
Niger	2006	0	1	0	0	0	0	0	1	DHS 2006
Nigeria	2003	1	—	—	—	—	—	—	—	DHS 2003
Rwanda	2005	0	1	0	0	0	0	0	1	DHS 2005
Senegal	2005	9	11	8	6	7	10	11	12	DHS 2005
Sierra Leone	2005	2	5	1	0	1	1	3	5	MICS 2005
Somalia	2006	1	1	1 ^b	1	1	1	1	1	MICS 2006
Tanzania, United Rep. of	2004–2005	22	29	20	18	21	18	25	30	DHS 2004–2005
Togo	2006	18	18	18	12	17	17	20	25	MICS 2006
Uganda	2006	17	18	16	—	—	—	—	—	DHS 2006 (Preliminary report)
Zambia	2006	61	71	56	58	71	61	78	—	MIS 2006
Zimbabwe	2005–2006	6	3	8	7	8	8	7	1	DHS 2005–2006

— not available.

Note: Intermittent preventive treatment consists of at least two doses of sulfadoxine-pyrimethamine/Fansidar received during antenatal care visits.

a. DHS is Demographic and Health Survey, MIS is Malaria Indicator Survey and MICS is Multiple Indicator Cluster Survey.

b. Data are for non-urban areas, including rural and nomad populations.

Pregnant women sleeping under insecticide-treated mosquito nets, by background characteristics

Country	Year	Percentage of pregnant women ages 15–49 sleeping under an insecticide-treated mosquito net								Source ^a
		Residence			Wealth index quintile					
		Total	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	
Benin	2006	20	26	17	—	—	—	—	—	DHS 2006 (Preliminary report)
Burkina Faso	2003	3	6	2	1	1	3	2	8	DHS 2003
Cambodia	2005	4	2	5	10	2	5	2	0	DHS 2005
Cameroon	2004	1	3	0	0	1	1	3	3	DHS 2004
Congo	2005	4	4	5	5	5	3	4	5	DHS 2005
Eritrea	2002	3	5	2	3	2	1	4	6	DHS 2002
Ethiopia	2005	1	6	1	1	0	0	1	5	DHS 2005
Ghana	2003	3	2	3	5	3	1	2	3	DHS 2003
Guinea	2005	0	1	0	0	1	0	0	2	DHS 2005
Kenya	2003	4	5	4	2	2	7	6	6	DHS 2003
Malawi	2004	15	30	12	6	10	13	17	33	DHS 2004
Niger	2006	7	15	5	4	7	5	6	13	DHS 2006
Nigeria	2003	1	0	2	—	—	—	—	—	DHS 2003
Rwanda	2005	17	29	16	8	17	12	19	36	DHS 2005
Senegal	2005	9	10	8	3	8	14	12	8	DHS 2005
Tanzania, United Rep. of	2004–2005	16	39	10	4	7	12	16	47	DHS 2004–2005
Uganda	2000–2001	1	0	1	—	—	—	—	—	DHS 2000–2001
Uganda	2006	10	23	9	—	—	—	—	—	DHS 2006 (Preliminary report)
Viet Nam	2005	15	1	19	25	12	17	14	8	AIS 2005
Zambia	2001–2002	8	10	7	—	—	—	—	—	DHS 2001–2002
Zambia	2006	24	18	27	24	28	18	22	25	MIS 2006
Zimbabwe	2005–2006	3	6	2	1	1	3	6	8	DHS 2005–2006

— not available.

a. DHS is Demographic and Health Survey, AIS is AIDS Indicator Survey and MIS is Malaria Indicator Survey.

This report assesses progress in making available key interventions to reduce the burden of malaria, particularly across sub-Saharan Africa, where the burden is greatest.

Attention and funding for malaria control have increased substantially. Global funding for malaria control has risen more than tenfold over the past decade, and malaria has been included among major international development targets, notably the Millennium Development Goals and the targets set at the 2000 African Summit on Roll Back Malaria in Abuja.

Across sub-Saharan Africa insecticide-treated net coverage has expanded considerably. All sub-Saharan countries with trend data available have shown major progress in expanding insecticide-treated net use among children under age five, with 16 of 20 countries with data at least tripling coverage since 2000. Despite this progress, though, overall insecticide-treated net use still falls short of global targets.

Treatment of malaria among children is moderately high across sub-Saharan Africa, though few countries have expanded treatment coverage since 2000 and many children are still being treated with less effective medicines. But the groundwork has been laid to greatly scale up coverage rates with more effective treatment in the coming years, and the next round of surveys is expected to show higher coverage rates.

This report comes during a rapid transition in the fight against malaria, when many sub-Saharan African countries have only recently scaled up intervention coverage or are beginning to do so. However, the impressive gains made in the fight against malaria across numerous sub-Saharan African countries show that major progress can be achieved—and in a short time.