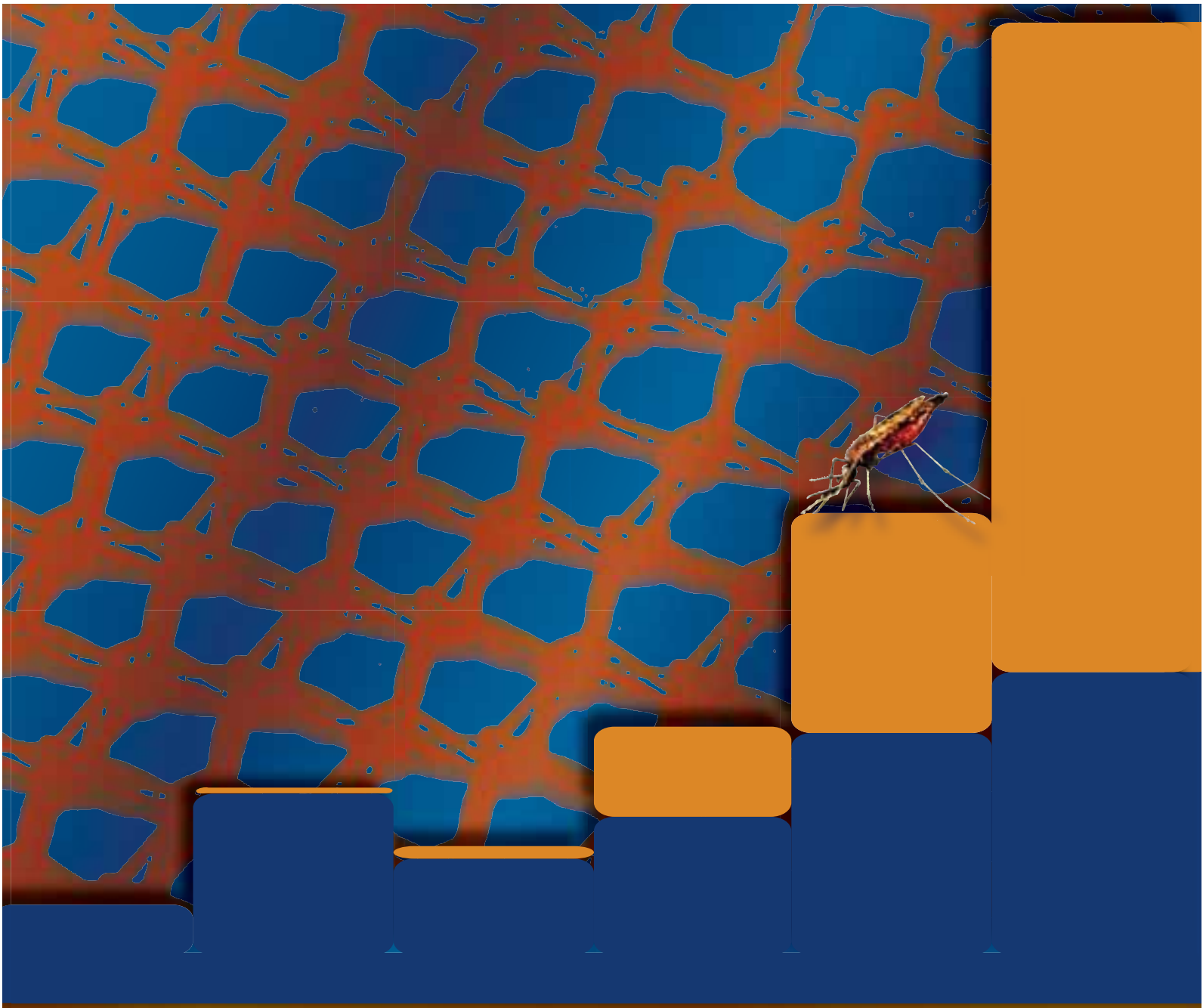

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Cover design by Anne Guilloux and Christopher Dye. The bars show the growing number of insecticide-treated nets (ITN) sold or delivered worldwide between 2001 and 2006. There was a modest increase in the number of conventional ITN delivered in 2005 and 2006 (blue bars), and a large increase in the number of long-lasting insecticidal nets delivered (orange bars), especially to countries in the African Region (Chapter 4).

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Abbreviations

ACT	Artemisinin-based combination therapy
AIDS	Acquired immunodeficiency syndrome
AFR	WHO African Region
AFRO	WHO Regional Office for Africa
AMR	WHO Region of the Americas
AMRO	WHO Regional Office for the Americas
API	Annual parasite incidence
DDT	Dichloro-diphenyl-trichloroethane
DHS	Demographic household survey
EMR	WHO Eastern Mediterranean Region
EMRO	WHO Regional Office for the Eastern Mediterranean
EUR	WHO European Region
EURO	WHO Regional Office for Europe
GBD	Global burden of diseases
GMP	Global Malaria Programme
HIV	Human immunodeficiency virus
IAEG	Inter-Agency and Expert Group on MDG Indicators
IRS	Indoor residual spraying
IPT	Intermittent preventive treatment
ITN	Insecticide-treated nets
LLIN	Long-lasting insecticidal nets
MDGs	Millennium Development Goals
MERG	Monitoring and Evaluation Reference Group (for malaria)
MICS	Multiple indicator cluster survey
MIS	Malaria indicator survey
NMCP	National malaria control programme
PAHO	Pan-American Health Organization
RBM	Roll Back Malaria
RDT	Rapid diagnostic test
SEAR	WHO South-East Asia Region
SEARO	WHO Regional Office for South-East Asia
SPR	Slide positivity rate
SUFI	Scaling Up for Impact
WPR	WHO Western Pacific Region
WPRO	WHO Regional Office for the Western Pacific

Abbreviations of antimalarial treatments

AQ	Amodiaquine
AL	Artemether-lumefantrine
AM	Artemether
AS	Artesunate
C	Clindamycine
CQ	Chloroquine
D	Doxycycline
IPT	Intermittent preventive treatment
MQ	Mefloquine
PG	Proguanil
PIP	Piperaquine
PQ	Primaquine
QN	Quinine
SP	Sulfadoxine-pyrimethamine
T	Tetracycline
(d)	Days on treatment course

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Summary

There were an estimated 247 million malaria cases among 3.3 billion people at risk in 2006, causing nearly a million deaths, mostly of children under 5 years. 109 countries were endemic for malaria in 2008, 45 within the WHO African region.

The combination of tools and methods to combat malaria now includes long-lasting insecticidal nets (LLIN) and artemisinin-based combination therapy (ACT), supported by indoor residual spraying of insecticide (IRS) and intermittent preventive treatment in pregnancy (IPT). Despite big increases in the supply of mosquito nets, especially of LLINs in Africa, the number available in 2006 was still far below need in almost all countries. The procurement of antimalarial medicines through public health services also increased sharply, but access to treatment, especially of ACT, was inadequate in all countries surveyed in 2006.

Household surveys and data from national malaria control programmes (NMCPs) show that the coverage of all interventions in 2006 was far lower in most African countries than the 80% target set by the World Health Assembly. Supplies of insecticide-treated nets (ITN) to NMCPs were sufficient to protect an estimated 26% of people in 37 African countries. Surveys in 18 African countries found that 34% of households owned an ITN; 23% of children and 27% of pregnant women slept under an ITN; 38% of children with fever were treated with antimalarial drugs, but only 3% with ACT; and 18% of women used IPT in pregnancy. Only 5 African countries reported IRS coverage sufficient to protect at least 70% of people at risk of malaria.

In regions other than Africa, intervention coverage is difficult to measure because household surveys are uncommon, preventive methods usually target high-risk populations of unknown size, and NMCPs do not report on diagnosis and treatment in the private sector.

While the link between interventions and their impact is not always clear, at least 7 of 45 African countries/areas with relatively small populations, good surveillance and high intervention coverage reduced malaria cases and deaths by 50% or more between 2000 and 2006 or 2007. In a further 22 countries in other regions of the world, malaria cases fell by 50% or more over the period 2000–2006. However, deeper investigations of impact are needed to confirm that these 29 countries are on course to meet targets for reducing the malaria burden by 2010.

Key points

Background and context

A renewed effort to control malaria worldwide, moving towards elimination in some countries, is founded on the latest generation of effective tools and methods for prevention and cure.

1. The advent of long-lasting insecticidal nets (LLINs) and artemisinin-based combination therapy (ACT), plus a revival of support for indoor residual spraying of insecticide (IRS), presents a new opportunity for large-scale malaria control.

2. To accelerate progress in malaria control, the 2005 World Health Assembly (WHA) set targets of ≥ 80% coverage for four key interventions: insecticide-treated nets for people at risk; appropriate antimalarial drugs for patients with probable or confirmed malaria; indoor residual spraying of insecticide for households at risk; and intermittent preventive treatment in pregnancy. The WHA further specified that, as a result of these interventions, malaria cases and deaths per capita should be reduced by ≥ 50% between 2000 and 2010, and by ≥ 75% between 2005 and 2015.

3. The *World malaria report 2008* uses data from routine surveillance (≈ 100 endemic countries) and household surveys (≈ 25 countries, mainly in Africa) to measure achievements up to 2006 and, for some aspects of malaria control, to 2007 and 2008. In five main chapters, 30 country profiles and seven annexes, the report describes: (a) the estimated burden of disease in each of the 109 countries and territories with malaria in 2006; (b) how WHO-recommended policies and strategies on malaria control have been adopted, by country, region and globally; (c) the progress made in implementing control measures; (d) the sources of funding for malaria control; and (e) recent evidence that interventions can reduce cases and deaths.

Burden of malaria in 2006, by country, region and globally

Half of the world's population is at risk of malaria, and an estimated 250 million cases led to nearly 1 million deaths in 2006.

4. An estimated 3.3 billion people were at risk of malaria in 2006. Of this total, 2.1 billion were at low risk (< 1 reported case per 1000 population), 97% of whom were living in regions other than Africa. The 1.2 billion at high risk (≥ 1 case per 1000 population) were living mostly in the WHO African (49%) and South-East Asia regions (37%).

5. There were an estimated 247 million episodes of malaria in 2006, with a wide uncertainty interval (5th–95th centiles) from 189 million to 327 million cases. Eighty-six percent, or 212 million (152–287 million) cases, were in the African Region. Eighty percent of the cases in Africa were in 13 countries, and over half were in Nigeria, Democratic Republic of the Congo, Ethiopia, United Republic of Tanzania and Kenya. Among the cases that occurred outside the African Region, 80% were in India, Sudan, Myanmar, Bangladesh, Indonesia, Papua New Guinea and Pakistan.

6. There were an estimated 881 000 (610 000–1 212 000) malaria deaths in 2006, of which 91% (801 000, range 520 000–1 126 000) were in Africa and 85% were of children under 5 years of age.

7. Estimates of malaria incidence are based, in part, on the numbers of cases reported by national malaria control programmes (NMCPs). These case reports are far from complete in most countries. A total of 94 million malaria cases was reported by national malaria control programmes in 2006, or 37% of the estimated global case incidence. The true proportion of malaria episodes detected by NMCPs would have been lower than 37% because, in some countries, reported cases include patients that are diagnosed clinically but do not have malaria. NMCPs reported 301 000 malaria deaths, or 34% of estimated deaths worldwide in 2006.

Policies and strategies for malaria control

National malaria control programmes have adopted many of the WHO-recommended policies on prevention and cure, but with variation among countries and regions.

8. Nearly all of the 45 countries in the African Region had adopted, by the end of 2006, the policy of providing insecticidal nets free of charge to children and pregnant women, but only 16 aimed to cover all age groups at risk. ITNs are also used in a high proportion of countries in the South-East Asia and Western Pacific regions, but in relatively few countries in the other three WHO regions.

9. Indoor residual spraying is generally used in foci of high malaria transmission. IRS is the dominant method of vector control in the European Region. It is used in fewer countries in Africa, the Americas and South-East Asia, and least in the Western Pacific Region.

10. By June 2008, all except four countries and territories worldwide had adopted ACT as the first-line treatment for *P. falciparum*. Free treatment with ACT was available in 8 of 10 countries in the South-East Asia Region, but a smaller proportion of countries in other regions.

11. The systematic use of intermittent preventive treatment in pregnancy is restricted to the African Region; 33 of the 45 African countries had adopted IPT as national policy by the end of 2006.

Preventing malaria

Despite big increases in the supply of mosquito nets, especially of long-lasting insecticidal nets in Africa, the number available is still far below need in most countries.

12. Between 2004 and 2006, there were modest increases in the supply of conventional ITNs to countries in the African, South-East Asia and Western Pacific regions, the three regions where nets are most frequently used. By contrast, there was a large increase in the supply of LLINs to countries in the African Region, reaching 36 million in 2006.

13. Based on NMCP records of ITN supplies, however, only six countries in the African Region had sufficient nets (ITNs including LLINs) by 2006 to cover at least 50% of people at risk. These were Ethiopia, Kenya, Madagascar, Niger, Sao Tome and Principe, and Zambia. ITN supplies were sufficient to protect 26% of people in 37 African countries that reported in 2006.

14. Among 18 national household surveys carried out in the African Region in 2006–2007, relatively high ownership and usage of ITNs (including LLINs) was found in Ethiopia, Niger, Sao Tome and Principe, and Zambia. The proportion of family members (children, pregnant women) that slept under an ITN was typically smaller than the proportion of households that owned an ITN. There was wide variation in ITN ownership and use among countries: household ownership of at least 1 net varied from 6% in Côte d'Ivoire to 65% in Niger. Average ITN coverage across the 18 countries with surveys was far below the 80% target: 34% of households owned an ITN, and 23% of children under 5 years and 27% of pregnant women slept under an ITN.

15. In regions other than Africa, ITNs are usually targeted at high-risk populations. While the size of these targeted populations is not known, NMCP data indicate that relatively high coverage (> 20% of all people at risk) was achieved in Bhutan, Papua New Guinea, Solomon Islands and Vanuatu.

16. Indoor residual spraying (IRS) is used focally in all regions of the world. In the African Region, NMCP data indicate that more than 70% of households at any risk of malaria were covered in Botswana, Namibia, Sao Tome and Principe, South Africa and Swaziland. In other regions of the world, relatively high coverage (> 20% of people at risk) was achieved only in Bhutan and Suriname.

Treating malaria

The procurement of antimalarial medicines through public health services increased sharply between 2001 and 2006, but access to treatment, especially of artemisinin-based combination therapy, was inadequate in all countries surveyed in 2006.

17. Between 2001 and 2006, NMCPs reported large increases in the number of courses of antimalarial drugs supplied through public health services. In particular, doses of ACT increased from 6 million in 2005 to 49 million in 2006, of which 45 million were for African countries. These NMCP figures probably underestimate usage, and the exact consumption of ACT is not known.

18. According to NMCP data, only 16 million rapid diagnostic tests (RDT) were delivered in 2006, of which 11 million were for countries in Africa, a small quantity in comparison with the number of malaria episodes.

19. Considering drugs supplied in the public sector (through NMCPs) in relation to estimated malaria cases, as a measure of potential demand, the African countries best-provisioned with any antimalarial drugs in 2006 were Botswana, Comoros, Eritrea, Malawi, Sao Tome and Principe, Senegal, United Republic of Tanzania and Zimbabwe. Among this group of countries, Eritrea, Sao Tome and Principe, and United Republic of Tanzania were also relatively well supplied with ACT.

20. According to national household surveys, however, none of the populations of 18 African countries surveyed in 2006 and 2007 had adequate access to antimalarial drugs. Only in Benin, Cameroon, Central African Republic, Gambia, Ghana, Uganda and Zambia were more than 50% of all children with fever treated with an antimalarial drug. In no country did access to treatment reach the 80% target, and the average across the 18 countries was 38%. The use of ACT was much lower: just 3% of children on average, ranging from 0.1% in Gambia to 13% in Zambia.

21. A subset of 16 national household surveys found that intermittent preventive treatment (IPT, ≥ 2 doses of sulfadoxine-pyrimethamine) was used most frequently by pregnant women in Gambia, Malawi, Senegal and Zambia (33–61%), and by an average of 18% of women in all 16 countries.

22. In regions other than Africa, access to treatment is more difficult to judge: household surveys that include questions on treatment for malaria are much less common and, as in Africa, national control programmes

do not report on diagnosis and treatment in the private sector. Nevertheless, as far as can be judged from NMCP data, the countries relatively well provisioned with antimalarial drugs were: Bhutan, Lao People's Democratic Republic, Vanuatu and Viet Nam.

Financing malaria control

Funding for malaria control in 2006 was reported to be greater than ever before, but it is not yet possible to judge from NMCP budgets which countries have adequate resources for malaria control.

23. According to NMCP data for 2006, the African Region had more funds for malaria control than any other, and reported a larger increase in funding than any other region between 2004 and 2006. However, the total of US$ 688 million for the African Region in 2006 is certain to be an underestimate because reports were submitted by only 26 of 45 countries. The US$ 4.6 available per (estimated) malaria case in the 26 reporting countries is unlikely to be adequate to meet targets for prevention and cure.

24. The major sources of extra funds for African countries between 2004 and 2006 were reported to be the national governments of the affected countries plus the Global Fund to Fight AIDS, Tuberculosis and Malaria. These two sources dominated funding for malaria control in the African Region and worldwide in 2006.

25. The balance of funding support varied among WHO regions. In the Americas, the European and South-East Asia regions, the majority of funds were from the governments of endemic countries. In the Eastern Mediterranean and Western Pacific regions, the Global Fund was reported to be the principal source of financial support. The Western Pacific Region placed greatest reliance on external funding, followed by the African and Eastern Mediterranean regions. Countries in the African Region presented the most diverse portfolio of support from external agencies.

Impact of malaria control

Some countries that have implemented aggressive programmes of prevention and treatment, in Africa and other regions, have reported significant reductions in the malaria burden.

26. While the effect of malaria control can be evaluated by repeated population surveys – of parasite prevalence, anemia, malaria-specific mortality or all-cause mortality – this report focuses on the inferences that can be drawn from national surveillance reports.

27. Among 41 African countries that provided case and death reports over the period 1997–2006, the most persuasive evidence for impact comes from four countries, or parts of countries, with relatively small populations, good surveillance, and high intervention coverage. They are Eritrea, Rwanda, Sao Tome and Principe, and Zanzibar (United Republic of Tanzania). All four countries/areas reduced the malaria burden by 50% or more between 2000 and 2006–2007, in line with WHA targets.

28. In other African countries where a high proportion of people have access to antimalarial drugs or insecticidal nets, such as Ethiopia, Gambia, Kenya, Mali, Niger and Togo, routine surveillance data do not yet show, unequivocally, the expected reductions in morbidity and mortality. Either the data are incomplete, or the effects of interventions are small.

29. The reportedly high coverage of indoor residual spraying in Namibia, South Africa and Swaziland is consistent with the observed declines in case numbers in these countries, and evidently builds on earlier successes achieved with IRS.

30. Surveillance reports for many countries outside Africa indicate that malaria declined during the decade 1997–2006. Malaria cases were falling in at least 25 endemic countries in five WHO regions. In 22 of these countries, the number of reported cases fell by 50% or more between 2000 and 2006–2007, in line with WHA targets.

31. The recorded number of malaria deaths has fallen in at least six countries in the Americas, and in the South-East Asia and Western Pacific regions. These countries are Cambodia, Lao People's Democratic Republic, Philippines, Suriname, Thailand and Viet Nam, and all six are on course to meet WHA targets for reductions in malaria mortality by 2010.

32. Reductions in cases and deaths can be linked to specific interventions in some countries, for example the targeted use of ITNs in Cambodia, India, Lao People's Democratic Republic and Viet Nam. In general, however, the links between interventions and trends remain ambiguous, and more careful investigations of the effects of control are needed in most countries.

33. WHO has identified four phases on the path to malaria elimination. By July 2008, the 109 countries/territories affected by malaria were classified as follows: control (82), pre-elimination (11), elimination (10), and the prevention of reintroduction (6). In January 2007, the United Arab Emirates was the first formerly-endemic country since the 1980s to be certified malaria-free by WHO, bringing the total number of malaria-free countries/territories to 92.

Résumé

Sur 3,3 milliards de personnes à risque en 2006, on estime à 247 millions le nombre de cas de paludisme, dont près d'un million de cas mortels, pour la plupart chez les enfants de moins de cinq ans. En 2008, le paludisme était endémique dans 109 pays, dont 45 sont situés dans la Région africaine de l'OMS.

L'arsenal de produits et de méthodes pour combattre le paludisme comprend maintenant les moustiquaires à imprégnation durable et les associations médicamenteuses à base d'artémisinine (ACT), conjuguées à la pulvérisation intradomiciliaire à effet rémanent et au traitement préventif intermittent pendant la grossesse. Malgré la forte augmentation de l'offre de moustiquaires, notamment de moustiquaires à imprégnation durable en Afrique, les quantités disponibles en 2006 étaient encore bien inférieures aux besoins dans presque tous les pays. L'approvisionnement en médicaments antipaludiques par l'intermédiaire des services de santé publique s'est lui aussi fortement accru, mais l'accès au traitement, en particulier aux ACT, était insuffisant dans tous les pays enquêtés en 2006.

Les enquêtes effectuées auprès des ménages et les données des programmes nationaux de lutte contre le paludisme (PNLPs) montrent qu'en 2006, la couverture de toutes les interventions dans la plupart des pays africains était bien inférieure à la cible de 80 % fixée par l'Assemblée mondiale de la santé. L'offre des moustiquaires imprégnées d'insecticide aux PNLPs était suffisante pour protéger une estimation de 26% des personnes dans 37 pays africains. Les enquêtes dans 18 pays africains ont trouvé que 34 % des ménages possédaient une moustiquaire imprégnée d'insecticide ; 23 % des enfants et 27 % des femmes enceintes dormaient sous des moustiquaires de ce type ; 38 % des enfants ayant de la fièvre se voyaient administrer des médicaments antipaludiques, mais 3 % seulement des ACT ; et 18 % des femmes suivaient un traitement préventif intermittent pendant la grossesse. Seulement cinq pays africains faisaient état d'une couverture de la pulvérisation intradomiciliaire à effet rémanent suffisante pour protéger au moins 70 % des personnes exposées au paludisme.

Dans les régions autres que l'Afrique, la couverture des interventions est difficile à mesurer parce que les Les enquêtes effectuées auprès des ménages sont peu fréquentes, les méthodes préventives ciblent généralement les populations à haut risque de taille inconnue, et les PNLPs ne présentent pas de rapport sur le diagnostic et le traitement dans le secteur privé.

Bien que le lien entre les interventions et leurs effets n'apparaisse pas toujours clairement, au moins sept des 45 pays et zones d'Afrique où la population est relativement peu nombreuse, la surveillance bonne et la couverture des interventions élevée sont parvenus à réduire la morbidité et la mortalité palustres d'au moins 50 % entre 2000 et 2006 ou 2007. Dans au moins 22 pays situés dans d'autres régions du monde, le nombre de cas de paludisme a chuté de 50 % entre 2000 et 2006. D'après les données obtenues par surveillance systématique, au moins 29 des 109 pays concernés dans le monde sont en voie d'atteindre les cibles fixées pour 2010.

Points essentiels

Aperçu général et contexte

Un nouvel effort est entrepris contre le paludisme dans le monde, tendant à l'élimination de la maladie dans certains pays, à l'aide de la dernière génération de produits et de méthodes préventifs et curatifs.

1. L'avènement des moustiquaires à imprégnation durable et des associations médicamenteuses à base d'artémisinine (ACT), ainsi que la remise à l'honneur de la pulvérisation intradomiciliaire à effet rémanent offrent une nouvelle possibilité de lutter contre le paludisme à grande échelle.

2. En 2005, pour progresser plus rapidement dans le combat contre le paludisme, l'Assemblée mondiale de la Santé a fixé pour cible une couverture d'au moins 80 % pour quatre interventions : moustiquaires imprégnées d'insecticide pour les personnes à risque ; médicaments antipaludiques appropriés pour les cas de paludisme probables ou confirmés ; pulvérisation intradomiciliaire à effet rémanent pour les ménages à risque ; et traitement préventif intermittent pendant la grossesse. L'Assemblée de la Santé a en outre précisé que, grâce à ces interventions, la morbidité et la mortalité palustres par habitant devraient diminuer d'au moins 50 % entre 2000 et 2010 et d'au moins 75 % entre 2005 et 2015.

3. Le *Rapport sur le paludisme dans le monde, 2008* se fonde sur des données issues de la surveillance systématique (dans une centaine de pays d'endémie) et d'enquêtes auprès des ménages (dans quelque 25 pays, principalement en Afrique) pour mesurer les progrès accomplis jusqu'en 2006 et, concernant certains aspects de la lutte antipaludique, jusqu'en 2007 et 2008. Composé de cinq grands chapitres, 30 profils de pays et sept annexes, le rapport indique : a) la charge estimative de la maladie dans chacun des 109 pays et territoires impaludés en 2006 ; b) comment les politiques et stratégies de lutte antipaludique recommandées par l'OMS ont été adoptées, par pays, par Région et dans l'ensemble du monde ; c) les progrès réalisés dans l'application des mesures de lutte ; d) les sources de financement de la lutte antipaludique ; et e) les éléments récents attestant que les interventions permettent de réduire la morbidité et la mortalité.

Charge du paludisme en 2006, par pays, par Région et au niveau mondial

La moitié de la population mondiale est exposée au risque de paludisme et on estime à 250 millions le nombre de cas en 2006, dont près d'un million de cas mortels.

4. On estime que 3,3 milliards de personnes étaient exposées au risque de paludisme en 2006. Sur ce total, 2,1 milliards couraient un risque faible (moins d'un cas signalé pour 1000 habitants) et vivaient pour 97 % ailleurs qu'en Afrique. Au nombre de 1,2 milliard, les personnes exposées à un risque élevé (au moins un cas pour 1000 habitants) vivaient en majorité dans les Régions africaine (49 %) et de l'Asie du Sud-Est (37 %) de l'OMS.

5. On estime à 247 millions le nombre d'épisodes de paludisme en 2006, avec un intervalle d'incertitude important (5e–95e percentiles), compris entre 189 millions et 327 millions. Quatre-vingt-six pour cent des cas, ou 212 millions (152–287 millions), se sont produits dans la Région africaine. Quatre-vingts pour cent des cas recensés en Afrique étaient concentrés dans 13 pays, et plus de la moitié au Nigéria, en République démocratique du Congo, en Ethiopie, en République-Unie de Tanzanie et au Kenya. Quatre-vingts pour cent des cas observés en dehors de la Région africaine se sont produits en Inde, au Soudan, au Myanmar, au Bangladesh, en Indonésie, en Papouasie-Nouvelle-Guinée et au Pakistan.

6. On estime à 881 000 (610 000–1 212 000) le nombre de décès par paludisme en 2006, dont 91 % (801 000, fourchette 520 000–1 126 000) ont eu lieu en Afrique et 85 % chez les enfants de moins de cinq ans.

7. Les estimations de l'incidence du paludisme s'appuient en partie sur le nombre de cas déclarés par les programmes nationaux de lutte antipaludique. Dans la plupart des pays, ce chiffre est loin d'être complet. Au total, les programmes nationaux de lutte antipaludique ont déclaré 94 millions de cas de paludisme en 2006, ce qui représente 37 % de l'incidence estimative à l'échelle mondiale. La proportion réelle d'épisodes de paludisme enregistrés par les programmes nationaux aurait été inférieure à 37 % car, dans certains pays, les cas déclarés englobent les patients chez qui le paludisme est diagnostiqué cliniquement alors qu'ils ne sont

pas atteints de la maladie. Les programmes nationaux ont déclaré 301 000 décès par paludisme, soit 34 % de la mortalité estimative à l'échelle mondiale en 2006.

Politiques et stratégies de lutte antipaludique

Les programmes nationaux de lutte antipaludique ont adopté bon nombre de stratégies préventives et curatives recommandées par l'OMS, mais il y a des écarts entre pays et Régions.

8. Fin 2006, les 45 pays de la Région africaine avaient presque tous adopté pour politique de fournir gratuitement des moustiquaires imprégnées d'insecticide aux femmes enceintes et aux enfants, mais seulement 16 d'entre eux entendaient couvrir toutes les tranches d'âge à risque. Les moustiquaires imprégnées d'insecticide sont également utilisées dans une grande proportion des pays des Régions de l'Asie du Sud-Est et du Pacifique occidental, mais dans relativement peu de pays dans les trois autres Régions de l'OMS.

9. La pulvérisation intradomiciliaire à effet rémanent est une méthode généralement utilisée dans les foyers de forte transmission du paludisme. C'est la principale méthode de lutte antivectorielle dans la Région européenne. Les pays sont moins nombreux à l'utiliser en Afrique, dans les Amériques et en Asie du Sud-Est, et c'est dans la Région du Pacifique occidental qu'elle est le moins utilisée.

10. En juin 2008, tous les pays et territoires, à l'exception de quatre d'entre eux, avaient opté pour les ACT comme traitement de choix contre *P. falciparum*. Le traitement par ACT était disponible gratuitement dans huit pays sur 10 dans la Région de l'Asie du Sud-Est, mais la proportion était moindre dans les autres Régions.

11. Le recours systématique au traitement préventif intermittent pendant la grossesse se limite à la Région africaine ; fin 2006, 33 des 45 pays africains l'avaient adopté comme politique nationale.

Prévention du paludisme

Malgré la forte augmentation de l'offre de moustiquaires, notamment de moustiquaires à imprégnation durable en Afrique, les quantités disponibles étaient encore bien inférieures aux besoins dans presque tous les pays.

12. Entre 2004 et 2006, l'offre de moustiquaires imprégnées d'insecticide a augmenté modérément dans les pays de la Région africaine et des Régions de l'Asie du Sud-Est et du Pacifique occidental, qui sont celles où les moustiquaires sont le plus utilisées. En revanche, l'offre de moustiquaires à imprégnation durable dans les pays de la Région africaine a beaucoup augmenté et atteignait 36 millions en 2006.

13. Cependant, d'après les quantités de moustiquaires imprégnées d'insecticide fournies par les programmes nationaux de lutte antipaludique, seuls six pays de la Région africaine avaient suffisamment de moustiquaires de ce type (y compris les moustiquaires à imprégnation durable) en 2006 pour protéger au moins 50 % des personnes à risque. Il s'agissait de l'Ethiopie, du Kenya, de Madagascar, du Niger, de Sao Tomé-et-Principe et de la Zambie.

14. D'après les 18 enquêtes nationales réalisées auprès des ménages dans la Région africaine en 2006–2007, la population était relativement nombreuse à posséder et à utiliser des moustiquaires imprégnées d'insecticide (y compris des moustiquaires à imprégnation durable) en Ethiopie, au Niger, à Sao Tomé-et-Principe et en Zambie. La proportion de membres de la famille (enfants, femmes enceintes) dormant sous une moustiquaire imprégnée d'insecticide était généralement inférieure à la proportion de ménages possédant une moustiquaire de ce type. La possession et l'utilisation des moustiquaires imprégnées d'insecticide étaient très variables selon les pays : en Côte d'Ivoire, 6 % seulement des ménages possédaient au moins une moustiquaire, contre 65 % au Niger. La couverture moyenne des moustiquaires imprégnées d'insecticide dans les 18 pays où des enquêtes ont été effectuées était bien inférieure à la cible de 80 % : 34 % des ménages en possédaient une, et 23 % des enfants de moins de cinq ans et 27 % des femmes enceintes dormaient sous une moustiquaire de ce type.

15. Ailleurs qu'en Afrique, les moustiquaires imprégnées d'insecticide sont généralement destinées aux populations à haut risque. On ignore la taille des populations visées, mais d'après les données des programmes nationaux de lutte antipaludique, la couverture est relativement élevée (supérieure à 20 % de toutes les personnes à risque) au Bhoutan, en Papouasie-Nouvelle-Guinée, dans les Iles Salomon et au Vanuatu.

16. La pulvérisation intradomiciliaire à effet rémanent est une méthode utilisée dans les foyers de transmission dans toutes les régions du monde. Dans la Région africaine, les données des programmes nationaux de lutte antipaludique indiquent que plus de 70 % des ménages exposés à un risque quelconque de paludisme bénéficiaient de cette intervention au Botswana, en Namibie, à Sao Tomé-et-Principe, en Afrique du Sud et au Swaziland. Dans les autres régions du monde, seuls le Bhoutan et le Suriname enregistrent une couverture relativement élevée (supérieure à 20 % des personnes à risque).

Traitement du paludisme

L'approvisionnement en médicaments antipaludiques par l'intermédiaire des services de santé publique s'est fortement accru entre 2001 et 2006, mais l'accès au traitement, en particulier aux associations médicamenteuses à base d'artémisinine, était insuffisant dans tous les pays enquêtés en 2006.

17. Entre 2001 et 2006, les programmes nationaux de lutte antipaludique ont rapporté une forte augmentation du nombre de traitements d'antipaludiques fournis par les

services de santé publique. Le nombre de doses d'ACT est notamment passé de 6 millions en 2005 à 49 millions en 2006, sur lesquels 45 millions de doses étaient destinées aux pays africains. Ces chiffres sont probablement des sous-estimations et on ignore la consommation exacte d'ACT.

18. D'après les données des programmes nationaux, seulement 16 millions de tests diagnostiques rapides ont été fournis en 2006, dont 11 millions pour des pays d'Afrique, ce qui est peu par rapport au nombre d'épisodes palustres.

19. Si l'on compare la quantité de médicaments fournis dans le secteur public (dans le cadre des programmes nationaux de lutte antipaludique) au nombre estimatif de cas en tant que mesure de la demande potentielle, les pays africains les mieux pourvus en antipaludiques en 2006 étaient le Botswana, les Comores, l'Erythrée, le Malawi, Sao Tomé-et-Principe, le Sénégal, la République-Unie de Tanzanie et le Zimbabwe. Dans ce groupe de pays, l'Erythrée, Sao Tomé-et-Principe et la République-Unie de Tanzanie étaient aussi relativement bien approvisionnés en ACT.

20. Cependant, d'après les enquêtes nationales auprès des ménages, les médicaments antipaludiques n'étaient suffisamment accessibles à la population dans aucun des 18 pays africains enquêtés en 2006 et 2007. Il n'y a qu'au Bénin, au Cameroun, en République centrafricaine, en Gambie, au Ghana, en Ouganda et en Zambie que plus de 50 % des enfants ayant de la fièvre étaient mis sous traitement antipaludique. Dans aucun pays l'accès au traitement atteignait la cible de 80 %, et la moyenne dans l'ensemble des 18 pays était de 38 %. L'utilisation des ACT était bien plus faible : seulement 3 % des enfants en moyenne, allant de 0,1 % en Gambie à 13 % en Zambie.

21. D'après un sous-ensemble de 16 enquêtes nationales auprès des ménages, c'est en Gambie, au Malawi, au Sénégal et en Zambie que l'usage du traitement préventif intermittent (au moins deux doses de sulfadoxine-pyriméthamine) était le plus répandu chez les femmes enceintes (33 %–61 %) et 18 % des femmes en moyenne l'utilisaient dans les 16 pays concernés.

22. Ailleurs qu'en Afrique, il est plus difficile d'apprécier l'accès au traitement : les enquêtes comprenant des questions sur le traitement du paludisme sont bien moins courantes et, comme en Afrique, les programmes nationaux de lutte antipaludique ne renseignent pas sur le diagnostic et le traitement dans le secteur privé. Néanmoins, d'après ce qu'indiquent les données des programmes nationaux, les pays relativement bien pourvus en médicaments antipaludiques sont le Bhoutan, la République démocratique populaire lao, le Vanuatu et le Viet Nam.

Financement de la lutte antipaludique

Le financement de la lutte antipaludique a atteint un niveau sans précédent en 2006, mais on ne peut pas encore dire d'après le budget des programmes nationaux de lutte antipaludique quels pays ont suffisamment de ressources pour combattre la maladie.

23. D'après les données des programmes nationaux pour 2006, la Région africaine était celle qui avait le plus de fonds pour la lutte antipaludique et qui faisait état de la plus forte augmentation du financement entre 2004 et 2006. Il est toutefois certain que le budget total de US $688 millions pour la Région africaine en 2006 est une sous-estimation car seuls 26 des 45 pays africains ont communiqué des informations. La somme de US $4,6 par cas (estimatif) de paludisme dans les 26 pays déclarants ne devrait pas suffire pour atteindre les cibles de prévention et de guérison.

24. Selon les informations obtenues, les principales sources de fonds supplémentaires pour les pays africains entre 2004 et 2006 étaient les gouvernements des pays impaludés et le Fonds mondial de lutte contre le sida, la tuberculose et le paludisme. Ces deux sources de financement de la lutte antipaludique étaient les plus importantes dans la Région africaine et dans le monde en 2006.

25. L'importance respective des sources de financement variait entre les Régions de l'OMS. Dans la Région européenne et dans les Régions des Amériques et de l'Asie du Sud-Est, les fonds provenaient en majorité des gouvernements des pays d'endémie. Dans les Régions de la Méditerranée orientale et du Pacifique occidental, la principale source d'appui financier était le Fonds mondial. La Région du Pacifique occidental était celle qui dépendait le plus du financement extérieur, suivie des Régions africaine et de la Méditerranée orientale. Les pays de la Région africaine étaient ceux qui présentaient la plus grande diversité de bailleurs de fonds extérieurs.

Efficacité de la lutte antipaludique

Certains pays d'Afrique et d'autres Régions qui ont appliqué des programmes énergiques dans les domaines préventif et curatif ont fait état d'une diminution importante de la charge du paludisme.

26. Les effets de la lutte antipaludique peuvent être évalués par des séries d'enquêtes en population sur la prévalence du parasite, l'anémie, la mortalité palustre ou la mortalité toutes causes confondues, mais le présent rapport s'intéresse aux conclusions que l'on peut tirer des rapports de surveillance nationaux.

27. Parmi les 41 pays africains qui ont fourni des chiffres sur la morbidité et la mortalité pendant la période 1997–2006, quatre pays ou zones à l'intérieur des pays, caractérisés par une population relativement peu nombreuse, une bonne surveillance et une couverture élevée des interventions, enregistrent les résultats les

plus probants. Il s'agit de l'Erythrée, du Rwanda, de Sao Tomé-et-Principe et de Zanzibar (République-Unie de Tanzanie). Dans ces quatre pays ou zones, la charge du paludisme a diminué d'au moins 50 % entre 2000 et 2006–2007, conformément aux cibles fixées par l'Assemblée de la Santé.

28. Dans les autres pays africains où une forte proportion d'habitants ont accès aux médicaments antipaludiques ou aux moustiquaires imprégnées d'insecticide comme l'Ethiopie, la Gambie, le Kenya, le Mali, le Niger et le Togo, les données issues de la surveillance systématique ne reflètent pas encore clairement le recul attendu de la morbidité et de la mortalité. Soit les données sont incomplètes, soit les interventions ont peu d'effet.

29. La couverture élevée de la pulvérisation intradomiciliaire à effet rémanent dont il est fait état en Namibie, en Afrique du Sud et au Swaziland concorde avec la baisse du nombre de cas constatée dans ces pays et va dans le sens des succès déjà enregistrés grâce à cette méthode.

30. D'après les rapports de surveillance de nombreux pays situés ailleurs qu'en Afrique, le paludisme a reculé pendant la décennie 1997-2006. Le nombre de cas diminuait dans au moins 25 pays d'endémie, situés dans cinq Régions de l'OMS. Dans 22 de ces pays, le nombre de cas déclarés a chuté de 50 % voire plus entre 2000 et 2006–2007, conformément aux cibles fixées par l'Assemblée de la Santé.

31. Le nombre déclaré de cas de paludisme a baissé dans au moins six pays des Régions des Amériques, de l'Asie du Sud-Est et du Pacifique occidental. Il s'agit du Cambodge, de la République démocratique populaire lao, des Philippines, du Suriname, de la Thaïlande et du Viet Nam, et tous sont en voie d'atteindre les cibles de l'Assemblée de la Santé concernant la réduction de la mortalité palustre d'ici à 2010.

32. La baisse de la morbidité et de la mortalité peut être associée à des interventions spécifiques dans certains pays, par exemple à l'utilisation ciblée des moustiquaires imprégnées d'insecticide au Cambodge, en Inde, en République démocratique populaire lao et au Viet Nam. D'une manière générale, cependant, le lien entre les interventions et les tendances restent ambigu et il faut étudier plus attentivement les effets de la lutte antipaludique dans la plupart des pays.

33. L'OMS a défini quatre phases dans le processus d'élimination du paludisme. En juillet 2008, les 109 pays et territoires impaludés se répartissaient comme suit : lutte (82), préélimination (11), élimination (10) et prévention de la réintroduction (6). En janvier 2007, les Emirats arabes unis ont été le premier ancien pays d'endémie à être certifié exempt de paludisme par l'OMS depuis les années 80, ce qui porte à 92 le nombre total de pays et territoires exempts de paludisme.

Resumen

En 2006 se registraron según las estimaciones unos 247 millones de casos de malaria entre 3300 millones de personas en riesgo, produciéndose como resultado casi un millón de muertes, principalmente de menores de cinco años. En 2008 había 109 países con malaria endémica, 45 de ellos en la Región de África de la OMS.

Entre los medios disponibles para combatir la malaria destacan los mosquiteros tratados con insecticidas de larga duración (MILD) y el tratamiento combinado basado en la artemisinina (TCA), que están respaldados por el rociamiento de interiores con insecticidas de acción residual (RIR) y el tratamiento preventivo intermitente durante el embarazo (TPI). Pese al gran aumento del suministro de mosquiteros, especialmente de MILD en África, el número disponible en 2006 se mantuvo todavía muy por debajo de las necesidades en casi todos los países. La adquisición de medicamentos antimaláricos a través de los servicios de salud pública también aumentó de forma pronunciada, pero el acceso al tratamiento, especialmente al TAC, fue insuficiente en todos los países encuestados en 2006.

Las encuestas de hogares y los datos de los programas nacionales de control de la malaria (PNCM) revelaron que la cobertura de todas las intervenciones en 2006 fue muy inferior a la meta del 80% fijada por la Asamblea Mundial de la Salud en la mayoría de los países africanos. Se estima que el suministro de mosquitero tratado con insecticida (MTI) a los PNCM era suficiente para proteger aproximadamente el 26% de la población en 37 países africanos. Encuestas realizadas en 18 países africanos revelan que el 34% de los hogares poseían un MTI ; el 23% de los niños y el 27% de las mujeres embarazadas dormían bajo un MTI; el 38% de los niños con fiebre fueron tratados con antimaláricos, pero sólo un 3% con TAC; y el 18% de las mujeres recibieron TPI durante el embarazo. Sólo 5 países africanos notificaron una cobertura de hogares suficiente para proteger al menos al 70% de las personas con riesgo de malaria.

En las otras regiones del mundo, diferentes al África, la cobertura de las intervenciones es difícil de medir debido a que las encuestas de hogares no son frecuentes, los métodos preventivos generalmente se focalizan sobre grupos de alto riesgo de tamaño desconocido, y los PNCM no reportan datos sobre diagnóstico y tratamiento en el sector privado.

Aunque la conexión entre las intervenciones y su impacto no siempre está clara, al menos 7 de 45 países o zonas africanas con poblaciones relativamente pequeñas, una buena vigilancia y una cobertura de intervención alta lograron reducir los casos de malaria y la mortalidad por esa causa en un 50% o más entre 2000 y 2006–2007. Asimismo, en al menos 22 de 64 países de otras regiones del mundo, los casos de malaria disminuyeron un 50% durante el periodo 2000–2006. No obstante, investigaciones más profundas acerca del impacto se necesitarán para confirmar que estos 29 países están bien encaminados para alcanzar las metas de reducción de la carga de malaria fijadas para 2010.

Puntos clave

Antecedentes y contexto

La renovación de los esfuerzos para controlar la malaria en todo el mundo, y aproximarse a la eliminación en algunos países, se basa en la última generación de medios eficaces de prevención y curación.

1. La irrupción de los mosquiteros tratados con insecticidas de larga duración (MILD) y el tratamiento combinado basado en la artemisinina (TAC), unidos a la reactivación del apoyo al rociamiento de interiores con insecticidas de acción residual (RIR), brinda una nueva oportunidad para controlar la malaria en gran escala.

2. A fin de acelerar los progresos de la lucha contra la malaria, la Asamblea Mundial de la Salud (AMS) de 2005 estableció metas de cobertura ≥ 80% para cuatro intervenciones clave: mosquiteros tratados con insecticida para las personas en riesgo; medicamentos antimaláricos apropiados para los enfermos con malaria probable o confirmada; rociamiento de interiores con insecticidas de acción residual para los hogares en riesgo; y tratamiento preventivo intermitente durante el embarazo. La AMS especificó además que, como resultado de esas intervenciones, los casos de malaria y la mortalidad por esa causa deberían reducirse al menos en un 50% entre 2000 y 2010, y al menos en un 75% entre 2005 y 2015.

3. El *Informe mundial sobre el paludismo 2008* usa datos procedentes de la vigilancia rutinaria (≈ 100 países endémicos) y de encuestas de hogares (≈ 25 países, principalmente africanos) para medir los logros registrados hasta 2006 y, para algunos aspectos del control de la malaria, hasta 2007 y 2008. En cinco capítulos principales, 30 perfiles de países y siete anexos, el informe describe: (a) la carga de morbilidad estimada en cada uno de los 109 países y territorios con malaria en 2006; (b) cómo se han adoptado, en los países, las regiones y a nivel mundial, las políticas y estrategias recomendadas por la OMS para combatir la malaria; (c) los progresos realizados en la aplicación de las medidas de control; (d) las fuentes de financiación del control de la malaria; y (e) datos probatorios recientes de que las intervenciones pueden reducir el número de casos y de defunciones.

Carga de malaria en 2006, por países y regiones y a nivel mundial

La mitad de la población mundial está expuesta al riesgo de contraer malaria, y unos 250 millones de casos de la enfermedad provocaron casi un millón de muertes en 2006.

4. En 2006 había unos 3300 millones de personas en riesgo de sufrir malaria. De esa cifra, 2100 millones estaban expuestas a un riesgo bajo (< 1 caso declarado por 1000 habitantes), el 97% fuera de África. Los 1200 millones con riesgo alto (≥ 1 caso por 1000 habitantes) vivían principalmente en las regiones de África (49%) y Asia Sudoriental (37%) de la OMS.

5. Se estima que en 2006 se registraron unos 247 millones de episodios de malaria, con un amplio intervalo de incertidumbre (percentiles 5 a 95): 18–327 millones. Un 86% de los casos, 212 millones (152–287 millones), se dieron en la Región de África. Un 80% de los casos registrados en este continente se concentraron en 13 países, y más de la mitad correspondieron a Nigeria, la República Democrática del Congo, Etiopía, la República Unida de Tanzanía y Kenya. Entre los casos registrados fuera de la Región de África, el 80% se dieron en la India, el Sudán, Myanmar, Bangladesh, Indonesia, Papua Nueva Guinea y el Pakistán.

6. Se estima que en 2006 hubo 881 000 (610 000–1 212 000) defunciones por malaria, el 91% de las cuales (801 000, intervalo: 520 000–1 126 000) se registraron en África, y el 85% entre menores de cinco años.

7. Las estimaciones sobre la incidencia de malaria se basan en parte en el número de casos notificados por los programas nacionales de control de la malaria (PNCM). Esos informes de casos distan mucho de estar completos en la mayoría de los países. Los programas nacionales de control de la malaria notificaron en total en 2006 94 millones de casos, o el 37% de la incidencia mundial de casos estimada. La proporción real de episodios de malaria detectados por los PNCM habría sido inferior a ese 37% debido a que, en algunos países, entre los casos notificados figuran pacientes con diagnóstico clínico de malaria que sin embargo no sufren la enfermedad. Los PNCM notificaron 301 000 muertes por malaria, lo que supone un 34% de las defunciones estimadas en todo el mundo en 2006.

Políticas y estrategias de control de la malaria

Los programas nacionales de control de la malaria han adoptado muchas de las políticas recomendadas por la OMS en materia de prevención y curación, pero con diferencias entre países y regiones.

8. La casi totalidad de los 45 países de la Región de África habían adoptado al final de 2006 la política de proporcionar mosquiteros tratados con insecticida gratuitamente a los niños y las mujeres embarazadas, pero sólo 16 de ellos se proponían abarcar a todos los grupos de edad en riesgo. Los MTI se usan también en un alto porcentaje de países en las Regiones de Asia Sudoriental y el Pacífico Occidental, pero en relativamente pocos países en las otras tres regiones de la OMS.

9. El rociamiento de interiores con insecticidas de acción residual se practica en general en los focos de alta transmisión de la malaria. El RIR es el método predominante de lucha antivectorial en la Región de Europa. Se usa en menos países en África, las Américas y Asia Sudoriental, y aún menos en la Región del Pacífico Occidental.

10. En junio de 2008, todos excepto cuatro países y territorios mundiales habían adoptado el TCA como tratamiento de primera línea contra *P. falciparum*. Se podía conseguir tratamiento gratuito con TCA en 8 de 10 países de la Región de Asia Sudoriental, pero en una proporción más pequeña de países en otras regiones.

11. La aplicación sistemática del tratamiento preventivo intermitente durante el embarazo está limitada a la Región de África; 33 de los 45 países africanos habían adoptado el TPI como política nacional al final de 2006.

Prevención de la malaria

A pesar del gran aumento del suministro de mosquiteros, especialmente de mosquiteros con insecticidas de larga duración en África, el número disponible está todavía muy por debajo de las necesidades en la mayoría de los países.

12. Entre 2004 y 2006 aumentó de forma moderada el suministro de MTI tradicionales a los países de las regiones de África, Asia Sudoriental y el Pacífico Occidental, las tres regiones donde más frecuente es el uso de mosquiteros. Muy importante fue en cambio el incremento del suministro de MILD a los países de la Región de África, alcanzándose la cifra de 36 millones en 2006.

13. A juzgar por los registros de los suministros de MTI de los PNCM, sin embargo, sólo seis países de la Región de África disponían en 2006 de mosquiteros suficientes (MTI, incluidos MILD) para garantizar la cobertura de al menos un 50% de las personas en riesgo: Etiopía, Kenya, Madagascar, Níger, Santo Tomé y Príncipe, y Zambia.

14. Entre las 18 encuestas nacionales de hogares llevadas a cabo en la Región de África en 2006–2007, se observó una tenencia y uso relativamente elevados de MTI (incluidos MILD) en Etiopía, el Níger, Santo Tomé y Príncipe y Zambia. La proporción de familiares (niños, mujeres embarazadas) que dormían bajo un MTI fue por lo general menor que la proporción de hogares que poseían un MTI. Se observaron grandes diferencias en lo que atañe a la tenencia y uso de MTI entre los países: el número de hogares con al menos un mosquitero oscilaba entre el 6% de Côte d'Ivoire y el 65% del Níger. La cobertura media con MTI entre los 18 países con encuestas fue muy inferior a la meta del 80%: el 34% de los hogares poseían un MTI, y sólo el 23% de los menores de cinco años y el 27% de las mujeres embarazadas dormían protegidos por un MTI.

15. Fuera de África, en las otras regiones, los MTI están dirigidos generalmente a las poblaciones de alto riesgo. Aunque se desconoce el tamaño de esas poblaciones destinatarias, los datos de los PNCM indican que en Bhután, Papua Nueva Guinea, las Islas Salomón y Vanuatu se alcanzó una cobertura relativamente alta (> 20% de todas las personas en riesgo).

16. El rociamiento de interiores con insecticidas de acción residual (RIR) se practica de manera focalizada en todas las regiones del mundo. En la Región de África, los datos de los PNCM indican que más del 70% de los hogares con algún riesgo de malaria estaban cubiertos en Botswana, Namibia, Santo Tomé y Príncipe, Sudáfrica y Swazilandia. En las otras regiones del mundo, sólo en Bhután y Suriname se logró una cobertura relativamente alta (> 20% de las personas en riesgo).

Tratamiento de la malaria

La adquisición de medicamentos antimaláricos a través de los servicios de salud pública aumentó pronunciadamente entre 2001 y 2006, pero el acceso al tratamiento, especialmente al tratamiento combinado basado en la artemisinina, fue insuficiente en todos los países encuestados en 2006.

17. Entre 2001 y 2006, los PNCM informaron de grandes aumentos del número de regímenes de medicamentos antimaláricos suministrados a través de los servicios de salud pública. En particular, las dosis de TCA aumentaron de 6 millones en 2005 a 49 millones en 2006, 45 millones de las cuales fueron para países africanos. Probablemente esas cifras de los PNCM subestiman el uso real, de modo que se desconoce el consumo exacto de TCA.

18. Según los datos de los PNCM, en 2006 sólo se suministraron 16 millones de pruebas de diagnóstico rápido (PDR), 11 millones de las cuales fueron para países africanos, lo que representa una cantidad pequeña en comparación con el número de episodios de malaria.

19. Considerando la relación entre los medicamentos suministrados en el sector público (a través de los PNCM) y los casos de malaria estimados, como reflejo de la demanda potencial, los países africanos mejor provistos con cualquier tipo de medicamento antimalárico en 2006 fueron Botswana, las Comoras, Eritrea, Malawi,

Santo Tomé y Príncipe, el Senegal, la República Unida de Tanzanía y Zimbabwe. En ese grupo de países, Eritrea, Santo Tomé y Príncipe y la República Unida de Tanzanía disfrutaron además de un suministro relativamente satisfactorio de TCA.

20. Según las encuestas nacionales de hogares, sin embargo, ninguna de las poblaciones de los 18 países africanos objeto de sondeo en 2006 y 2007 tenían acceso suficiente a antimaláricos. Sólo en Benin, el Camerún, la República Centroafricana, Gambia, Ghana, Uganda y Zambia se trataba con antimaláricos a más de un 50% de los niños con fiebre. El acceso al tratamiento no alcanzó en ningún país la meta del 80%, y la media en la totalidad de los 18 países fue del 38%. El uso de TCA fue mucho menor: sólo lo recibieron un 3% de los niños por término medio, con un margen de entre el 0,1% de Gambia y el 13% de Zambia.

21. Un subconjunto de 16 encuestas nacionales de hogares reveló que la mayor frecuencia de tratamiento preventivo intermitente (TPI, ≥ 2 dosis de sulfadoxina-pirimetamina) de las mujeres embarazadas se daba en Gambia, Malawi, el Senegal y Zambia (33%–61%), con una media del 18% de las mujeres en la totalidad de los 16 países.

22. Fuera de África, el acceso al tratamiento es más difícil de calibrar: las encuestas de hogares con preguntas sobre el tratamiento de la malaria son mucho menos frecuentes y, como ocurre con África, los programas nacionales de control no informan sobre el diagnóstico y tratamiento en el sector privado. No obstante, por lo que puede colegirse a partir de los datos de los PNCM, los países relativamente bien provistos con antimaláricos fueron Bhután, la República Democrática Popular Lao, Vanuatu y Viet Nam.

Financiación del control de la malaria

La financiación del control de la malaria alcanzó en 2006 cotas sin precedentes, pero aún no es posible determinar, a partir de los presupuestos de los PNCM, qué países disponen de recursos suficientes para controlar la enfermedad.

23. Según los datos de los PNCM correspondientes a 2006, la Región de África es la que disponía de más fondos para combatir la malaria, y la que informó de un mayor aumento de la financiación entre 2004 y 2006. Sin embargo, el total de US$ 688 millones destinados a la Región de África en 2006 representa sin duda una subestimación, pues sólo notificaron al respecto 26 de un total de 45 países. Es improbable que los US$ 4,6 disponibles por caso (estimado) de malaria en los 26 países informantes sean suficientes para alcanzar las metas de prevención y curación.

24. Las principales fuentes de fondos extraordinarios para los países africanos entre 2004 y 2006 fueron los gobiernos nacionales de los países afectados y el Fondo Mundial de Lucha contra el SIDA, la Tuberculosis y la Malaria. Esas dos fuentes dominaron el terreno de la financiación de la lucha antimalárica en la Región de África y en todo el mundo en 2006.

25. La distribución del apoyo financiero difirió entre las regiones de la OMS. En las regiones de las Américas, Europa y Asia Sudoriental, la mayoría de los fondos fueron aportados por los gobiernos de los países endémicos. En las regiones del Mediterráneo Oriental y el Pacífico Occidental, el Fondo Mundial fue la principal fuente de apoyo financiero. La Región del Pacífico Occidental dependió más de la financiación externa, seguida de las regiones de África y el Mediterráneo Oriental. Los países africanos son los que recibieron apoyo de una más amplia variedad de organismos externos.

Impacto del control de la malaria

Algunos países que han aplicado programas enérgicos de prevención y curación, en África y en otras regiones, han informado de reducciones importantes de la carga de malaria.

26. Aunque es posible evaluar el impacto del control de la malaria mediante encuestas de población periódicas -sobre la prevalencia del parásito, los casos de anemia, la mortalidad específica por malaria y la mortalidad por todas las causas-, este informe se centra en las conclusiones que pueden extraerse de los informes de vigilancia nacionales.

27. Entre los 41 países africanos que proporcionaron informes de casos y sobre la mortalidad durante el periodo 1997–2006, los datos probatorios más convincentes sobre el impacto proceden de cuatro países, o partes de países, con poblaciones relativamente pequeñas, una buena vigilancia y una alta cobertura de las intervenciones. Se trata de Eritrea, Rwanda, Santo Tomé y Príncipe y Zanzíbar (República Unida de Tanzanía). Esos cuatro países/zonas lograron reducir la carga de malaria en un 50% o más entre 2000 y 2006–2007, en consonancia con las metas de la AMS.

28. En otros países africanos en que una alta proporción de la población tiene acceso a medicamentos antimaláricos o mosquiteros con insecticida, como Etiopía, Gambia, Kenya, Malí, el Níger y el Togo, los datos de la vigilancia sistemática aún no muestran de forma inequívoca las reducciones esperadas de la morbilidad y la mortalidad. Bien los datos están incompletos, o bien el efecto de las intervenciones es reducido.

29. La alta cobertura conseguida al parecer en lo referente al rociamiento de interiores con insecticidas de acción residual en Namibia, Sudáfrica y Swazilandia concuerda con la disminución del número de casos observada en esos países, y se beneficia sin duda de los buenos resultados conseguidos antes con el RIR.

30. Los informes de vigilancia de numerosos países que no son africanos indican que la malaria disminuyó durante el decenio 1997–2006. Los casos de malaria han caí-

do al menos en 25 países endémicos en cinco regiones de la OMS. En 22 de esos países, el número de casos notificados se redujo en un 50% o más entre 2000 y 2006–2007, en consonancia con las metas de la AMS.

31. La cifra registrada de muertes por malaria ha disminuido al menos en seis países de las Américas, así como en las regiones de Asia Sudoriental y el Pacífico Occidental. Los países en cuestión son Camboya, la República Democrática Popular Lao, Filipinas, Suriname, Tailandia y Viet Nam, todos los cuales están bien encaminados para alcanzar las metas de la AMS relativas a la reducción de la mortalidad por malaria para 2010.

32. Las reducciones del número de casos y las defunciones pueden relacionarse en algunos países con intervenciones específicas, por ejemplo con el uso focalizado de MTI en Camboya, la India, la República Democrática Popular Lao y Viet Nam. Sin embargo, en general, la relación entre las intervenciones y las tendencias observadas sigue siendo dudosa, y en la mayoría de los países habrá que realizar investigaciones más meticulosas sobre los efectos de las medidas de control.

33. La OMS distingue cuatro fases en el camino hacia la eliminación de la malaria, de tal manera que a julio de 2008 los 109 países/territorios afectados por la malaria se clasificaron de la siguiente manera: control (82), preeliminación (11), eliminación (10) y prevención de la reintroducción (6). En enero de 2007 los Emiratos Árabes Unidos se convirtieron en el primer país endémico que la OMS certificaba como libre de malaria desde los años ochenta, lo que elevó a 92 el número total de países/territorios sin esa enfermedad.

1. Introduction

The large, round numbers that delineate the immense and persistent burden of malaria have become a familiar part of discussions in the global public health forum: 3 billion people at risk of infection in 109 malarious countries and territories and around 250 million cases annually, leading to approximately 1 million deaths. In 2004, *Plasmodium falciparum* was among the leading causes of death worldwide from a single infectious agent (*1*).

These commonly-cited statistics have underpinned a renewed assault on malaria, which has been under way since the turn of the millennium. There is an emerging consensus on how best to use refined methods for malaria prevention and treatment, notably long-lasting insecticidal nets (LLIN) and artemisinin-based combination therapy (ACT), backed by indoor residual praying (IRS) (*2–4*). More widespread agreement on policy and strategy has stimulated leaders of the countries most affected, backed by international organizations and donors, to set increasingly ambitious targets for control: that is, to achieve at least 80% coverage of key interventions by 2010 (*5*). Beyond Scaling Up For Impact (SUFI) (*6*), Malaria No More (*7*) and renewed calls for action by the UN Secretary General, there is active debate about the possibility of large-scale malaria elimination (*8–10*).

As malaria control intensifies, it is vital to monitor malaria burden and trends, and to track the coverage and impact of interventions. While malaria undoubtedly imposes a major burden on health, estimates of the numbers of cases and deaths have been, for many countries, too inaccurate to establish firm baselines against which to evaluate the success of control measures. Therefore, while each year more people are protected against infected mosquitoes, and more have access to correct antimalarial medicines, measures of the number of people who need and who receive these services are still not sufficiently precise, either for programme planning or for evaluation against coverage targets. Most difficult of all is the assessment of epidemiological impact. Although malaria control programmes are not conducted as controlled experiments, there are valid methods for evaluating impact from surveillance and survey data. However, all such methods require accurate data.

Against that background, this second edition of the *World malaria report*, following the first edition published in 2005 (*11*), reviews progress in control in five areas.

1. Malaria burden and trends as reported to WHO, leading to an update of the scale of the malaria problem by country, by region and worldwide for the period 2001–2006. This report contains a complete set of estimates of malaria cases and deaths for each of the 109 malarious countries and territories and an assessment of the uncertainty surrounding these estimates, and draws comparisons with other estimation exercises.
2. National policies and strategies on malaria control, established in response to the burden of disease. This report details whether or not national malaria control programmes (NMPs) are implementing WHO-recommended policies and strategies for malaria control, taking into account the interventions that are appropriate in different epidemiological settings.
3. Progress in implementing control measures, as compared with international targets for malaria control. Extending a 2007 UNICEF review (*12*), the report highlights, country by country, progress in implementing the WHO-recommended methods of prevention (insecticide-treated nets, indoor residual spraying, ITP) and treatment (artemisinin-based combination therapy and other appropriate treatment). The analysis identifies the gaps in programme implementation by intervention, geographical location and groups at particular risk in each population.
4. Funding to support malaria control, described in relation to the coverage of major interventions. National budgets and expenditures are given, together with sources of funding and major areas of expenditure. Although the financial data are incomplete for many countries, the report makes an initial attempt to examine whether available funding for malaria control is adequate to meet needs.
5. Recent evidence of the epidemiological impact of malaria control programmes, obtained both from routine surveillance and survey data.

In all five areas, the report presents a critical review of the evidence, and of the conclusions that can be drawn from it. These conclusions are presented so as to stimulate improvements in policy, financing, implementation, and monitoring and evaluation. The goal of the *World malaria report*, in short, is to support the development of effective national malaria control programmes.

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2.

Policies, strategies and targets for malaria control

The government of every country affected by malaria has a national malaria control policy covering prevention and case-management. This chapter summarizes the policies, strategies and targets for malaria control that are recommended by WHO.

Diagnosis and treatment of malaria, including preventive treatment

The objectives of an antimalarial treatment policy are to: ensure rapid cure of the infection; reduce morbidity and mortality, including malaria-related anaemia; prevent the progression of uncomplicated malaria into severe and potentially fatal disease; reduce the impact of malaria infection on the fetus during pregnancy; reduce the reservoir of infection; prevent the emergence and spread of drug resistance; and prevent malaria in travellers.

Current WHO recommendations for the diagnosis and treatment of malaria (*1*) are given in **Box 2.1**. In order to achieve global and national targets, diagnostic and treatment methods should follow the guidelines for deployment shown in **Box 2.2**.

Malaria prevention through mosquito control

The main objective of malaria vector control is to reduce significantly the incidence and prevalence of both parasite infection and clinical malaria. There are two main approaches to malaria prevention by mosquito control: the use of insecticide-treated nets (ITNs) and indoor residual spraying (IRS). These core interventions may be complemented, usually in specific locations, by other methods such as larval control or environmental management. WHO recommendations for the use of ITNs and IRS are shown in **Box 2.3**. Additional guidance on the effective deployment of mosquito-control methods appears in **Box 2.4**.

Goals, indicators and targets

The launch of Roll Back Malaria (RBM) in 1998, the United Nations Millennium Declaration in 2000, the Abuja Declaration by African Heads of State in 2000 (part of the African Summit on Roll Back Malaria), the World Health Assembly in 2005, and the RBM global strategic plan 2005–2015 have all contributed to the establishment of goals, indicators and targets for malaria control. The following is a brief account of the goals for malaria control, and of the way in which progress towards these goals will be measured.

BOX 2.1

WHO recommendations for the diagnosis and treatment of malaria

1. The treatment of malaria infections should be based on a laboratory-confirmed diagnosis, with the exception of children under 5 years of age in areas of high transmission in whom treatment may be provided on the basis of a clinical diagnosis.
2. All uncomplicated *P. falciparum* infections should be treated with an artemisinin-based combination therapy,[1] and *P. vivax* with chloroquine and primaquine (except where *P. vivax* is resistant to chloroquine, when it should be treated with ACT and primaquine).
3. Four ACTs are currently recommended for use: artemether-lumefantrine, artesunate-amodiaquine, artesunate-mefloquine and artesunate-sulfadoxine-pyrimethamine. The choice of the ACT should be based on the efficacy of the partner medicine in the country or area of intended deployment.
4. Patients suffering from severe malaria presenting at the peripheral levels of the health system should be provided prereferral treatment with quinine or artemisinins, and transferred to a health facility where full parenteral treatment and supportive care can be given.
5. Severe malaria should be treated parenterally with either an artemisinin derivative[2] or quinine until the patient can swallow, when a complete course of ACT must be administered.
6. In areas of high transmission, intermittent preventive treatment (IPT) with sulfadoxine-pyrimethamine (SP) should be administered to pregnant women at least twice during the second and third trimesters of pregnancy, and three times in the case of HIV-positive pregnant women. The effectiveness of IPT should be monitored in light of increasing SP resistance.

[1] In central America, the only remaining region where *P. falciparum* is sensitive to chloroquine, the change to ACT should be made when chloroquine failure rates reach 10%.
[2] Artesunate is preferred in areas of low to moderate transmission.

BOX 2.2

A guide to the deployment of diagnostic and treatment methods

1. Effective diagnosis and treatment should be available at all health facilities.
2. In situations where a health facility is not accessible to the majority of people within 24 hours of the onset of illness, diagnosis and treatment should be provided through a programme of home-based management of malaria.
3. Diagnosis and treatment may be provided through the private sector, informal and formal, but with stringent government regulation.
4. Commodities and services should be made available at affordable prices and with quality assurance.
5. A quality assurance system for both microscopy and RDT should be established. Such a system will promote a high quality of diagnosis and care, and produce reliable data for surveillance and impact assessment.
6. Prereferral treatment with artemisinins/quinine, followed by immediate referral to higher levels of the health system, should be implemented at primary health care facilities for patients with severe malaria.
7. Rectal artemisinins should be deployed at the community level as prereferral treatment of severe malaria in children under 5 years and followed up with referral to a health facility where full treatment can be provided.
8. An efficient national procurement and supply-chain management system for medicines and rapid diagnostic tests should be implemented, to ensure that commodities that meet minimum standards are available at points of delivery.
9. Pharmacovigilance is needed to detect and report adverse reactions to medicines, including the maintenance of a pregnancy registry to study the effects of artemisinins on pregnant women and on pregnancy outcomes.
10. The use of monotherapies in the treatment of *P. falciparum* malaria should be abandoned (*2*). This applies to artemisinins and to current and potential partner medicines. The purpose is to increase efficacy of treatment and, importantly, delay the onset of parasite resistance.
11. Surveillance of therapeutic efficacy over time is an essential component of malaria control. The results of in vivo tests for therapeutic efficacy provide essential information for determining whether first- and second-line drugs are still effective (*3*, *4*).[1]
12. Operational research is needed to identify and address gaps in knowledge, and improve practices and delivery mechanisms. This research will assist countries in achieving the targets for curative and preventive treatment.

BOX 2.3

WHO recommendations for the use of insecticide-treated nets (ITNs) and the application of indoor residual spraying (IRS)

1. Protective nets should be treated with long-lasting formulations of insecticide (LLINs) (5). ITNs should be used by everyone in the community: high levels of net usage are more likely to protect individuals who do not use nets, in addition to those who do use them.
2. Young children and pregnant women are the most vulnerable; their protection with ITNs is the immediate priority while progressively achieving full coverage. In areas of low transmission, where all age groups are vulnerable, national programmes should establish priorities on the basis of the geographical distribution of malaria.
3. IRS is the application of insecticides to the inner surfaces of dwellings, where endophilic anopheline mosquitoes often rest after taking a blood meal (*6*). Twelve insecticides belonging to four chemical groups are currently recommended by WHO for IRS. The selection of an insecticide for IRS in a given area is based on data on insecticide resistance, the residual efficacy of insecticide, costs, safety and the type of surface to be sprayed.
4. DDT has comparatively long residual efficacy (6 months or more) against malaria vectors and plays an important role in the management of vector resistance. WHO recommends DDT only for indoor residual spraying. Countries may use DDT for as long as necessary, in the quantity needed, provided that the guidelines and recommendations of WHO and the Stockholm Convention are all met (*7*).
5. Only insecticides to which vectors are susceptible should be used. Monitoring and management of insecticide resistance are vital in the use of ITNs and IRS.

[1] Routine surveillance for drug efficacy, established by NMCPs in collaboration with WHO, has identified e.g. the failure of ACT on both sides of the Cambodia–Thailand border, perhaps caused by local emergence of resistance to artemisinin derivatives.

BOX 2.4

A guide to the effective deployment of mosquito-control methods

1. Both IRS and ITNs may be used in a range of epidemiological settings, from low to high transmission.
2. The distribution of ITNs should be either free of charge or highly subsidized. Mosquito nets are bulky, so special attention should be paid to procurement, storage and transport. For example, where access during the rainy season is difficult, LLINs should be prepositioned during the dry season.
3. In order to protect a high proportion of people at risk, a minimum ratio of one ITN or LLIN per two persons at risk is recommended.
4. Several years of consecutive rounds of IRS are usually required to achieve and sustain the full potential of this intervention, so the adoption of IRS requires medium– to long-term political and financial commitment by national programmes and funding partners. Therefore, IRS would ideally not be planned unless full capacity for implementation, monitoring and evaluation is in place at national, provincial and district levels.
5. Timing in IRS operations is essential. Owing to the short duration of insecticide efficacy when sprayed on walls, spraying campaigns must be completed just before the onset of the transmission season. Because they are costly, it is not usually feasible to implement IRS continuously for long periods of time.
6. IRS is effective in reducing malaria parasite prevalence and incidence in areas of high transmission but, once these goals have been achieved, IRS may be supplemented and then supplanted by other interventions, including LLINs.
7. IRS is the first-line intervention for containing malaria epidemics, and earlier application is likely to be more effective. IRS may also be used to prevent transmission in epidemic-prone areas and in areas with low seasonal transmission (e.g. highlands, fringes); in settings where LLINs are ineffective owing to pyrethroid resistance; and occasionally to control malaria in "complex emergencies" (e.g. displaced populations, refugees).
8. IRS and LLINs may be jointly deployed in areas of high transmission to further enhance their impact through extended insecticide coverage in time and space. The combination can also maintain the efficacy of vector control through the management of insecticide resistance, and limit the application of IRS in situations where it cannot be properly implemented (timing, dosage, coverage) or might be interrupted (e.g. shortage of funds, social disruption, war).

Global vision

The Roll Back Malaria partnership's vision is that "by 2015, the malaria-related Millennium Development Goals (MDGs) are achieved. Malaria is no longer a major cause of mortality and no longer a barrier to social and economic development and growth anywhere in the world"(*8*).

Global targets

Since the inception of accelerated malaria control with the founding of the Roll Back Malaria Partnership in 1998, the principal goal has been to reduce mortality by 50% by 2010 (*9*). In April 2000, African Heads of State, as part of the African Summit on Roll Back Malaria, made commitments "to an intensive effort to halve the malaria mortality for Africa's people by 2010"(*10*). In 2005, the World Health Assembly determined to "ensure a reduction in the burden of malaria of at least 50% by 2010 and by 75% by 2015" (*11*). This resolution has been interpreted to mean a reduction in malaria morbidity as well as mortality. The reference year for measuring changes in morbidity and mortality was taken to be 2000.

With the publication in 2005 of the Roll Back Malaria global strategic plan for 2005–2015 (*9*), WHO and RBM adopted 2005 as the baseline for evaluating whether morbidity and mortality had been reduced by ≥ 75% by 2015. The baseline year was changed from 2000 to 2005 because better data were available to make mortality estimates in 2005 (compared with 2000). In addition, malaria mortality was unlikely to have changed much between 2000 and 2005, since the major impetus in malaria control in most high-burden countries began in 2005 and 2006.

The targets for coverage with curative and preventive measures were initially set at ≥ 60% of all populations at risk by 2005 (*10*). In 2005, the World Health Assembly increased those coverage targets to ≥ 80% by 2010 (*11*).

The United Nations Millennium Development Goals (MDGs) also include targets for malaria control. In 2000, the United Nations, as part of the Millennium Declaration, resolved by 2015 to "reduce… under-five mortality by two thirds of their current rates" (*12*). In addition, they resolved "to have halted and begun to reverse… the scourge of malaria…".

In 2003, malaria experts set objectives that were more measurable, and revised these objectives in 2007. Building on that work, the 2007 United Nations Secretary-General's report included indicators to monitor progress towards new targets, as recommended by the Inter-Agency and Expert Group on MDG Indicators (IAEG). MDG target 6C is to "have halted by 2015 and begun to reverse the incidence of malaria and other major diseases". The indicators specific to malaria are:

6.6 Incidence and death rates associated with malaria.

6.7 Proportion of children under 5 years sleeping under insecticide-treated bednets.

6.8 Proportion of children under 5 years with fever who are treated with appropriate antimalarial drugs.

Table 2.1 Malaria indicators, targets and sources of data (*9, 11, 13–15*)

1. TRENDS IN MALARIA CASES AND DEATHS

IMPACT MEASURE	INDICATOR	NUMERATOR	DENOMINATOR	DATA TYPE/SOURCE	TARGET
Malaria cases	1.1 Confirmed malaria cases (microscopy or RDT, per 1000 persons per year)[a]	Confirmed malaria cases per year (< 5 years or total)	Population (< 5 years or total)	Routine surveillance	Reduction in cases and deaths per capita: ≥ 50% by 2010 compared to 2000, and ≥ 75% by 2015 compared to 2005[c]
	1.2 Inpatient malaria cases (per 1000 persons per year)[b]	No. of inpatient malaria cases per year (< 5 years or total)	Population (< 5 years or total)	Routine surveillance	
Malaria deaths	1.3 Inpatient malaria deaths (per 1000 persons per year)[b]	No. of inpatient malaria deaths per year (< 5 years or total)	Population (< 5 years or total)	Routine surveillance	
	1.4 Malaria-specific deaths (per 1000 persons per year)	No. of malaria deaths per year (< 5 years or total)	Population (< 5 years or total) in study sample	Verbal autopsy (surveys), complete or sample vital registration systems	
	Used mostly for high-transmission countries 1.5 Deaths in children < 5 years old from all causes (per 1000 children < 5 years old per year)	No. of deaths in children < 5 years old from all causes	Population < 5 years in study sample	Household surveys, complete or sample vital registration systems	

[a] Use only if > 90% of suspected cases have parasite-based examination (microscopy or RDT).
[b] Marker for severe malaria.
[c] Cases and deaths per capita may also be compared with the MDG baseline of 1990, although estimates for 1990 are less reliable.

2. COVERAGE OF INTERVENTIONS

CONTROL STRATEGY	INDICATOR	NUMERATOR	DENOMINATOR	DATA TYPE/SOURCE	TARGET
Prompt access to effective treatment	2.1 Appropriate antimalarial treatment of children < 5 years within 24 hours of onset of fever[a,b,c] (MDG indicator 6.8)	No. of children < 5 years receiving appropriate antimalarial treatment (according to national policy) within 24 hours of onset of fever	No. of children < 5 years with fever in the last 2 weeks in surveyed households[a]	Household surveys	≥ 80%
Mosquito control with insecticide-treated nets (ITNs)	2.2 ITN use in all persons or children < 5 years or pregnant women (MDG indicator 6.7)[d,e]	No. of persons (all ages) or children < 5 years or pregnant women that reported sleeping under an ITN during previous night	No. of persons (all ages) or children < 5 years old or pregnant women in surveyed households	Household surveys	≥ 80%
	2.3 Coverage of all persons at risk with an ITN[d,e]	No. of persons covered by ITN distributed[e]	No. of persons at risk of malaria	Routine NMCP data, epidemiological estimates	≥ 80%
Mosquito control by indoor residual spraying of insecticide (IRS)	2.4 Households sprayed with insecticide among those targeted	No. of households sprayed in one year according to national guidelines	No. of households targeted according to national guidelines	Routine NMCP data	≥ 80%
Prevention of malaria in pregnancy	*Used mostly for high-transmission countries* 2.5 Pregnant women that received two doses of intermittent preventive treatment	No. of pregnant women who received two doses of intermittent preventive treatment	No. of pregnant women with at least one ANC visit in one year	Routine antenatal clinic data	≥ 80%

[a] As malaria incidence is reduced, a smaller percentage of fevers will be due to malaria. With improved diagnosis, treatment can be targeted at confirmed cases. This indicator is currently under review.
[b] In areas where *P. vivax* is dominant, and in areas of low transmission, this indicator may be less useful.
[c] The intention is to treat all persons with an appropriate antimalarial medicine; however, children are most at risk, especially in areas of high transmission.
[d] Indicator should be calculated separately for all persons, children, and pregnant women.
[e] LLINs are the preferred type of ITN; LLINs are assumed to be protective for three years. One LLIN is assumed to protect two persons.

3. OPERATIONAL INDICATORS USED AT HEALTH FACILITY, DISTRICT AND NATIONAL LEVELS, MEASURED USING ROUTINE HEALTH INFORMATION SYSTEMS

MONITORING	INDICATOR	NUMERATOR	DENOMINATOR	DATA TYPE/ SOURCE	TARGET
Malaria transmission	3.1 Slide positivity rate (SPR)[a]	No. of laboratory-confirmed malaria cases	No. of suspected malaria cases with parasite-based laboratory examination	Routine surveillance	No target set, indicates level of control[b]
Quality of diagnosis	3.2 Percentage of out-patient suspected malaria cases that undergo laboratory diagnosis[c]	No. of outpatient suspected malaria cases that undergo laboratory diagnosis (in age groups specified by national policy)	No. of outpatient suspected malaria cases that should be examined	Routine surveillance data	≥ 90%
Appropriate treatment at health facilities	3.3 Percentage of out-patient cases that received appropriate antimalarial treatment according to national policy	No. of malaria cases receiving appropriate antimalarial treatment at health facility	No. of outpatient malaria cases expected to be treated at health-facility level with appropriate antimalarial medicine	Routine logistic data	100%
Routine distribution of mosquito nets by NMCP	3.4 ITN distribution to populations at risk	No. of ITNs distributed to populations at risk (e.g. pregnant women attending antenatal clinics, children attending EPI[d] clinics)	Population at risk	Routine logistic data	≥ 80%
Antimalarial drug supplies	3.5 Health facilities without stock-outs of first-line antimalarial medicines, mosquito nets and diagnostics, by month	No. of health facilities without stock-outs of first-line antimalarial medicines, ITN and RDT, by month	No. of reporting health facilities	Routine logistic data	100%
Reports for programme management	3.6 Completeness of monthly health facility reports on logistics or surveillance	No. of reports received each month, on logistics or surveillance	No. of reports expected each month	Routine surveillance and logistic data	> 90%

[a] "Slide" includes microscopy or rapid diagnostic test (RDT).
[b] SPR < 5% during the malaria season marks the transition from control stage to pre-elimination stage.
[c] Laboratory diagnosis includes microscopy and RDT; this is also an indicator of the quality of surveillance.
[d] Expanded Programme on Immunization.

Drawing together the work of Roll Back Malaria since 1998, the Abuja Declaration in 2000, the 2005 World Health Assembly, the various revisions of MDGs specifically for malaria, and the global strategic plan, **Table 2.1** shows the recommended indicators (with numerators and denominators) for measuring epidemiological impact (part 1) and effective coverage (part 2), plus the targets for 2010 and 2015. MDG indicators 6.7 and 6.8 are aligned with indicators in **Table 2.1**, namely 2.2 and 2.1. In addition, **Table 2.1** (part 3) gives operational indicators that are useful for managing national malaria programmes at health facility, district and national levels.

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3.

Estimated burden of malaria in 2006

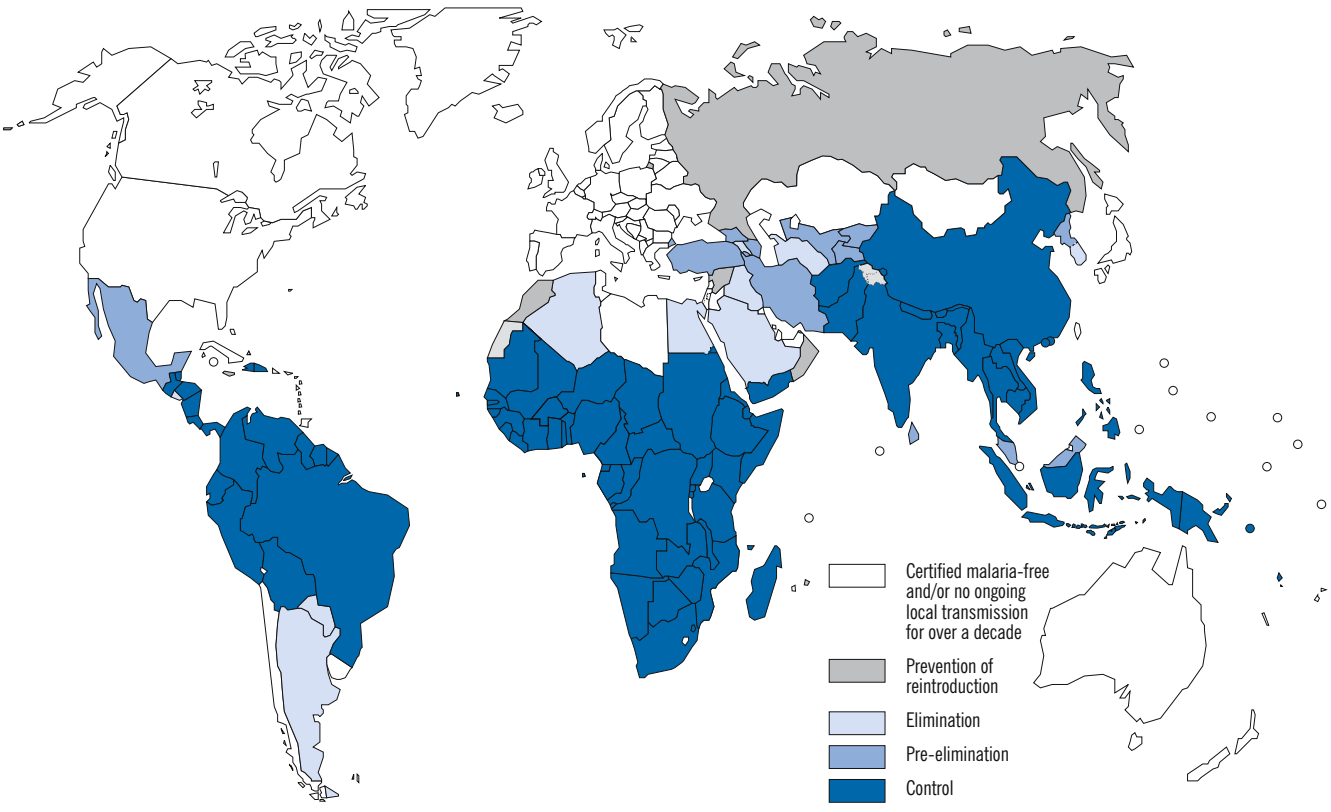
The methods used to estimate the populations at low and high risk of malaria are described in the country profiles: methods and definitions (page 35). The methods used to calculate the numbers of cases and deaths, by country and region, are described in **Annex 1**. Estimates for each country in 2006 are in **Annex 2**.

Population at risk

The 109 countries and territories classified as endemic, or previously endemic with the threat of reintroduction, fall into four groups. The four groups describe the transition from control to elimination (**Fig. 3.1**, chapter 5).

Information on the number of people living in areas where malaria transmission occurs was obtained from NMCPs. About half the world's population (3.3 billion) live in areas that have some risk of malaria transmission and one fifth (1.2 billion) live in areas with a high risk of malaria (more than 1 reported case per 1000 population per year; **Table 3.1**). Another 2.1 billion live in areas of low risk. Although low-risk areas cover a large number of people living across a wide geographical area, they produce a relatively small number of malaria cases each year (less than 2 million) and account for less than 3% of cases reported by countries in 2006. The largest populations at any risk of malaria are found in the WHO South-East Asia and Western Pacific regions. Africa has the largest number of people living in areas with a high risk of malaria, followed by the South-East Asia Region (**Fig. 3.2**).

Fig. 3.1 Malaria-free countries and malaria-endemic countries in phases of control, pre-elimination, elimination and prevention of reintroduction, end 2007



[a] China, Indonesia, Phlippines, Solomon Islands, Sudan, Vanuatu and Yemen have subnational elimination programmes.

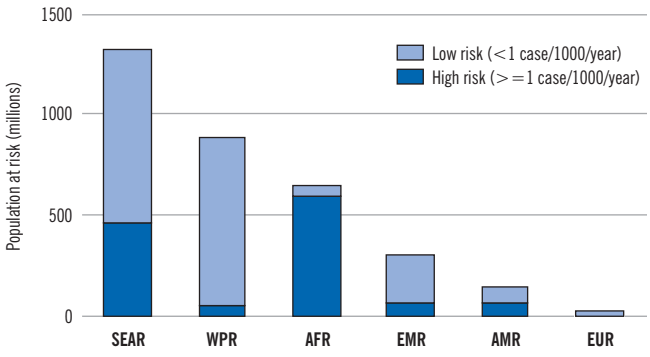
Table 3.1 Estimates of populations at low and high risk of malaria, and estimates of cases and deaths compared with NMCP reports, by WHO region, 2006

POPULATION AT RISK (MILLIONS)	POPULATION	% ANY RISK	TOTAL AT RISK	LOW RISK	HIGH RISK	HIGH RISK (AS % OF ANY RISK)
Africa	774	84	647	61	586	91
Americas	895	15	137	76	61	45
Eastern Mediterranean	540	55	295	230	66	22
Europe	887	2	22	19	2	11
South-East Asia	1 721	77	1 319	863	457	35
Western Pacific	1 763	50	888	833	54	6
World	**6 581**	**50**	**3 308**	**2 082**	**1 226**	**37**

CASES (THOUSANDS)	REPORTED	% FALCIPARUM	ESTIMATED	LOWER	UPPER	REPORTED/ESTIMATED (%)
Africa	83 618	98	212 000	152 000	287 000	36
Americas	1 042	29	2 700	2 400	3 200	39
Eastern Mediterranean	2 914	76	8 100	7 000	11 400	84
Europe	2	2	4	4	5	63
South-East Asia	4 338	56	21 000	19 000	29 000	20
Western Pacific	2 133	67	2 200	1 500	3 200	95
World	**94 048**	**92**	**247 000**	**189 000**	**327 000**	**37**

DEATHS (THOUSANDS)	REPORTED (ALL AGES)	REPORTED (% < 5 YEARS)	ESTIMATED (ALL AGES)	LOWER	UPPER	REPORTED/ESTIMATED (%)
Africa	156	88	801	529	1 126	20
Americas	0	29	3	2	3	8
Eastern Mediterranean	2	76	38	20	60	5
Europe	0	0	0	0	0	0
South-East Asia	2	35	36	24	50	5
Western Pacific	1	40	4	2	6	33
World	**161**	**85**	**881**	**610**	**1 212**	**18**

Fig. 3.2 Number of people estimated to be at low and high risk of malaria, by WHO region, 2006



Malaria cases

Estimates of the number of malaria cases were made by: (1) adjusting the reported malaria cases for reporting completeness, the extent of health service utilization and the likelihood that cases are parasite-positive*; or (2) from an empirical relationship between measures of malaria transmission risk and case incidence (**Annex 1**).

There were an estimated 247 million malaria cases (5th–95th centiles, 189–327 million) worldwide in 2006, of which 91% or 230 million (175–300 million) were due to *P. falciparum* (**Table 3.1**). The vast majority of cases (86%) were in the African Region, followed by the South-East Asia (9%) and Eastern Mediterranean regions (3%) (**Fig. 3.3**). The percentage of cases due to *P. falciparum* exceeded 75% in most African countries but only in a few countries outside Africa (**Fig. 3.4**).

In Africa, 19 of the most populous countries accounted for 90% of estimated cases in 2006 (**Fig. 3.5**). There is considerable uncertainty surrounding the estimates for individual countries. For example, lower and upper estimates for Nigeria (35–80 million cases), derived from risk mapping, differ by a factor of more than two. Estimates for Kenya, derived from routine surveillance reports, ranged from 5 million to 19 million cases in 2006, a fourfold difference.

* Cibulskis RE et al. Estimating trends in the burden of malaria. *American Journal of Tropical Medicine and Hygiene,* 2007, 77(suppl 6): 133–137.

Fig. 3.3 Estimated incidence of malaria per 1000 population, 2006

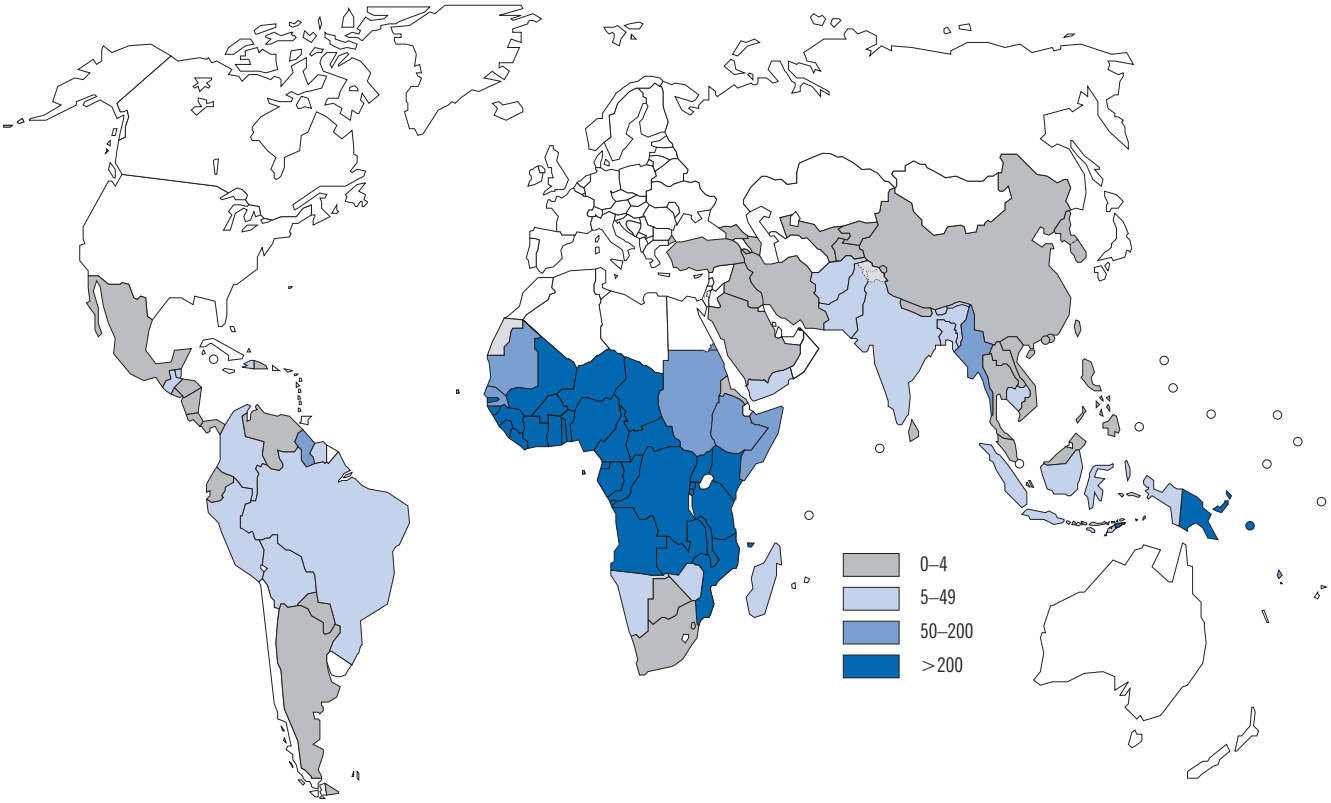


Fig. 3.4 Estimated percentage of malaria cases due to *P. falciparum*, 2006

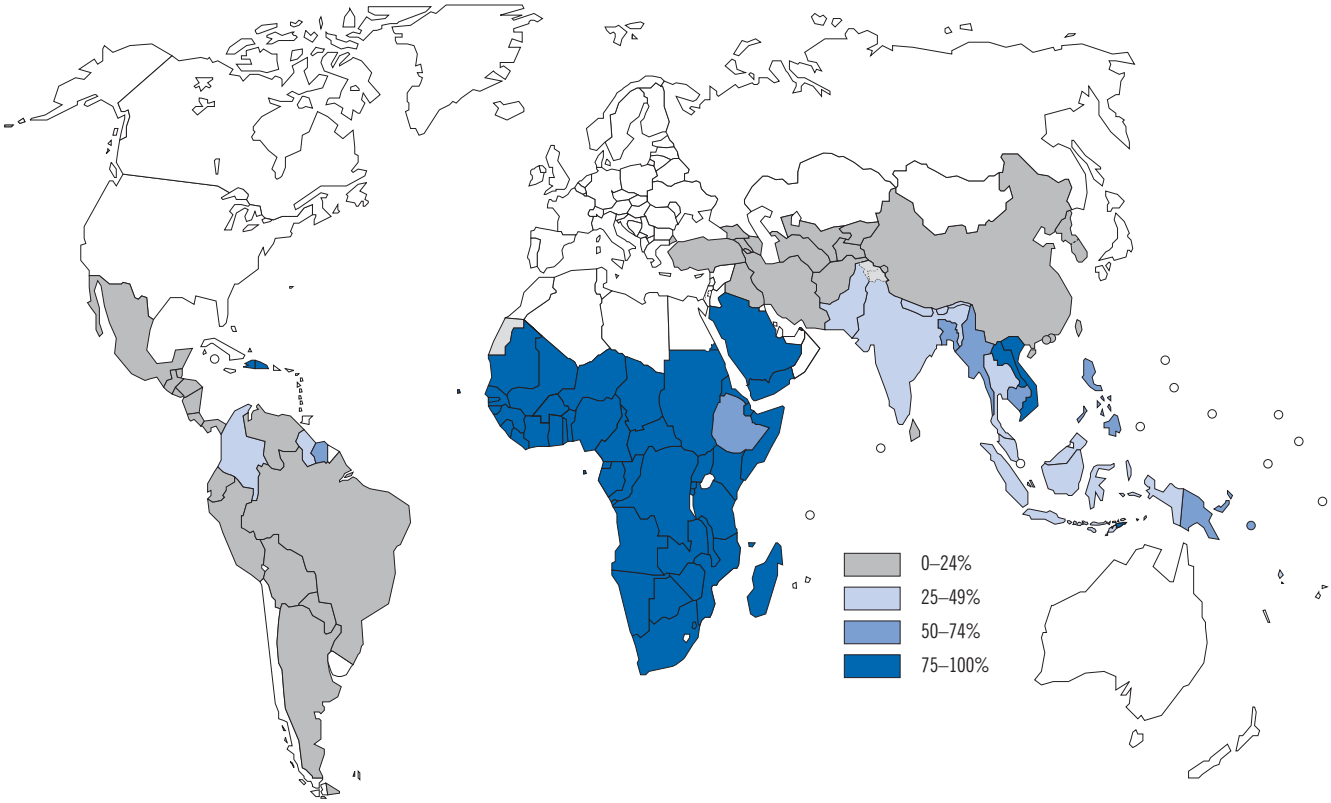
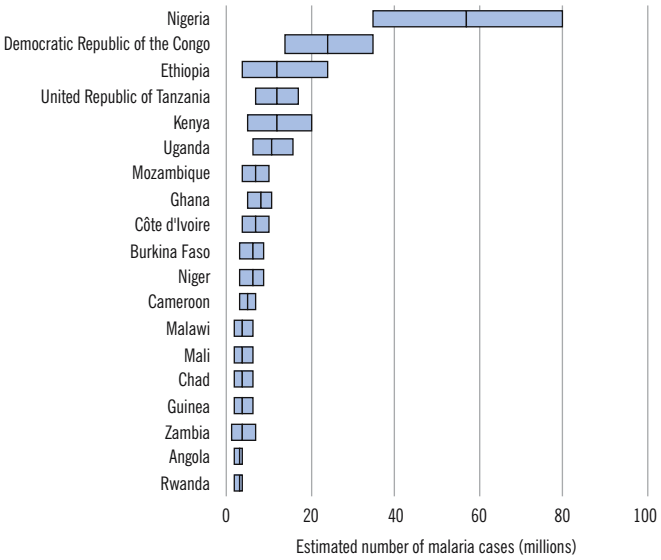
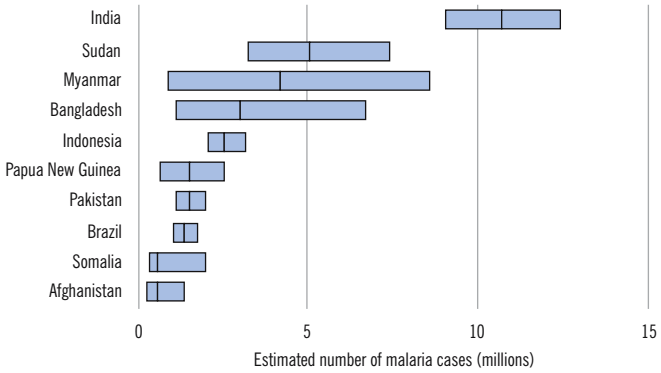


Fig. 3.5 Nineteen countries estimated to have 90% of cases in the African Region, 2006[a]



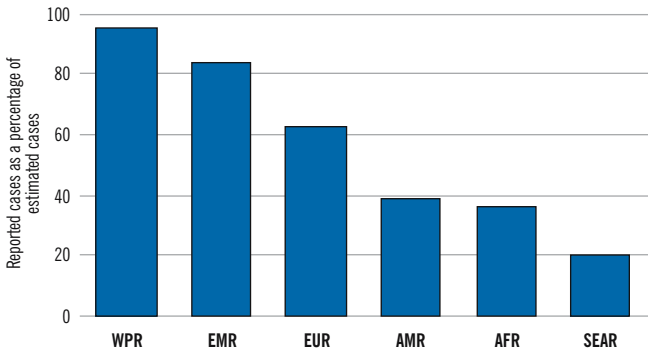
[a] The width of bars indicates 5th and 95th centiles.

Fig. 3.6 Ten countries estimated to have 90% of cases in regions other than Africa, 2006[a]



[a] The width of bars indicates 5th and 95th centiles.

Fig. 3.7 Reported cases as a percentage of all estimated cases, by WHO region, 2006



Ten countries accounted for 90% of the cases that occurred outside Africa in 2006, with wide uncertainty intervals around the point estimates (**Fig. 3.6**). Approximately 30% of these cases, and 15% of *P. falciparum* cases, were in India.

The number of cases reported by national malaria control programmes (NMCPs) was only 37% of the estimated global incidence. The gap between case reports and true incidence was greatest in the South-East Asia Region, and least in the Eastern Mediterranean and Western Pacific regions (**Fig. 3.7**). The gap between reported and estimated cases needs careful interpretation (**Box 3.1**). For example, a high ratio of reported/estimated cases does not necessarily mean that a high proportion of cases is captured by a national reporting system.

Malaria deaths

Estimates of the number of malaria deaths were also made by: (1) multiplying the estimated number of *P. falciparum* malaria cases by a fixed case-fatality rate for each country; or (2) from an empirical relationship between measures of malaria transmission risk and malaria-specific mortality rates (**Annex 1**).

There were an estimated 881 000 (610 000–1 212 000) deaths worldwide in 2006, of which 90% were in the African Region, and 4% in each of the South-East Asia and Eastern Mediterranean regions (**Table 3.1**). The risk of death from malaria is considerably higher in Africa than other parts of the world (**Fig. 3.8**). An estimated 85% of deaths occur in children under 5 years, but the proportion is much higher in the African (88%) and Eastern Mediterranean regions (76%) than in other regions (16–40%, **Table 3.1**). Eighteen countries accounted for 90% of deaths in the African Region (**Fig. 3.9**), and seven countries had 90% of deaths outside the African Region, dominated by Sudan and India (**Fig. 3.10**).

According to data and estimates, only 1 in 5 malaria deaths was reported worldwide in 2006, but the ratio of reported/estimated deaths was much lower in the Americas and in the Eastern Mediterranean and South-East Asia regions (**Table 3.1**). These low ratios are seen in some countries outside Africa where NMCPs rely solely on malaria-specific information systems, and do not compile data from other inpatient and death registration systems. In addition, reports of malaria deaths may appear to be more complete in Africa because deaths, like cases, are not usually confirmed parasitologically.

Comment

Our calculations of the number of people at risk of malaria differ from other recent estimates by Guerra et al. (*1*), where 1.4 billion people were estimated to be at high risk of falciparum malaria (as distinct from all *Plasmodium* spp) and 0.97 billion were at low risk (**Table 3.1**).

Some of the differences between the new estimates presented here and those of Guerra et al. could be due to variations in the completeness and quality of the data

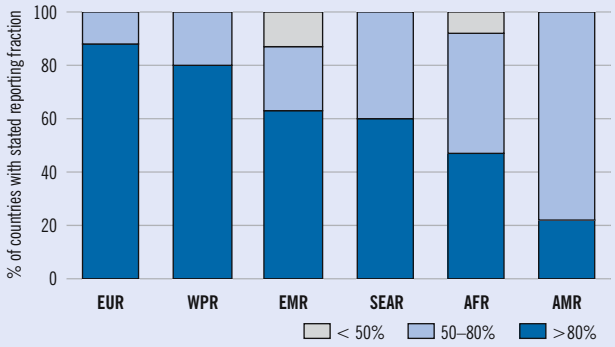
BOX 3.1

Reported versus estimated malaria cases

There are three factors that determine whether malaria cases reported by NMCPs are a true reflection of the number of cases occurring in a country (Annex 1):

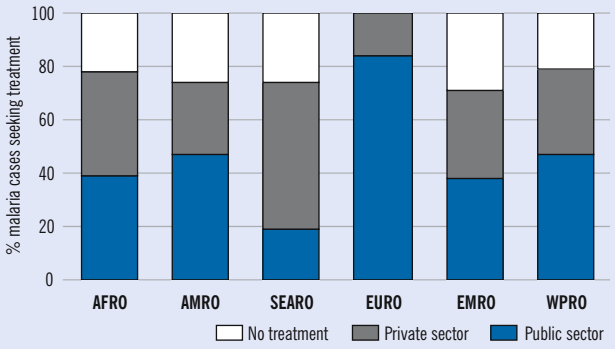
(1) The completeness of reports in routine surveillance systems. In reply to a WHO questionnaire, many NMCPs claimed that the percentage of reports submitted by health facilities was greater than 80% of the number expected. Reporting was most complete in the European and Western Pacific regions (**Fig. 3A**). About half of the countries in the African Region stated that reporting rates were above 80%.

Fig. 3A Percentage of surveillance reports obtained by NMCPs, by WHO region, 2006



(2) The proportions of malaria patients that use public and private health facilities, or do not seek treatment at all. From an analysis of household survey data, it is estimated that 37% of malaria cases sought treatment at facilities covered by ministry of health reporting systems (**Fig. 3B**; see also chapter 4). The remaining 63% of cases use facilities in the private sector, shops and pharmacies, or do not seek treatment at all. The South-East Asia Region had the lowest percentage of cases captured by ministry of health reporting systems, primarily because a large number of patients use private practitioners of one sort or another.

Fig. 3B Sources of treatment for malaria patients, by WHO region, 2006



(3) The proportion of cases that have a confirmed diagnosis. In some countries, mainly in regions other than Africa, all suspected malaria cases are subjected to laboratory investigation, and all reported malaria cases have confirmed *Plasmodium* infections (**Fig. 3C**). In many African countries, a small proportion of suspected malaria cases is subjected to laboratory investigation, and diagnosis is based only on clinical signs and symptoms. Because slide positivity rates are generally below 50%, more than half of all clinically diagnosed cases do not have malaria (**Fig. 3D**).

Fig. 3C Percentage of suspected malaria cases in public health facilities that were given a laboratory diagnostic test, by WHO region, 2006

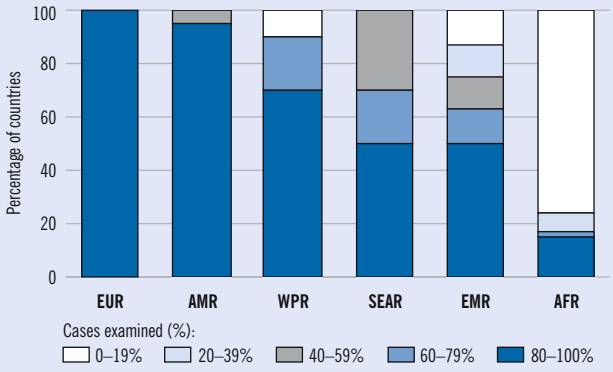
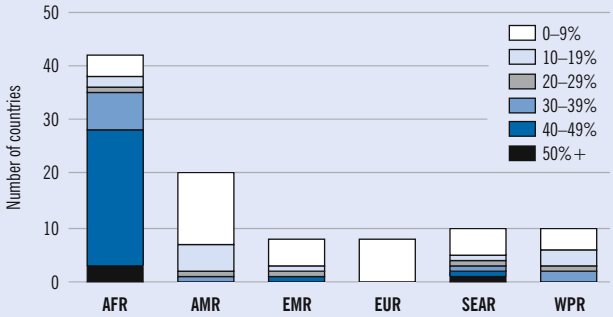


Fig. 3D Distribution of slide positivity rates reported by countries, by WHO region, 2006



These three factors may together generate counterbalancing errors in reported cases; for example, while overdiagnosis in (3) leads to overestimates of incidence, failure to take into account cases attending private health facilities (2) leads to underestimates. All three factors must be considered when estimating the total number of cases in a country.

Fig. 3.8 Estimated deaths from malaria per 1000 population, 2006

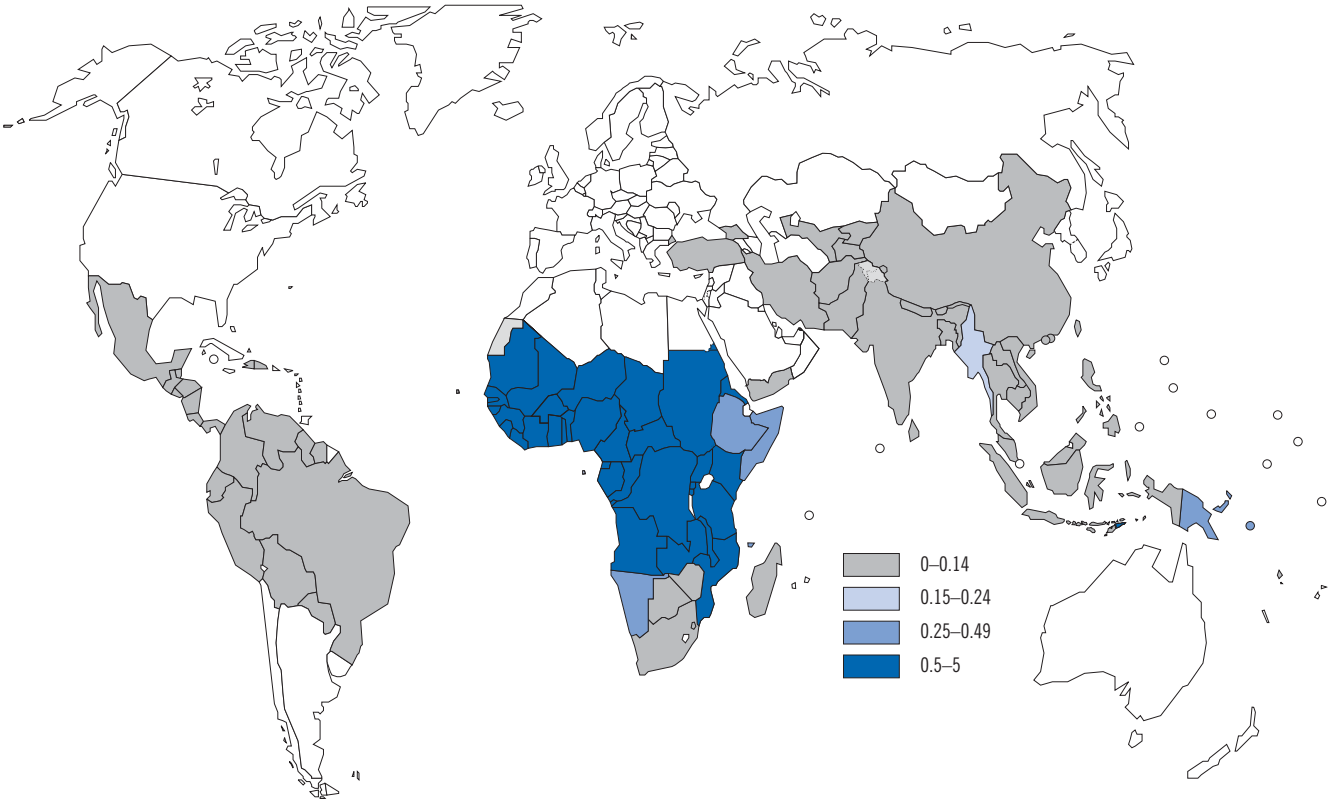


Fig. 3.9 Eighteen countries estimated to have 90% of malaria deaths in the African Region, 2006

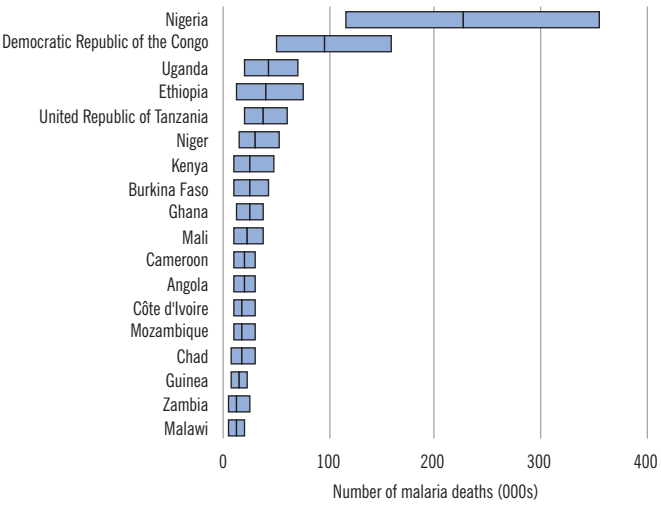
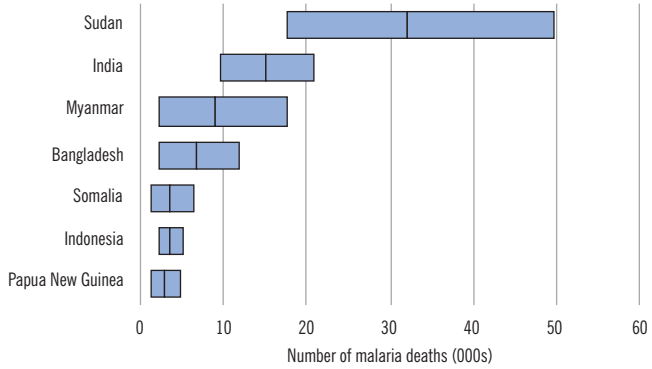


Fig. 3.10 Seven countries estimated to have 90% of malaria deaths in regions other than Africa, 2006



used in the two assessments. However, the larger estimate of the number of people at high risk obtained by Guerra et al. is partly explained by their choice of a lower threshold of 1 case per 10 000 people per year to delimit low and high risk areas. Populations living in areas with a risk of 1 case per 5 000 would be classified as high risk by Guerra et al. That previous study found a smaller number of people at low risk, partly because of the lower threshold, but also because their estimates were restricted to falciparum malaria. The new calculations presented here include *P. vivax*. In particular, they take account of the extensive geographical distribution of *P. vivax* in China. This inclusive approach is likely to overestimate the number of people at any risk of malaria because transmission becomes more patchy in areas of low incidence. To obtain more accurate estimates of risk, the distribution of malaria needs to be mapped on a fine scale, to populations of 100 000 or less.

The population at risk of malaria is, in areas of moderate or high transmission, a useful guide to the number of people who would benefit from insecticidal nets (ITNs) or indoor residual spraying (IRS), but these risk estimates are less useful in areas of low transmission where preventive methods are used more focally.

The estimates of malaria incidence in Africa given in **Annex 1** and **Table 3.1** are similar to those made by Snow et al. (210 million cases, inter-quartile range 130–325 million cases (*2*))[1] and Korenromp (230 million cases (*3*)). This is to be expected because the data and estimation procedures were similar. Snow et al. later provided a higher estimate of

[1] Note that the estimate for the WHO African Region excludes Djibouti, Somalia and Sudan.

365 million cases in Africa (*4*), using an updated endemicity map, but the range (IQR 216–374 million) still overlaps with range of estimates for *P. falciparum* here.

Incidence estimates given here for regions other than Africa are substantially lower than previously estimated by Mendis et al. (51.2 million) (*5*) and Snow et al. (150.1 million) (*4*). Previous estimates are for the mid-1990s, or employ endemicity maps derived from an even earlier period, and some of the differences could be due to real reductions in the number of cases since that time. However, the estimation methods used in previous publications have also been challenged; for example, some calculations (*3*) have given numbers for countries in the Western Pacific Region that are considered by other authorities to be too high (*6*).

Whichever combination of data and calculation methods is used, current estimates of malaria cases and deaths are surrounded by much uncertainty. The imprecision affects the estimates for each country, as well as the ranking of countries in regions.

For most countries in Africa, the number of cases and deaths was derived from approximate relationships between transmission intensity, malaria case incidence and malaria-specific mortality, based on limited data (method 2). In regions other than Africa, and for selected African countries, incidence estimates were based on routine surveillance data (method 1). This is the preferred method for all countries because it accounts for the variety of factors that influence incidence and mortality from year to year. Such information can also be readily incorporated into the planning and evaluation of malaria programmes. However, the estimates are critically dependent on the information provided to WHO by NMCPs, and on data collected in published household surveys. Estimates of the number of malaria cases are particularly sensitive to the completeness of health facility reporting. If health ministries keep accurate records of the number of surveillance reports received and expected from health facilities, then adjustments can be made for missing reports. However, if this information is not recorded accurately then the adjustments made could be inappropriate leading either to an over- or underestimate of the number of cases. The systems of disease surveillance and vital registration that provide essential data are often at their weakest in the countries most affected by malaria.

Estimates of the number of deaths in Africa are within the range estimated by Snow et al. (1.1 million deaths, inter-quartile range 700 000–1.6 million (*2*)). Estimates of the number of deaths are also broadly consistent with those obtained in the 2004 Global Burden of Disease study.[1] The main difference is that the new estimates include fewer deaths in the Western Pacific Region, principally because of the apparent reductions in mortality in Cambodia and Viet Nam (chapter 5). Mortality estimates for countries and regions include the same kinds of uncertainty as observed for case incidence estimates.

[1] www.who.int/healthinfo/bodestimates/en/index.html.

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4.

Interventions to control malaria

Adoption of policies and strategies for malaria control

Vector control

Table 4.1 and **Annex 4a** show the number of countries in each region that had adopted nine key policies and strategies for malaria control recommended by WHO. Most countries in the WHO African Region adopted, by the end of 2006, the policy of providing ITNs free of charge (33) to children and pregnant women (37), but only 16 aimed to cover the whole population at risk. Insecticidal nets are used in a high proportion of countries in the South-East Asia and Western Pacific regions, typically with free distribution to the whole population at risk. ITNs are used in relatively few countries in the other three WHO regions.

IRS is the dominant method of vector control in the European Region (8 of 9 endemic countries), with the greatest number of houses sprayed in Azerbaijan, Tajikistan and Turkey. It is used in fewer countries in the African (16 of 45) and South-East Asia regions (6 of 10) and in the Americas (12 of 22), and least in the Western Pacific Region (2 of 10).

There was little variation among the six WHO regions in the proportion of countries that said they had a strategy for managing insecticide resistance, ranging from 40% to 60% of countries in each region. A total of 53 countries and territories, among the 109 with malarious areas, claimed to have a strategy for resistance management.

Diagnosis and case management

World Health Assembly resolution WHA60.18 (May 2007) urged Member States to discourage or disallow the use of oral artemisinin-based monotherapies, in both the public and private sector; to promote the use of artemisinin-based combination therapies; and to implement policies that prohibit the production, marketing, distribution and use of counterfeit antimalarial medicines.[1]

Since 2001, a growing number of countries have adopted the policies for case management recommended by WHO. **Fig. 4.1** shows the steep upward trend in the number of countries worldwide that adopted ACT as the first-line treatment for *P. falciparum* (dark bars), albeit with a time lag until deployment of these medicines in the general health services (light bars).

ACT was the first-line treatment for *P. falciparum* in 66 countries by the end of 2006, and in almost all countries in the African, South-East Asia and Western Pacific regions. By June 2008 (the latest information available to WHO), only 4 countries and territories worldwide (Cape Verde, Dominican Republic, French Guyana and Swaziland) had

Table 4.1 Number of countries having adopted WHO-recommended policies and strategies for malaria control, by WHO region

WHO REGION	ITN			IRS			TREATMENT		IPT	
	ITN-TARGETING ALL	IT-TARGETING CHILDREN UNDER 5 YEARS AND PREGNANT WOMEN	ITN-DISTRIBUTION-FREE	IRS AS PRIMARY VECTOR CONTROL METHOD	IRS-INSECTICIDE-RESISTANCE MANAGEMENT IMPLEMENTED	DDT USED FOR IRS	ACT (YES/NO)	TREATMENT-ACT IS FREE IN PUBLIC SECTORS	IPT STRATEGY USED TO PREVENT MALARIA DURING PREGNANCY	NO. ENDEMIC COUNTRIES
Africa	16	37	33	16	23	8	40	23	33	45
Americas	12	6	5	12	9	1	8	6	0	22
Eastern Mediterranean	6	4	7	5	6	0	10	7	0	13
Europe	3	3	4	8	5	0	1	1	0	9
South-East Asia	9	6	9	6	6	3	9	8	0	10
Western Pacific	8	4	7	2	4	1	9	6	0	10
Total	**54**	**60**	**65**	**49**	**53**	**13**	**77**[a]	**51**	**33**	**109**

Data are as reported by NMCPs at the end of 2006 except for policy on ACT treatment, which has been updated to June 2008.

[a] Out of 81 countries endemic for *P. falciparum*.

[1] Further information on policies related to drug use can be found on the following web sites: www.who.int/malaria/treatmentpolicies.html; www.who.int/malaria/pages/performance/marketingmonotherapies.html; www.who.int/malaria/pages/performance/monotherapycountries.html.

Fig. 4.1 Worldwide adoption and deployment of ACT as first-line treatment for *P. falciparum*

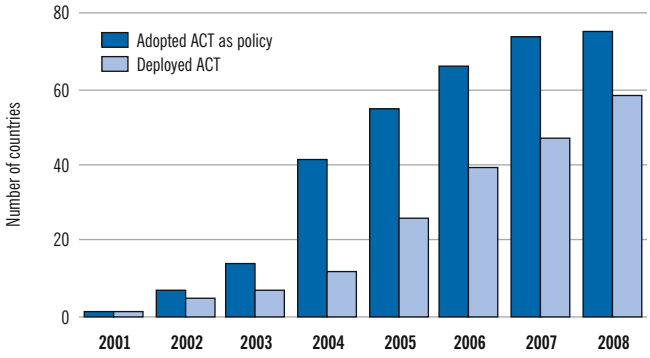
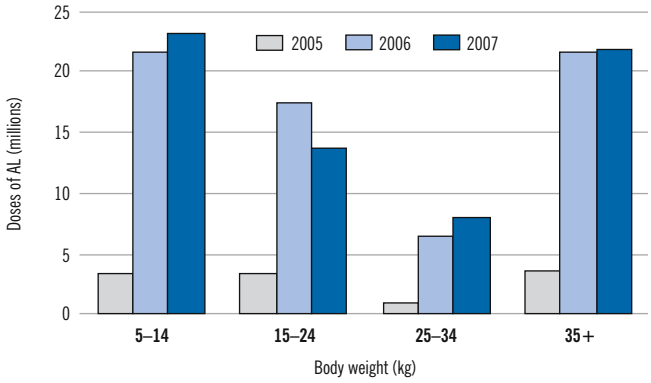


Fig. 4.2 Procurement of artemether-lumefantrine, by patient body weight (orders placed in 2005–2007)



not yet adopted ACT as the first-line treatment for P. falciparum (**Table 4.1**, **Annex 4b**). Free treatment with ACT is more widely available in the South-East Asia and Western Pacific regions than in the African Region.

Among the four recommended drug combinations that include artemisinin derivatives (chapter 2), WHO is currently monitoring the global supply of and demand for the fixed-dose combination artemether-lumefantrine (AL), as one of the requirements of a memorandum of understanding signed by the manufacturer Novartis and WHO in 2001, which makes Coartem® available at cost price through public health services. During 2006 and 2007, most AL was procured for young children below 15 kg (**Fig. 4.2**). The highest proportions of countries procuring AL in 2007 were in the African (23 of 45) and South-East Asia (5 of 10) regions. There were fewer in the Region of the Americas (2 of 22), and in the Eastern Mediterranean (4 of 13) and Western Pacific regions (2 of 10).

UNICEF and other agencies (Crown Agents, IDA Solutions, John Snow Incorporated, Medical Export Group, Médecins sans Frontières, Missionpharma, United Nations Development Programme, United Nations Office for Project Services) have established direct procurement agreements with Novartis to supply Coartem® at the price negotiated by WHO. Consequently, a declining proportion of AL was procured through WHO by 2007, as other agencies played a larger role (**Fig. 4.3**).

By 2007, a total of 40 out of 74 private companies identified by WHO had declared their intention to stop producing and marketing oral artemisinin-based monotherapies. However, only 20 of 78 countries had introduced regulatory measures that will lead to the withdrawal of monotherapy.

The quantity of antimalarial drugs needed in each country depends on whether treatment is given presumptively to all patients who present with fever, or whether malaria and the species of *Plasmodium* are confirmed by parasitological diagnosis. The proportion of people treated for malaria that have a confirmed diagnosis is low in the African Region compared with other regions of the world (**Fig. 4.4**), with the result that antimalarials, where they are available, could be used to treat patients without malaria.

Fig. 4.3 Procurement of artemether-lumefantrine, by procurement agency, 2005–2007

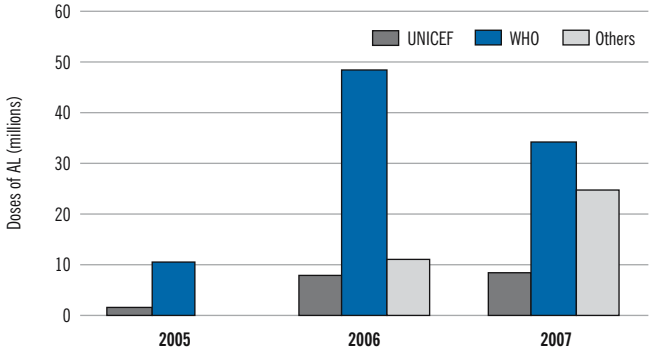
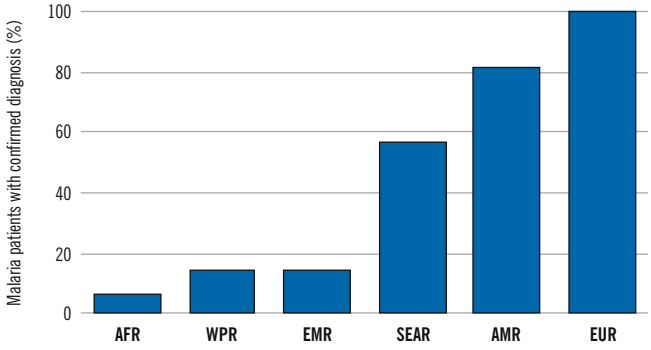


Fig. 4.4 Persons treated for malaria that have a confirmed diagnosis[a]



[a] The percentage is calculated as: (persons positive by microscopy or RDT)/(persons positive by microscopy or RDT + reported malaria cases not examined by microscopy or RDT).

Fig. 4.5 Distribution of (a) ITN other than LLIN and (b) LLIN by national malaria control programmes, in the African, South-East Asia and Western Pacific regions

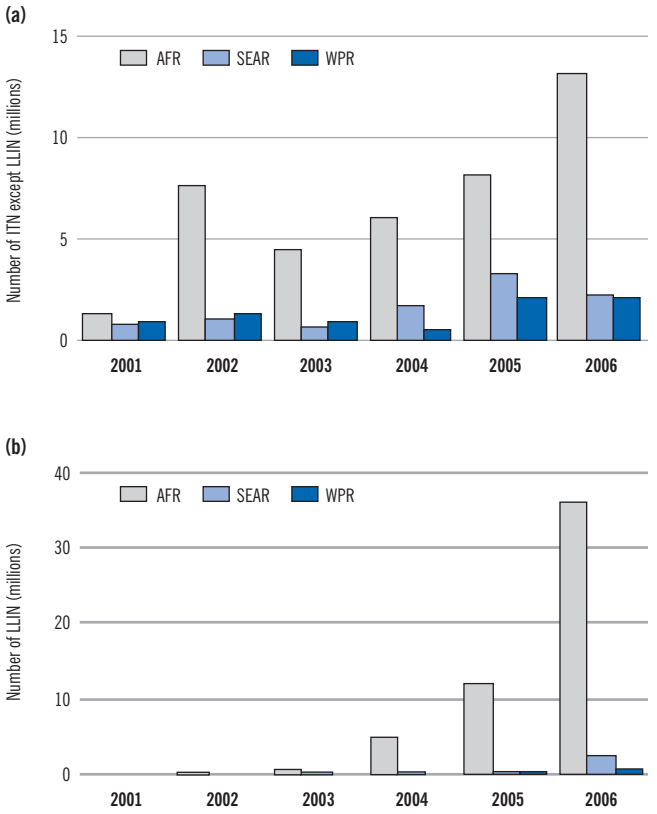
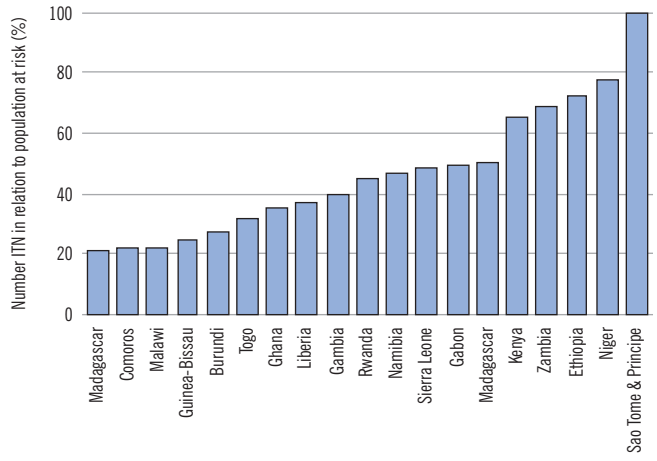


Fig. 4.6 Nineteen African countries with ITN sufficient to cover > 20% of the population at risk in 2006–2007 (NMCP data)



Intermittent preventive treatment in pregnancy

The systematic use of IPT in pregnancy is restricted to the African Region where 33 of the 45 countries had adopted IPT as national policy by the end of 2006 (**Table 4.1**).

Coverage of interventions

Distribution, possession and use of insecticidal nets

Data from national malaria control programmes

The number of ITNs (other than LLINs) distributed annually appears to have increased in the African, South-East Asia and Western Pacific regions in 2005 and 2006 (**Fig. 4.5a**). But the most striking change in the African Region is in the number of LLINs distributed from 2005 onwards, reaching 36 million in 2006 (**Fig. 4.5b**). As a result of this sharp increase, 70% of all nets distributed by NMCPs in Africa in 2006 were LLINs.

Assuming that one ITN is needed for every two people at risk (as recommended by WHO), approximately 324 (647 divided by 2) million ITNs (preferably LLINs) were needed in the African Region in 2006. NMCPs reported that 52.9 million LLINs were distributed between 2004 and 2006, and 13.2 million ITNs in 2006 (**Annex 5**). Assuming that each LLIN is effective for three years and any other ITN for one year, it may be estimated that 66.2 million people were protected in 2006.

While the recent increase in LLIN distribution in Africa is impressive, there is enormous variation in the availability of nets among countries. ITNs protected more than 20% of people at risk of malaria in only 19 African countries in 2006, and more than 50% in only 6 countries (**Fig. 4.6**).

Eight countries completed nationwide distribution of LLINs between 2004 and 2007. Ethiopia (2005–2006) and Zambia (2006–2007) targeted all households. Togo (2004), Niger (2005–2006), Rwanda (2006), Kenya (2006), Sierra Leone (2006) and Mali (2007) distributed LLINs primarily to children under 5 years and pregnant women. All except Mali and Togo appear in **Fig. 4.6**.

In regions other than Africa, ITNs are commonly targeted not at the entire population at any risk of malaria, but towards subpopulations at higher risk. For this reason, only nine NMCPs outside Africa reported ITN distribution that could have protected more than 10% of the population at risk in 2006, all in the South-East Asia and Western Pacific regions (**Fig. 4.7**). In 28 countries that reported on ITN use in 2006, the numbers of nets distributed would have protected an average of 4% of the population living in areas with any risk of malaria.

Data from household surveys

In 2006 and 2007, 22 countries carried out surveys of mosquito net ownership and use, 18 in the African Region (**Annex 6**). The 18 African countries were inhabited by 276 million people, 43% of the African population at risk of malaria. Surveys carried out in 2007 in the Democratic Republic of Congo, Nigeria and Rwanda were unpublished at the time of completing this report.

In the surveyed African countries, an average of 34%

Fig. 4.7 Nine countries in the Americas, South-East Asia and Western Pacific with ITN sufficient to cover > 10% of the population at risk in 2006–2007 (NMCP data)

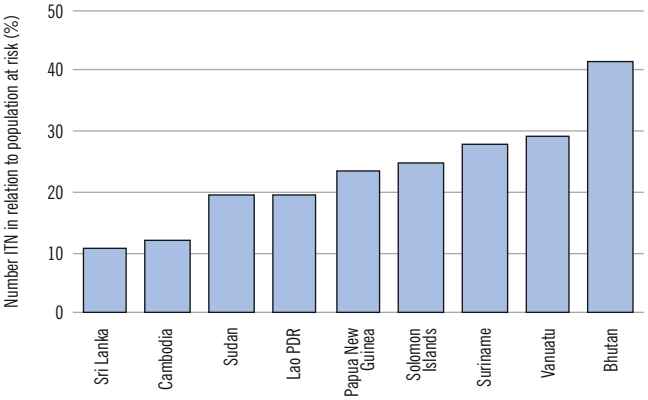
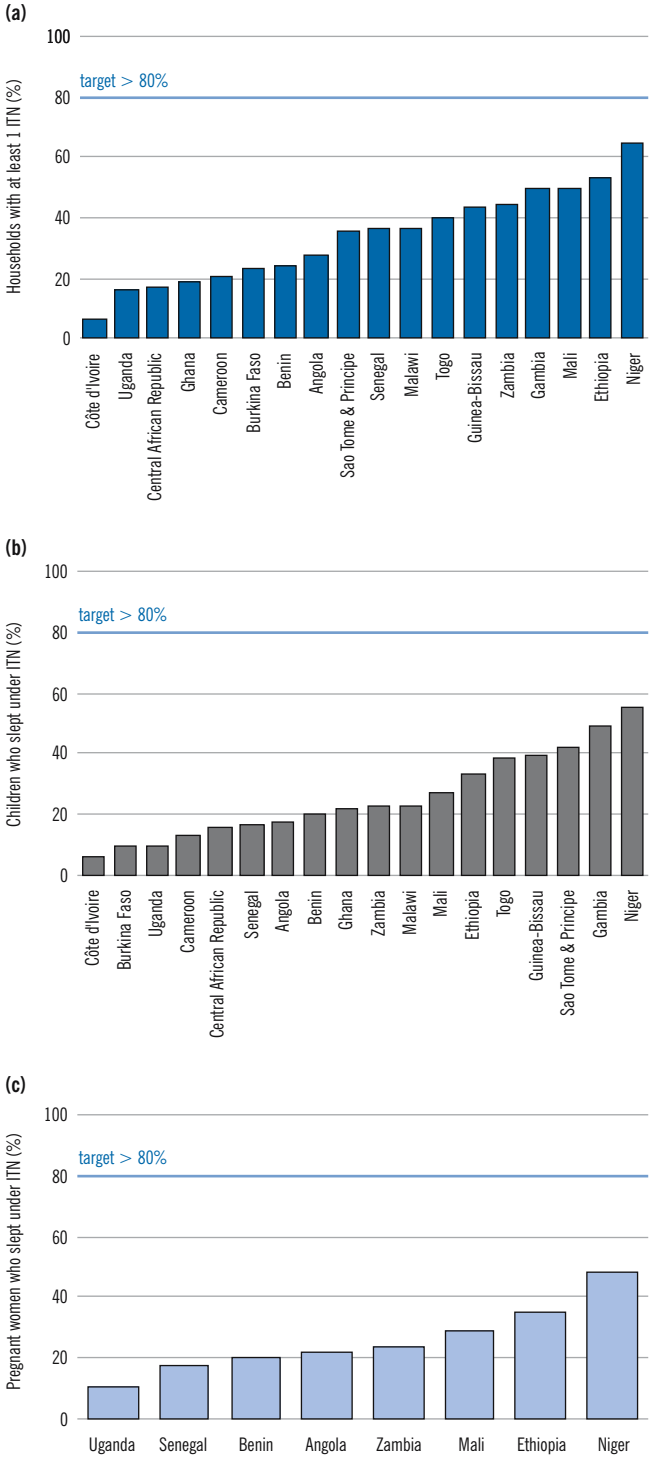


Fig. 4.8 Household surveys of (a) ITN ownership, (b) use by children < 5 years and (c) pregnant women, Africa, 2006–2007 (DHS, MICS and MIS surveys)



(mean weighted for population at risk) of households owned an ITN (18 countries). Only 23% of children slept under an ITN (18 countries), as compared with the target of ≥ 80% (chapter 2). In a smaller subset of 8 countries, an average of 27% of pregnant women slept under an ITN.

As indicated by NMCP data (above), there was wide variation among countries in ITN possession and use. The percentage of households that owned an ITN was greater than or equal to 40% in 8 countries in 2006–2007 (**Fig. 4.8a**). In the 18 surveyed countries, there was no significant difference in the proportion of households that owned an ITN in rural (26% on average) and urban areas (34%).

There were only six countries in which more than 30% of children under 5 years slept under an ITN (Ethiopia, Gambia, Guinea-Bissau, Niger, Sao Tome and Principe, and Togo), and only Niger reported that more than 50% of children slept under an ITN on the night preceding the survey (**Fig. 4.8b**). The percentage of women sleeping under an ITN in the 8 surveyed countries ranged from 10% in Uganda to 48% in Niger (**Fig. 4.8c**).

While these surveys reveal that the coverage of ITNs in African populations was nowhere near the target of 80% by 2006, consecutive surveys in selected countries show how household ownership (**Fig. 4.9a**) and usage of ITNs (**Fig. 4.9b**) increased over the preceding 6–7 years, notably in Ethiopia, Gambia, Guinea-Bissau, Sao Tome and Principe, Togo and Zambia.

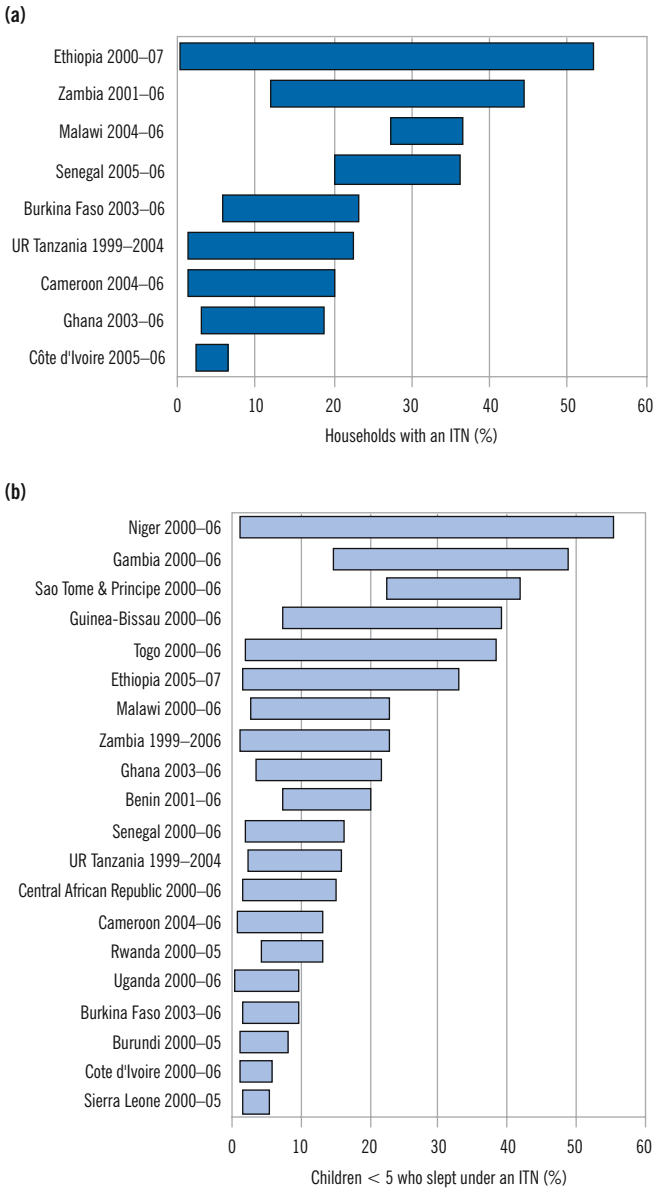
Only four countries outside the African Region did household surveys in 2006 (**Annex 6**). An ITN was owned by 18% of households in Djibouti, 12% in Somalia, 18% in Sudan and 19% in Viet Nam. The proportions of children that slept under an ITN were different, but also low: 1% in Djibouti, 9% in Somalia, 28% in Sudan and 5% in Viet Nam.

Indoor residual spraying of insecticide

Information about indoor residual spraying of insecticide comes from national malaria control programmes; IRS coverage is not recorded in household surveys.

According to NMCP data, more than 100 million peo-

Fig. 4.9 Increases in (a) household ownership of ITN and (b) the proportion of children using ITN in African countries with at least 2 surveys (DHS, MICS and MIS surveys)[a]



[a] The limits of the bars show the the coverage at earlier (left) and later (right) surveys.

ple were protected by IRS in 2006, including 70 million in India and 22 million in the African Region. IRS coverage varied greatly among countries other than India. Eleven African countries that use IRS provided information on coverage in 2006. In 9 of these, coverage would have been sufficient to protect at least 10% of the population at risk, and coverage was estimated to be over 70% in Botswana, Namibia, Sao Tome and Principe, South Africa and Swaziland (**Fig. 4.10a**).

Outside the African Region, the use of IRS tends to be more focal. Eleven countries in the other five WHO regions reported IRS coverage that would have protected more than 5% of the population at risk in 2006 (**Fig. 4.10b**). Coverage above 20% was restricted to Bhutan and Suriname.

Diagnosis and case management

Data from national malaria control programmes

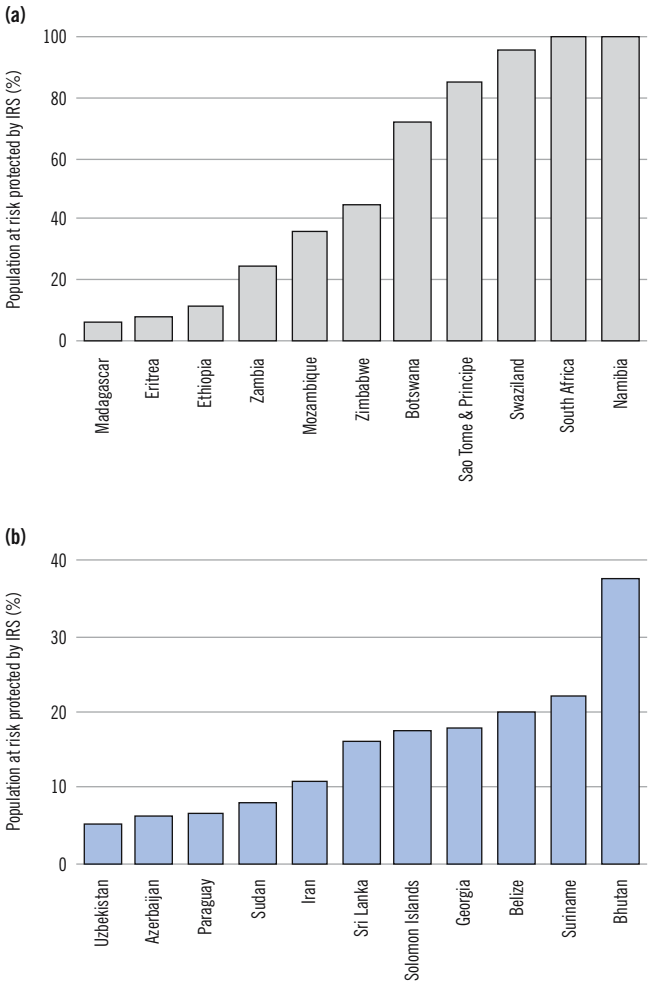
NMCPs reported the worldwide distribution of 16 million RDTs, 80 million courses of antimalarial medicine, and 49 million courses of ACT through public health services in 2006. The total number of treatment courses of antimalarial drugs delivered through public health services were 32% of an estimated 247 million cases. The reported volume of antimalarial drugs distributed increased abruptly from 2004 onwards, but the large increase in ACT distribution started in 2006 (**Fig. 4.11**). These reports from countries undoubtedly underestimate ACT usage: orders by, and deliveries to, countries for just one of the four ACTs recommended by WHO (i.e. artemether-lumefantrine) is known from other sources to have exceeded 67 million courses of treatment in 2006. Most of the other antimalarial medicines (besides ACT) are procured by wholesalers for private-sector distribution and these data are not available to NMCPs.

As with insecticidal nets, most of the drugs were reportedly distributed in a few countries in 2006. Considering drug supplies in relation to estimated malaria cases, as a measure of potential demand, the African countries best-provisioned with any antimalarial drugs in 2006 were Botswana, Comoros, Eritrea, Malawi, Sao Tome and Principe, Senegal, United Republic of Tanzania and Zimbabwe, all of which had more than one dose per case (**Fig. 4.12a**). For the provision of ACT, only Eritrea, Sao Tome and Principe, Uganda and the United Republic of Tanzania had more than one dose per case (**Fig. 4.12b**).

Prior to 2006, ACT was used to treat significant numbers of cases in just a few African countries, for example Burundi (1.2 million courses in 2005), Ethiopia (3.2 million in 2005) and Kenya (723 000 in 2005). Zambia and Zanzibar (United Republic of Tanzania) started ACT distribution in 2004, but did not report on their distribution or usage before 2006.

In regions other than Africa, 12 countries distributed more than one treatment course of antimalarial drugs per estimated case through public health services. Drug supplies in relation to malaria cases were greatest in Bhutan, Lao People's Democratic Republic, Papua New Guinea,

Fig. 4.10 Countries in (a) the African and (b) other regions where > 5% of the population at risk was protected by IRS in 2006[a]



[a] Estimates for India, Namibia and South Africa were > 100% of the population at risk.

Fig. 4.11 Rapid diagnostic tests and antimalarial drugs distributed by public health services, 2001–2006 (NMCP data)

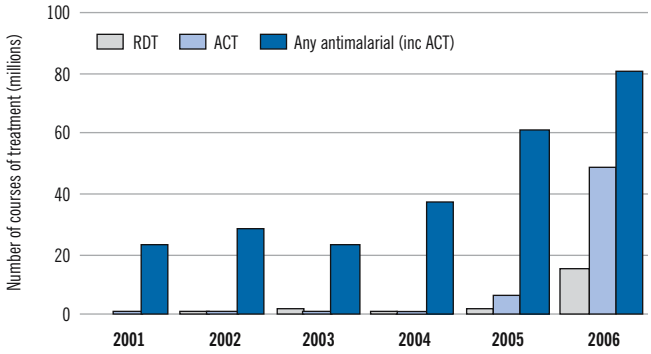
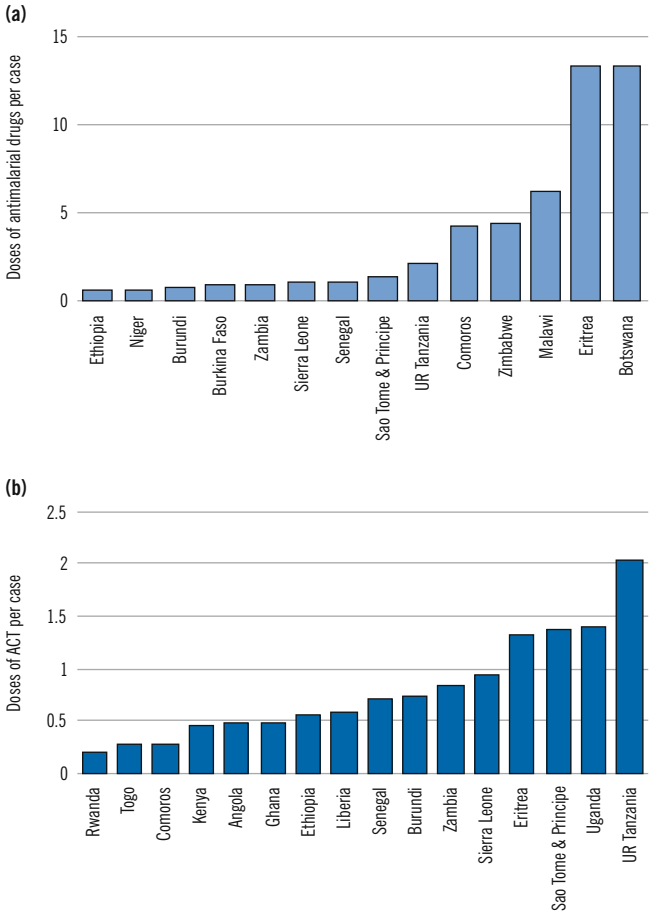


Fig. 4.12 Doses of (a) any antimalarial drug and (b) ACT, per estimated case of malaria, distributed by NMCPs in the African Region in 2006–2007 (NMCP data)



Vanuatu and Viet Nam (**Fig. 4.13**). Nicaragua and Turkey reported drug stocks greatly in excess of apparent need (**Annex 5**).

Ten African countries reported that a total of 10.8 million RDTs were distributed in 2006. The total was partitioned very unevenly among Ethiopia (9.7 million, more than 90% of the distribution in the African Region), Angola (4.9 million) and Sierra Leone (1.5 million), with fewer in Burundi, Eritrea, Kenya, Mauritania, Sao Tome and Principe, Senegal and Uganda,.

Of the 4.8 million RDTs used outside Africa, more than half were used in India (2.8 million), and fewer than 1 million in each of Bangladesh, Indonesia, Lao People's Democratic Republic, Myanmar, Papua New Guinea and Somalia.

Data from household surveys

Eighteen national household surveys were carried out in the African Region in 2006–2007. They found that less than half (average 38%) of children under 5 years with fever took an antimalarial drug, and 19% took an antimalarial on the same or the next day. Just 3% of children in the 18 countries were given ACT (at any time), and 18%

Fig. 4.13 Doses of any antimalarial drug, per case of malaria, distributed by NMCPs in regions other than Africa in 2006–2007 (NMCP data)

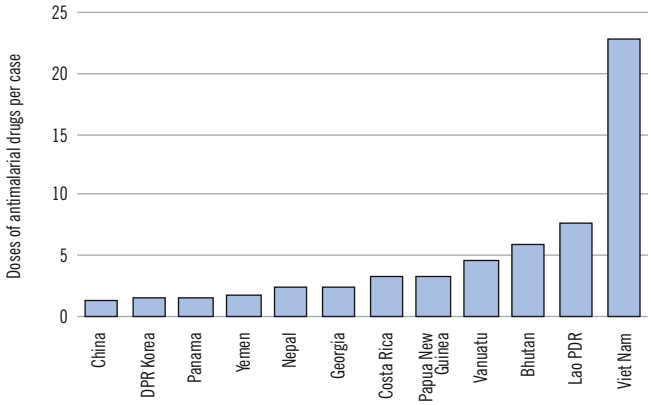


Fig. 4.14 Availability of any antimalarial drug and ACT to children with fever, 2006–2007 (DHS, MICS and MIS surveys)

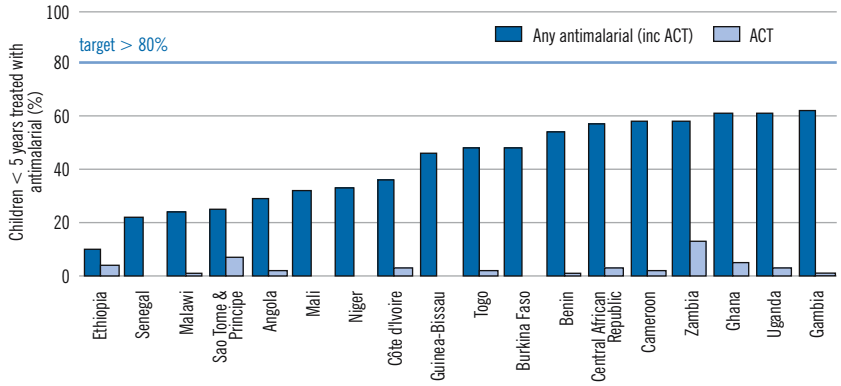
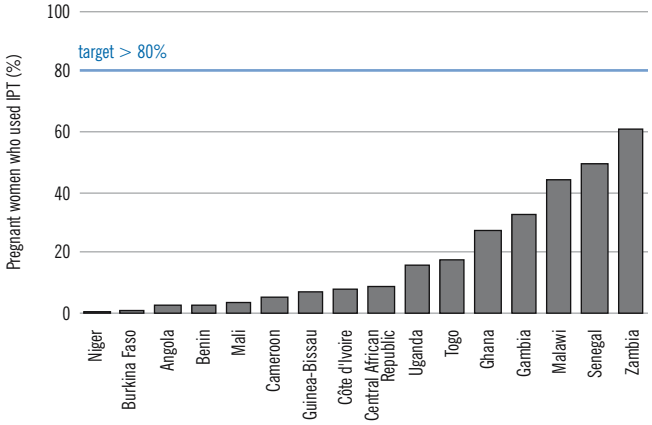


Fig. 4.15 Pregnant women who used IPT (≥ 2 doses of SP/Fansidar; DHS, MICS, and MIS surveys)



of pregnant women in 16 countries used IPT (≥ 2 doses of SP). These averages are much lower than the 80% target for all treatment indicators.

Access to treatment varied widely among the African countries surveyed. Treatment with any antimalarial drug taken at any time ranged from 10% in Ethiopia to 63% in Gambia, and with ACT from 0.1% in Gambia to 13% in Zambia (**Fig. 4.14**). Besides Zambia, only Sao Tome and Principe provided ACT to more than 5% of children with fever. The use of IPT by pregnant women in 16 countries varied from 0.3% in Niger to 61% in Zambia (**Fig. 4.15**).

Outside the African Region in 2006, only three countries undertook national household surveys (MICS) that included questions on antimalarial treatment. These few surveys found that the percentages of children < 5 years with fever who took any antimalarial drugs were 10% in Djibouti, 8% Somalia and 3% in Viet Nam.

Access to antimalarial drugs is typically better in urban than rural areas. In 41 surveys carried out worldwide between 2000 and 2007 (37 in the African Region), the proportion of children under 5 years treated with any antimalarial medicine on the same or the next day was on average 27% higher in urban than rural areas ($t = 5.7$, $p < 0.001$; **Fig. 4.16**).

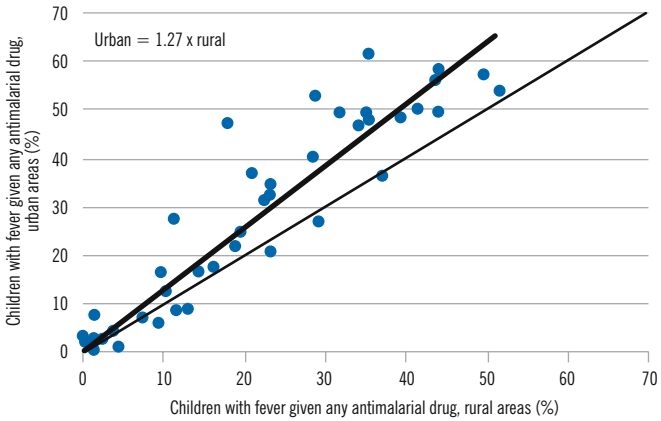
While ACT has gained wider usage since 2005, other antimalarial drugs have been available for much longer. Among 11 African countries that carried out surveys over the period 2000–2001 and then again in 2006, chloroquine use declined in 10 as expected (**Fig. 4.17a**). More surprisingly, the use of any antimalarial drugs also fell in 10 out of 13 countries (**Fig. 4.17b**). By contrast, treatment with SP did not systematically increase or decrease over this period.

Household surveys that assess the way in which malaria patients use public and private health services, used in combination with routine surveillance data, can help to define the role of NMCPs in national malaria control (**Fig. 4.18**). The proportion of patients with fever suspected of being malaria (including fever, and fever with cough and rapid breathing) using the private sector was relatively high in the South-East Asia and Eastern Mediterranean regions (78% and 62%, respectively, of all those seeking treatment), and low in the European (19%) and American regions (34%). In the African and Western Pacific regions, treatment was divided almost equally between the public and private sectors.

Funding for malaria control

According to NMCP data for 2006, the African Region had more money for malaria control than any other, and reported a greater increase in funding than any other region between 2004 and 2006 (**Fig. 4.19**; **Annex 7**). However, the total of US$ 688 million for the African Region in 2006

Fig. 4.16 Comparison of access to antimalarial drugs in urban and rural areas, 2000–2007[a]



[a] The indicator measured is the percentage of children < 5 years with fever who took any antimalarial drugs the same or next day (42 DHS, MICS and MIS surveys worldwide, 38 in the African Region).

is certainly an underestimate because reports were submitted by only 26 of 45 countries. The US$ 4.6 available per (estimated) malaria case in the 26 reporting countries is unlikely to be adequate to meet targets for prevention and cure.

Also, some countries outside Africa did not report on funding: 9 of 22 malarious countries in the Americas, 5 of 13 countries in the Eastern Mediterranean Region, and one from each of the European and Western Pacific regions did not report. Based on NMCP data, the picture of funding for malaria control worldwide is therefore incomplete.

The major sources of extra funds for African countries between 2004 and 2006 were reported to be national governments plus the Global Fund to Fight AIDS, TB and Malaria (**Fig. 4.20a**). These two sources dominated funding for malaria control worldwide in 2006, and in the African Region (**Fig. 4.20b**), but the balance of funding support was different in other parts of the world. In the Americas, the European and South-East Asia regions, the majority of funds were from the governments of endemic countries (**Fig. 4.21**). In the Eastern Mediterranean and Western Pacific regions, the Global Fund was reported to be the principal source of financial support. The Western Pacific Region placed greatest reliance on external funding, followed by the African and Eastern Mediterranean regions. Countries in the African Region presented the most diverse portfolio of support from external agencies.

Comment

Between 2004 and 2006, there were marked increases in funding, and consequently in the supplies of long-lasting insecticidal nets (LLINs) and artemisinin-based combination therapy (ACT), especially in the African Region. These increases have almost certainly continued into 2007, although WHO does not yet have complete data for that year. The growth in supply and usage of LLINs and ACT has followed the widespread adoption of policies recommended by WHO. However, the absolute levels of funding, and the

Fig. 4.17 Decline in the availability of (a) chloroquine and (b) any antimalarial drugs between 2000–2001 and 2006 (DHS, MICS and MIS surveys)

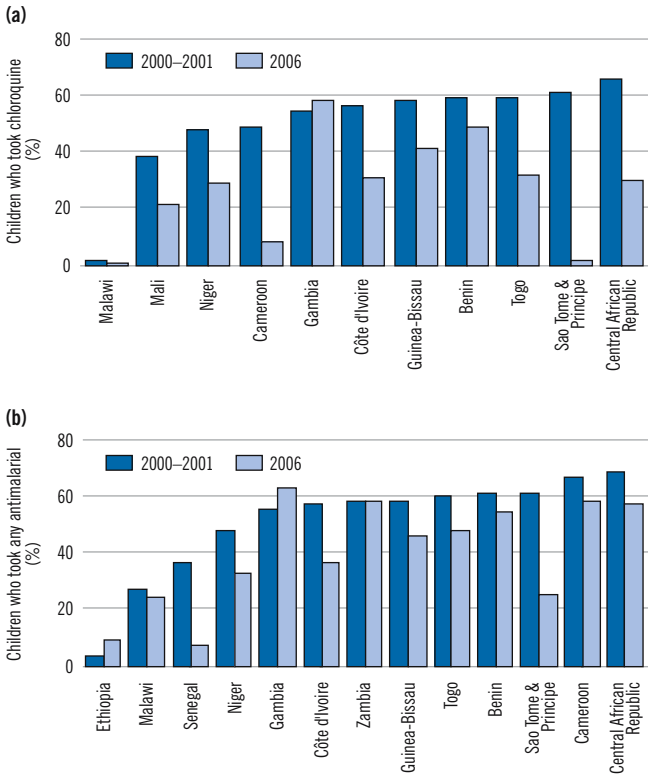


Fig. 4.18 Percentage of patients with fever that seek treatment in public and private health facilities, and who do not seek any treatment, by WHO region (data from 59 DHS and MICS surveys, weighted by estimated fever cases per country)

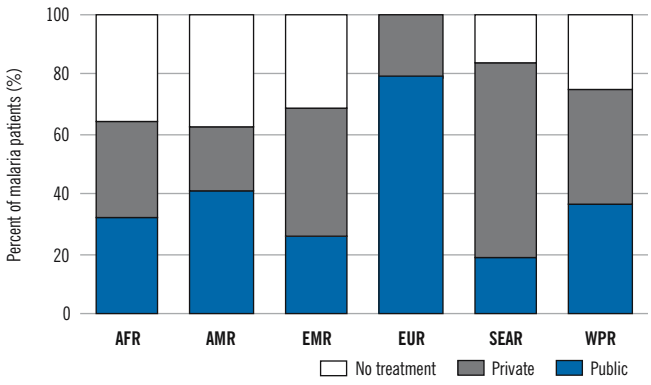
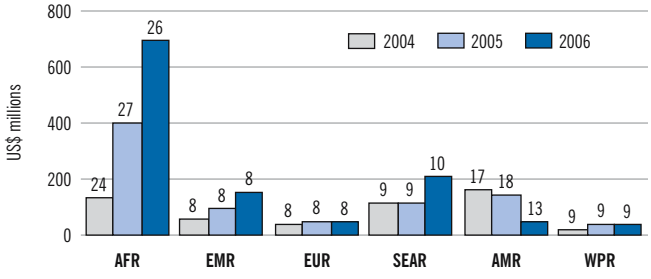


Fig. 4.19 Funds available for malaria control, by WHO region, 2004–2006 (US$ millions, NMCP data)[a]



[a] The numbers of countries submitting reports are given above each bar.

Fig. 4.20 Sources of funding for malaria control (a) in the African Region and (b) globally, 2004–2006

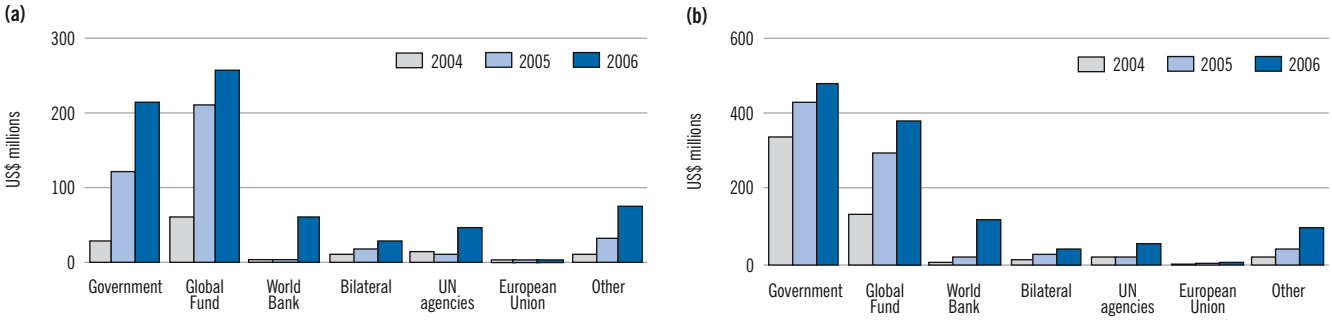
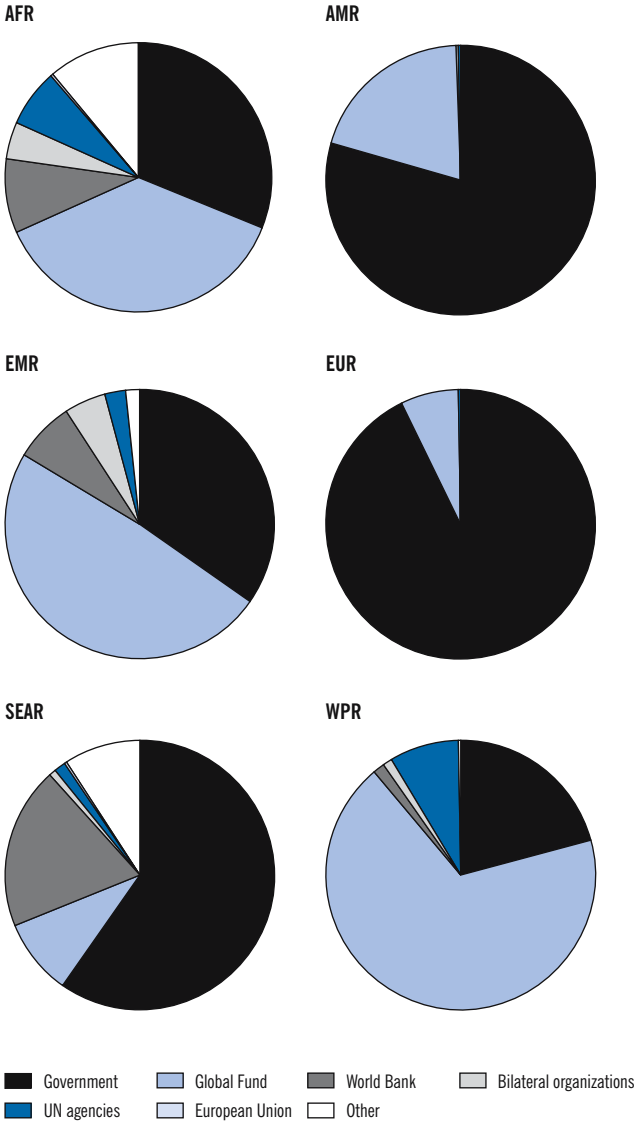


Fig. 4.21 Sources of funding for malaria control, by WHO region, 2006



total supply of the commodities required for prevention and cure, were reported to be low on average and highly variable among countries. The approach to interpreting the data differs between Africa and other regions, and the following commentary also makes that distinction.

WHO African Region

In the African Region, NMCP data suggest that an average of 26% of people living in 37 countries was protected by ITNs in 2006, with especially high coverage in Ethiopia, Niger and Sao Tome and Principe. Surveys in 18 countries (all except 1 carried out in 2006) found that one third (34%) of households owned an ITN, and that one quarter of children (23%) and pregnant women (27%) slept under an ITN (**Table 4.2**). As for the NMCP data, surveys recorded the highest coverage in Ethiopia, Niger, and Sao Tome and Principe. The Roll Back Malaria Partnership estimates that an additional 35.2 million LLINs were dispatched to countries in the African Region in 2007, and that nets covered a population of 125 million, which suggests that up to 39% of people at risk could have been protected during that year (*1*). ITNs probably protected more people in 2007 than ever before, but there was a clear and large gap between provision and need.

IRS is typically focal, even in Africa (*2*). Mozambique and Zimbabwe covered an estimated one third to one half of the population at risk, but much higher coverage was achieved in Botswana, Namibia, Sao Tome and Principe, South Africa and Swaziland.

This review of drug availability in the African Region also highlights the gap between provision and need. In 2006, only eight countries in the African region had more than one treatment course of antimalarial drugs per estimated malaria case, and only four countries had at least one treatment course of ACT per malaria case. As measures of access to treatment, these figures are no more than indicative, because many suspected malaria cases are unconfirmed and treated presumptively and because antimalarial drugs are widely available outside the public health services, from pharmacies, shops, private practitioners and other outlets (private-sector data generally not available to NMCPs). However, the impression that drug supplies were not sufficient in most countries is reinforced by household surveys done in 2006 and 2007. These

surveys found that 38% of children with fever were given any antimalarial drug from any source, and only 3% were treated with ACT.

Given the high frequency of chloroquine resistance, it is not surprising that the use of this drug diminished over the period 2000–2001 to 2006. It is more surprising that treatment with any antimalarial drug also dropped over this 5–6 year period. The household surveys offer one possible explanation: that the supply of alternative drugs (including ACT) was, by 2006, still inadequate to compensate for progressive chloroquine disuse.

Table 4.2 Intervention coverage in the WHO African Region, as compared with targets of > 80%, based on household surveys

CONTROL STRATEGY	INDICATOR	COVERAGE (%)	NO. COUNTRIES
Prompt access to effective treatment	2.1 Appropriate antimalarial treatment of children < 5 years within 24 hours of onset of fever	38% (any antimalarial, any time) 19% (any antimalarial same or next day) 3% (ACT, any time)	18 19 13
Mosquito control with insecticidal nets (ITN)	2.2 ITN ownership or use, all by children < 5 years or pregnant women	34% (households with ITN) 23% (children < 5 years) 27% (pregnant women)	19 18 8
Prevention of malaria in pregnancy	2.5 Pregnant women that received two doses of intermittent preventive therapy	18%	16

Supplies of ACT to African countries are, however, bound to increase. The reported number of courses of ACT distributed in 2006 (43 million) is lower than suggested by data from manufacturers and the main international procurement agencies, and RBM estimates that approximately 100 million doses of ACT were procured in 2006 (*1*). The difference between procurement and use can be explained by the time delay from orders in 2006 to delivery in 2007.

As with the distribution of mosquito nets, there was much variation in access to drug treatment among countries. While more than half the children in seven countries were treated with any antimalarial drug in 2006, no national household survey has yet found that 80% or more of children with fever were given appropriate drug treatment. For ACT, Zambia was among the first African countries to distribute these drugs in 2004, and yet only 13% of children were treated with ACT in 2006. And access to treatment differs, not just between countries, but also within countries. For example, household surveys show that a higher proportion of children receive antimalarial treatment in urban than in rural areas.

In summary, measures of intervention coverage based on routine data and household surveys give a consistent picture for the African Region. The evidence presented here suggests, as in another recent review (*3*), that most countries were far from meeting the targets for prevention and cure by the end of 2006. However, while summary statistics capture the gap between supply and need (**Table 4.2**), a small group of African countries has performed well on all indicators. ITN coverage is relatively good in Ethiopia, Kenya, Niger, Gambia, Madagascar, Mali, Sao Tome and Principe, and Zambia. IRS coverage is comparatively good in southern Africa (Botswana, Namibia, South Africa and Swaziland), and in Sao Tome and Principe. While access to ACT remains low almost everywhere, countries that are relatively well-provisioned with drugs include Botswana, Eritrea, Gambia, Sao Tome and Principe, Uganda, United Republic of Tanzania and Zambia. Some of these countries now have evidence that these interventions are starting to reduce malaria cases and deaths (chapter 5).

Regions other than Africa

In regions other than Africa, the effective coverage of interventions is harder to judge because prevention, either with ITNs or IRS, is often targeted to subpopulations at relatively high risk, rather than to everyone who might be exposed to malaria. The size of these targeted populations is not reported by NMCPs. In addition, the precise role of NMCPs in malaria control is not always clearly defined. For example, many patients do not seek diagnosis and treatment through public health services, especially in the South-East Asia Region. One difficulty in monitoring is that household surveys are done infrequently outside the African Region; in 2006 surveys that asked questions about coverage of antimalarial interventions were done only in Djibouti, Somalia, Sudan and Viet Nam.

Working therefore with NMCP data, ITN coverage was found to be relatively high (> 20% of the population at risk) in Bhutan, Papua New Guinea, Solomon Islands and Vanuatu. Bhutan and Solomon Islands also had comparatively high coverage of IRS, as well as Suriname (> 20% of the population at risk). And Bhutan, Lao People's Democratic Republi, Nicaragua, Turkey, Vanuatu and Viet Nam were best provisioned with antimalarial drugs (an estimate of at least four doses per case).

Based on surveys, ITN ownership was low (< 20% of households) as expected in Djibouti, Somalia and Sudan, but it was also low in Viet Nam (19%). Similarly, the proportions of children with fever that were given antimalarial treatment was 10% or less in Djibouti, Somalia and Viet Nam.

Some of the countries that reported high coverage of interventions (e.g. Bhutan, Lao People's Democratic Republic and Viet Nam) have also reported falling numbers of malaria cases and deaths. The inference, to be explored further in chapter 5, is that malaria control has had a significant impact on disease burden in these countries.

The analysis in this chapter is based on routine logistic and surveillance data from NMCPs, on household surveys, and on estimates of populations at risk and disease burden, all of which have their limitations. For example, many NMCPs do not yet have reporting systems that distinguish between procurement and delivery of ITNs, drugs and other commodities. Household surveys, although typically well designed and executed, cannot be done annually

in all countries. And most surveys are carried out during the dry season, for logistic reasons, when ITN usage is likely to be lower than in the wet season. A 2006 survey in Niger, for example, found marked seasonal variation in ITN use by children under 5 years, from 15% in the dry season to 56% in the wet season (*4*). Estimates of populations at risk of malaria, which are used to judge the coverage of IRS and ITN, may give an unduly pessimistic view of malaria control in countries where insecticidal nets and residual spraying are targeted only at high-risk populations.

Funding malaria control

Recognizing the importance of linking the coverage of interventions with programme finances, **Annex 7** compiles the first set of annual reports on funding available to NMCPs. Much information is missing from countries; there are uncertainties in the submitted data and discrepancies in information from different sources (e.g. Global Fund and World Bank as compared with NMCPs; **Annex 7**). These problems arise partly because NMCPs have no standard method of reporting on budgets and expenditures. Among other things, these data do not yet allow analysis of: (1) whether a budget meets the needs for malaria control in any country; (2) whether funds have been successfully raised against that budget; and (3) whether available funds have been effectively spent according to the proposed budget.

A cautious interpretation does, however, provide some initial insights into the financing of malaria control. Funding increased substantially in the African Region between 2004 and 2006, but was probably still far below need in 2006. Malaria control in the Americas and in the European and South-East Asia regions was funded mainly by the governments of the affected countries; and countries in the African, Eastern Mediterranean and Western Pacific regions placed greatest reliance on external support. These summary results, and the reports for specific countries, are subject to confirmation with a more detailed analysis of verified data.

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5.

Impact of malaria control

Evaluating malaria control from routine surveillance data

Where national malaria control programmes have achieved high population coverage with one or more interventions, marked reductions in cases and deaths are expected.

While the impact of malaria control can be evaluated, with greater or lesser precision, by repeated population surveys – of parasite prevalence (*1*), malaria-specific mortality (*2*), or all-cause mortality (*3*) – this brief overview draws on information from national surveillance reports. Although routine surveillance data are highly variable in quality, the annual records of cases and deaths submitted to WHO are the most abundant source of information on the effects of malaria control worldwide. Their potential in evaluation studies has not been fully exploited.

In this chapter, the nationally aggregated surveillance data are used to address three questions, country by country: (1) whether there is a significant time trend; (2) whether the trend represents underlying changes in incidence or mortality; and (3) whether the trend can be attributed to one or more specific interventions. These questions are most easily answered where case and death reports are more comprehensive and submitted with fewer delays, where a higher proportion of suspected cases is confirmed by laboratory diagnosis.

The data are of two types. The first consists of reports of numbers of outpatients and inpatients (suspected and confirmed), of laboratory tests carried out on these patients (RDT, slide positivity rate, *Plasmodium* spp), and of malaria deaths (**Annexes 1 & 3**), mainly for the period 2001–2006. Most of this information is available for most endemic countries. The second type, available in this report for selected African countries, specifies the timing and scale of interventions in relation to, and as a possible explanation for, changes in the numbers of cases and deaths. Because malaria interventions are carried out by national public health services, and not carried out as controlled experiments, the plausibility of the link between interventions and malaria trends varies from one setting to another. There at least two other possible explanations for temporal changes in the numbers of cases and deaths: variation in reporting completeness, and changes in climatic or other environmental variables that influence malaria transmission.

Impact of malaria control in the WHO African Region

The reported number of malaria outpatients increased steadily from 3.2 million in 2001 to 8.4 million in 2006. Approximately half (21 or 22 in each year) of the countries in the African Region reported inpatient cases to WHO between 2001 and 2006. Hospital admissions for malaria in these countries doubled from 1 million to 2.2 million over the same period, and malaria deaths rose from 100 504 to 258 548. The growth in cases and deaths, which is most likely due to improved surveillance or more complete records for recent years, is conspicuous in Benin, Burkina Faso, Ghana, Mozambique, Nigeria, Senegal and the United Republic of Tanzania. In Burkina Faso, Nigeria and Senegal, there were contemporary increases in the numbers of all outpatients attending health facilities, which points to improvements in reporting.

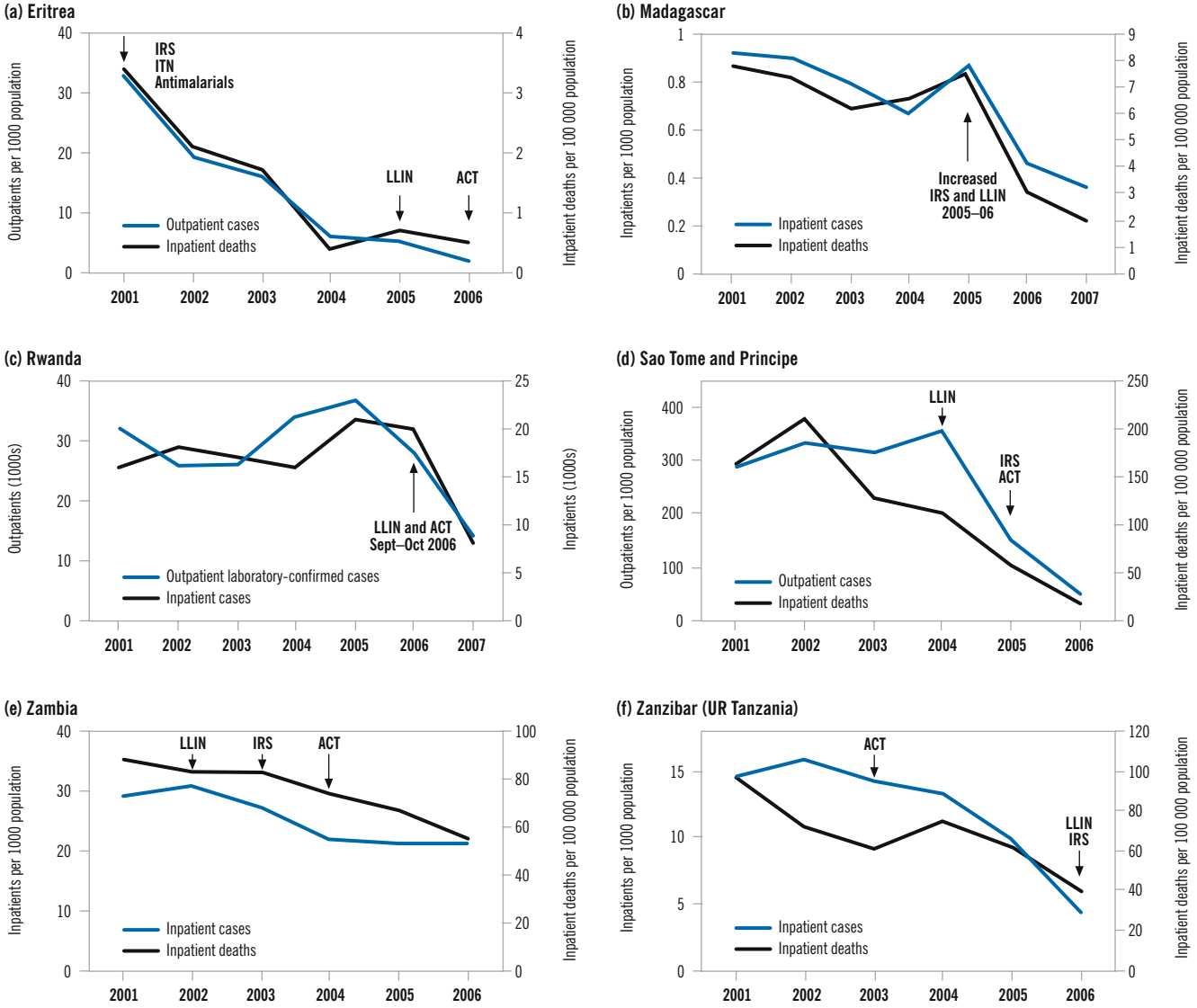
Because few African countries had achieved high coverage of interventions by 2006 (chapter 4), reductions in the malaria burden across the whole region are not expected. However, within the regionwide rise in reported cases and deaths, the following six countries/areas showed declines in morbidity and mortality, with more or less supporting evidence to suggest that the reductions were due to specific interventions.

Eritrea

Eritrea had a population of 3.8 million in 2001 and reported a total of 126 000 malaria cases in that year. By 2001 the number of reported cases had already fallen to half the number reported in 1998 (255 000), although the most recent phase of malaria control did not begin until 2000. Approximately 818 000 nets were distributed from 2001 to 2006, with LLIN distribution starting in 2005. In 2004, 73% of households in areas of high transmission owned an ITN and 58.6% of children 0–5 years slept under a net (*4*). About 250 000 courses of antimalarial medicines are distributed each year, and annual rounds of IRS have protected approximately 200 000 people between 2001 and 2006.

The number of patients admitted to hospitals for any reason increased by 38% between 2001 and 2006, but malaria inpatients of all ages declined by 64%, and the number of children under 5 years by 65% (**Fig. 5.1a**). Likewise, the number of malaria outpatients of all ages had fallen by more than 90% in 2006, and the number of reported cases in children under 5 years by 33%. Malaria deaths

Fig. 5.1 Trends in malaria cases (inpatients and outpatients) and deaths (inpatients) in relation to interventions, six African countries, 2001–2006 (NMCP data)



(inpatients) in adults and children were approximately 80% lower in 2006. Despite a doubling of the number of patients tested between 2001 and 2006, laboratory-confirmed malaria cases declined by 33% over this period. The slide positivity rate also dropped, from 43% in 2001 to 14% in 2006.

Previous, fuller investigations of malaria control in Eritrea contend that the observed declines in cases and deaths were due to these interventions and not solely to environmental or other factors (*4–6*).

Madagascar

Madagascar had a population of 17 million people in 2001, of which half were at high risk of malaria. The NMCP reported 1.4 million cases in that year. Three million ITNs (1.6 million in 2006) were distributed between 2001 and 2006, and another 3 million were distributed in 2007. Approximately 250 000 houses, protecting nearly 1.3 million people, were sprayed each year in 2005–2007. No information is available on the recent history of treatment.

As vector control has become more intensive, the total number of malaria cases reported annually has fallen. The number of cases reported in 2007 was less than half the average for 2001–2003. The number of malaria inpatients, and the number of inpatients that died, were also 40–50% lower in 2007 than in 2001–2003 (**Fig. 5.1b**). However, the total number of confirmed cases reported from Madagascar and the slide positivity rate have remained stable since 2002, and it is possible that the downward trends in **Fig. 5.1b** are due to a deterioration in inpatient reporting.

Rwanda

Two sources of data were available from Rwanda: nationwide case records for 2001–2006, as reported to WHO; and data from a special WHO study on the impact of malaria control in 2001–2007, based on information from 19 health facilities.

Approximately 765 000 ITNs (not LLINs) were distributed between 2001 and 2005 in a population of 8–9 million; 185 000 LLINs were added in 2005. During a nationwide

malaria control campaign targeting children under 5 years in 2006, a further 1.96 million LLINs were distributed. As a result, 60% of children were sleeping under an ITN by 2007 (assessed by household survey in that year). In 2006, 684 990 courses of ACT were distributed for the first time. Both LLINs and ACT were rapidly distributed nationwide during September–October 2006.

The number of outpatients attending health facilities for any reason doubled between 2001 and 2006. Suspected malaria cases (seen as outpatients) increased by 42% and laboratory-confirmed malaria cases by 50% over the same period. The number of people admitted to hospital for any reason increased by 31%, and malaria inpatients by 10%. Malaria deaths dropped by 45% during this time but deaths from all causes also fell, by 20%. Therefore, surveillance data indicated limited or no impact prior to the rapid, mass distribution of LLINs and ACT in September and October 2006.

However, malaria cases and deaths appeared to decline rapidly after the distribution of LLINs and ACT (**Fig. 5.1c**). In the 19 health facilities visited for the special study in 2007, malaria outpatients (laboratory-confirmed) and inpatients had declined by 58% and 55%, respectively, as compared with the average for 2001–2005. Whether the decline seen in the 19 health facilities reflects a trend nationwide needs to be confirmed by a more thorough examination of all surveillance data compiled up to 2007.

Sao Tome and Principe

The population of Sao Tome and Principe was 152 000 in 2006. IRS covered approximately 30 000 houses, protecting nearly 130 000 people in 2006 and in 2007 (chapter 4). The NMCP reported distributing 79 000 LLINs in 2005 and 2006, enough to protect almost everyone. The amount of ACT distributed (15 000–20 000 courses per year) should have been enough to cover all reported cases in 2006.

Compared to the average for 2001–2003, the number of confirmed malaria cases had been reduced by more than 80% by 2006 (**Fig. 5.1d**). Similarly, the number of malaria deaths reported by hospitals (inpatients) in 2006 was more than 90% lower than the previous maximum of 211 in 2002. The slide positivity rate declined from 51% in 2001 to 26% in 2005, and then to 9% in 2007. Sao Tome and Principe therefore shows a strong association between intervention and impact, albeit on a relatively small scale.

Zambia

In the context of malaria control, Zambia is unique for at least four reasons: (1) health information records from health facilities in all districts have been more or less complete since 2000; (2) a 2006 survey compared parasite prevalence and anaemia among those with and without ITNs; (3) a special study compiled data during the malaria season in the first two quarters of 2007; and (4) as part of a renewed malaria control programme, ACT has been available nationwide since 2004 (*7*).

Zambia reported 4.7 million malaria cases in 2006, a relatively high incidence of 758 per 1000 population. During 2002–2005, 1.26 million ITNs were distributed, enough to protect about 2.5 million people (assuming one net protects two people). An additional 1.2 million LLINs were distributed in 2006. The total of 2.4 million ITNs could have protected approximately 5 million people, or one third of the population in 2006. These data are consistent with the results of a 2006 survey which found that 44% of households owned an ITN, and 23% of children under 5 years slept under an ITN. IRS covered an average of 0.9 million persons between 2003 and 2005, and 2.4 million in 2006 (mostly in urban areas). During 2004–2006, 6.5 million ACT were distributed, enough to treat approximately half of the malaria cases reported through public health facilities.

Surveillance data submitted to WHO show that the numbers of malaria inpatients and deaths were 22% and 29% lower, respectively, in 2006 than the average for 2001–2003 (**Fig. 5.1e**). Both cases and deaths were falling at an average of 9% per year between 2001 and 2006. The numbers of inpatients and deaths in the first two quarters of 2007 were 31% and 37% lower, respectively, than the numbers reported in the first two quarters of 2000–2002.

These observations are consistent with the results of a 2006 national survey which found that children living in households with at least two mosquito nets had a lower prevalence of parasites and anaemia than children living in households with no ITN (*1*).

Zanzibar (United Republic of Tanzania)

Zanzibar is unique because surveillance data, plus a special study of malaria control, both suggest that a single intervention – the distribution of ACT through public health facilities – began to reduce malaria across the island from 2003 onwards.

ACT was made freely available in all public health facilities in September 2003. One round of indoor residual spraying was carried out in 2006, followed by a further two rounds in 2007, both covering nearly all households. Inpatient malaria cases and deaths declined substantially between 2003 and 2006 (**Fig. 5.1f**). The slide positivity rate also declined, from 36% in 2001 to 3% in 2006. By 2006, cases and deaths had been reduced by more than 80% in comparison with the numbers recorded in 2001 and 2002 (**Fig. 5.1f**). However, it is uncertain if the decline in malaria admissions and deaths reported nationally reflects a true decline in malaria incidence because the number of admissions and deaths from causes other than malaria follows a similar trend, which suggests a deterioration in reporting. More substantial evidence for an impact of malaria intervention comes from a detailed investigation carried out in North A District where, in children under 5 years, there were substantial reductions in *P. falciparum* prevalence, malaria-related admissions, blood transfusions, crude mortality and malaria-attributed mortality (*8*).

Fig. 5.2 Trends in reported malaria cases in selected countries, by WHO region, 1997–2006 (NMCP data)

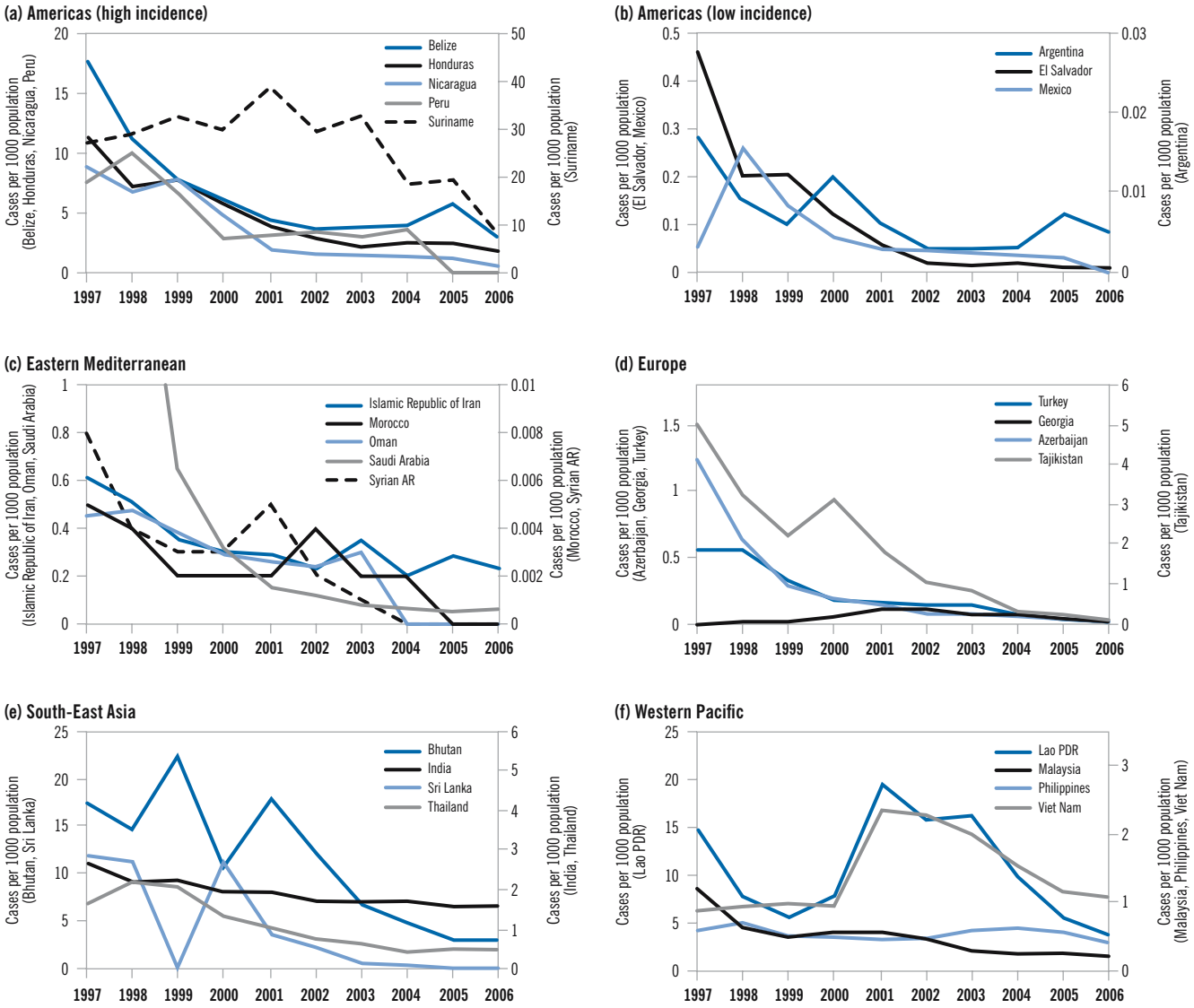
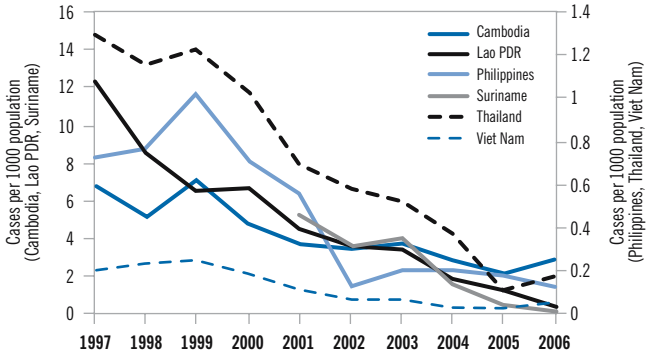


Fig. 5.3 Trends in reported malaria deaths, six countries in the Americas and the South-East Asia and Western Pacific regions, 1997–2006 (NMCP data)



Impact of malaria control in other regions

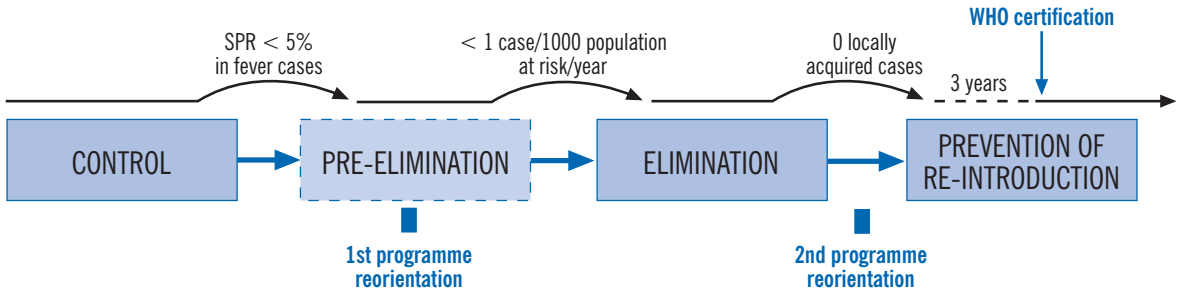
Surveillance reports for many countries outside Africa indicate that malaria declined during the decade 1997–2006. At least 25 countries across the five WHO regions (excluding Africa) show downward trends in malaria cases (**Fig. 5.2**), and malaria deaths appear to have declined in at least six countries in the Americas and in the South-East Asia and Western Pacific regions (**Fig. 5.3**).

The evidence that these downward trends represent real declines in malaria burden, which can be attributed specifically to malaria control, varies from one setting to another. Surveillance reports for most of the countries not shown in Fig. 5.2 do not clearly indicate downward trends in case incidence, for at least three possible reasons: the surveillance data are unreliable (large, unexplained annual fluctuations); surveillance has been steadily improving (more cases reported each year); and the true malaria incidence is either steady or increasing. Which of these explanations applies is generally unknown.

In the WHO Region of the Americas (AMRO/PAHO), the

[1] www.paho.org/english/ad/dpc/cd/malaria.htm.

Fig. 5.4 Steps from malaria control to elimination



SPR: slide or rapid diagnostic test positivity rate.

reduction in malaria in some countries (**Figs 5.2a & 2b**) is coincident with improved regionwide policies on malaria control. This region[1] advocates surveillance and early case detection to prevent and contain epidemics; integrated vector management; prompt diagnosis and treatment; and health system strengthening.

There is no evidence of a decline in malaria in the three countries that report the greatest numbers of cases. In Bolivia, the number of malaria cases recorded by the NMCP increased between 1997 and 2006. Despite Brazil's success in malaria control during the 1990s (*6*), the number of cases reported annually between 1997 and 2006 fluctuated around an average of approximately 500 000. A similar pattern was reported by Colombia, although the trend has been downwards since 2000.

In the WHO Eastern Mediterranean Region, the countries that have shown the greatest reductions in malaria (**Fig. 5.2c**) are those where NMCPs have strong political and financial support from the government, and which operate within health systems that are well developed at central and peripheral levels.[1] The evidence of any effect of malaria control is weakest in the six higher-burden countries: Afghanistan, Djibouti, Pakistan, Somalia, Sudan and Yemen.

In the WHO European Region, Turkey has reported the greatest number of cases since 1990, exceeding 80 000 in 1994, mainly from the south-east of the country along the borders with Iraq and the Syrian Arab Republic. The rise and fall of reported cases in Iraq, the Syrian Arab Republic and Turkey run in parallel, and appear to be linked epidemiologically. Large-scale epidemics of malaria in Central Asia, particularly in Tajikistan, followed the break-up of the former Soviet Union in 1991. Turkey and Tajikistan accounted for three quarters (74%) of cases reported from the European Region in 2006, but the case incidence in these two countries has fallen substantially since the 1990s (**Fig. 5.2d**).

As the total number of malaria cases diminished between 2001 and 2006, the slide positivity rate was falling in all countries except Uzbekistan, as was the fraction of cases due to *P. falciparum*. Transmission of *P. falciparum* is now confined to Tajikistan, mainly in the region of Khatlon. *P. falciparum* in countries other than Tajikistan is imported.

The reduction in cases in the European Region could be attributable to indoor residual spraying (IRS), the dominant method of vector control (chapter 4), combined with prompt treatment. However, there are apparently no direct analyses, country by country, of the impact of IRS and case management, which show precisely why malaria cases were falling over the 10 years to 2006.

In the South-East Asia (**Fig. 5.2e**, **Fig. 5.3**) and Western Pacific regions (**Fig. 5.2f**), recent reductions in cases and deaths have been associated with the targeted use of ITNs in Cambodia (*9*), India (*6*), Lao People's Democratic Republic (*10*) and Viet Nam (*11*), and through prompt diagnosis and effective treatment as available, for example, at local malaria clinics in Thailand.[2]

Malaria elimination

The WHO Global Malaria Programme aims not only to reduce the burden of malaria in endemic areas, but also to limit the geographical extent of malaria in the world. To achieve the second of these aims requires local elimination – the complete interruption of mosquito-borne malaria transmission in a defined geographical area (*12*).

WHO has identified four programmatic phases on the way to achieving and maintaining elimination: control, pre-elimination, elimination, and the prevention of reintroduction (**Fig. 5.4**) (*13*). Countries make the transition from control to the pre-elimination phase when less than 5% of all suspected malaria cases have a laboratory confirmation of malaria. The elimination phase begins when there is less than 1 malaria case per 1000 people at risk per year. Elimination has been achieved when the "prevention of reintroduction", without local transmission by mosquitoes, has been successful for three or more consecutive years. While the sequence of events leading to elimination is logically clear, there is no evidence yet to show that malaria elimination can be achieved and maintained in areas that currently have high transmission.

By July 2008, 10 countries worldwide were in the elimi-

[1] www.emro.who.int/rbm/index.htm.
[2] www.searo.who.int/EN/Section10/Section21.htm.
[3] Azerbaijan, Democratic People's Republic of Korea, Georgia, Islamic Republic of Iran, Kyrgyzstan, Malaysia, Mexico, Sri Lanka, Tajikistan, Turkey and Uzbekistan.
[4] China, Indonesia, Philippines, Solomon Islands, Sudan, Vanuatu and Yemen.

nation phase: Algeria, Argentina, Armenia, Egypt, El Salvador, Iraq, Paraguay, Republic of Korea, Saudi Arabia and Turkmenistan. A further 11 countries were in the pre-elimination phase,[3] and seven were attempting to establish malaria-free zones in parts of each country.[4] In January 2007, the United Arab Emirates was the first formerly endemic country since the 1980s to be certified malaria-free by WHO. The WHO European and Eastern Mediterranean regions have adopted malaria elimination as (part of) their regional strategy, following the successes in several Member States.

Comment

The most significant effects of malaria control in the African Region are detectable in countries, or parts of countries, with relatively small populations and high intervention coverage. These are Eritrea, Rwanda, Sao Tome and Principe, and Zanzibar (United Republic of Tanzania). These countries have used prevention and cure in rapid sequence or in combination, and the effects of different interventions are not easily separable. However, all 4 countries and areas appear to have cut malaria burden by 50% or more between 2000 and 2006–2007, and appear to be on course to meet WHA targets by 2010. Nationwide effects of malaria control, as judged from surveillance data, are less clear in larger countries such as Madagascar and Zambia.

In other African countries that have achieved high or early intervention coverage – Burundi (use of ACT), Ethiopia, Gambia, Kenya, Mali, Niger and Togo (widespread use of ITNs) – the expected effects on morbidity and mortality are not yet visible in routine data. The reported declines in case numbers in South Africa and Swaziland, and perhaps Namibia since 2004 (not shown in **Figs 5.2 & 5.3**), build on earlier successes achieved with indoor residual spraying (chapter 4) (*14–16*).

In many countries outside Africa, including the 25 shown in **Figs 5.2 & 5.3**, the numbers of cases and deaths reported to WHO were falling over the period 1997–2006. In some of these data, the causal links between interventions and trends are plausible, but not unequivocal, and more careful investigations of the effects of control are needed in most countries. Nevertheless, in 22 of the 25 countries, malaria cases fell by 50% or more between 2000 and 2006–2007, in line with WHA targets.

Such investigations will need to overcome the general difficulties of using surveillance data to evaluate impact, plus the problems that are specific to any region or country. Inpatient records have the advantage (over outpatient data) that a higher proportion of cases and deaths are confirmed as malaria. However in all regions except Europe, less than half of all malaria patients present to public health facilities. So downward trends in the number of inpatients, and deaths among inpatients, as recorded by NMCPs, may not represent trends in the population at large. In the African Region, a relatively small proportion of suspected malaria cases has a confirmed diagnosis, and real trends in malaria incidence may be obscured by changes in fever episodes which have a diverse set of causes. This problem will be relieved if rapid diagnostic tests (RDT) become widely available, so that confirmation of malaria prior to treatment becomes the norm (chapter 4).

In addition to their utility in evaluation, routine surveillance data provide continuous information for programme management – at national and district levels, and within health facilities. By compiling case and death records more carefully, and by analysing the results more thoroughly, surveillance will more effectively serve both purposes.

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PROFILES

30 high-burden countries

Country profiles: methods and definitions

I. Epidemiological profile

Population. The total population for each country is taken from the *World population prospects*, 2006 revision (*1*). The population size of children under 5 years of age is also given since this age group is particularly susceptible to malaria infection and disease.

Population by malaria endemicity. The country population is subdivided among three levels of malaria endemicity as reported by the national malaria control programme (NMCP):

1. Areas of high transmission, where the reported malaria case incidence from all species is 1 or more per 1000 population per year in 2006.
2. Areas of low transmission, where the reported malaria case incidence from all species is less than 1 per 1000 population per year in 2006, but greater than zero. Transmission in these areas is generally highly seasonal with or without epidemic peaks.
3. Malaria-free areas, where there is no continuing, local mosquito-borne malaria transmission, and all malaria cases are introduced (*2*). An area is designated malaria-free when no cases have occurred for several years. Areas may be malaria-free due to environmental factors or as a result of effective control efforts. In practice, malaria-free areas can only be accurately designated by national programmes taking into account the local epidemiological situation and entomological and biomarker investigations.

If an NMCP did not provide the number of people living in high- and low-risk areas, the numbers were inferred from subnational case incidence data provided by the programme.

Population at risk. The total population living in areas where malaria is endemic (low and high transmission). The population living in malaria-free areas is excluded. The population at risk is used as the denominator when calculating the operational coverage of ITN and IRS, and hence to assess current and future needs, taking into account the population already covered.

Stratification of burden. Epidemiological maps for each country are based on the malaria cases reported in 2006 at the first administrative level (province, region, state, etc.). Four levels of endemicity are depicted:

1. 100 or more cases per 1000 population per year;
2. 1 or more cases per 1000 population per year, and less than 100 cases;
3. less than 1 case per 1000 population per year but more than zero;
4. zero recorded cases.

The first two categories correspond to the high-transmission category described above. It should be noted that case incidence rates for 2006 do not necessarily reflect the endemicity of areas in previous years. If subnational data on population or malaria cases were lacking, an administrative unit was given a label of "no data" on the map. In some cases, the subnational data provided by a malaria control programme did not correspond to a mapping area known to WHO. This may be the result of modifications to administrative boundaries or the use of names not verifiable by WHO.

Vector and parasite profile. The species of mosquito responsible for malaria transmission in a county, and the species of *Plasmodium* involved, are listed according to information provided by WHO regional offices.

Estimated burden of malaria. Estimates of the number of malaria cases and deaths for 2006 are given, together with lower and upper limits. The estimates for numbers of cases are for confirmed cases, i.e. fever with parasites. Each estimate was derived by one of two methods:

1. by adjusting the malaria cases reported by countries for reporting completeness, health-facility utilization and case-confirmation rates; or
2. if the quality of case reporting was not considered sufficiently high, from an empirical relationship between measures of malaria transmission risk and case incidence.

Estimates of the numbers of deaths were derived from an empirical relationship between measures of malaria transmission risk and malaria mortality rates as produced for the *Global burden of disease 2004*, and extrapolated to 2006. Further details of the methods are given in **Annex 1**.

Reported malaria cases, deaths and admissions per 1000. Reported malaria cases are the sum of confirmed cases (confirmed by slide examination or RDT) and probable and unconfirmed

cases (cases that were not tested but treated as malaria). NMCPs often collect data on the number of suspected cases, those tested, and those confirmed. Probable or unconfirmed cases are calculated by subtracting the number tested from the number suspected (**Annex 1**). Reported malaria deaths include all deaths in health facilities that are attributed to malaria, whether or not confirmed by microscopy or by RDT. Reported malaria admissions include all malaria cases admitted to a health facility with a primary diagnosis of malaria, whether or not they are confirmed by microscopy. Malaria admissions can often be taken as a proxy for severe malaria, although it is acknowledged that in some countries uncomplicated *P. falciparum* or *P. vivax* cases may also be admitted.

Also shown are the national numbers of outpatient consultations, inpatient admissions and health-facility deaths from all causes. The numbers of all-cause consultations and deaths are useful in:

1. calculating the proportion of all outpatient and inpatient attendances attributed to malaria, or the extent to which a health system's resources are consumed by malaria; and
2. assessing whether or not trends in reported malaria cases, admissions and deaths are due to differences in reporting, or to general utilization of health facilities over time.

It may also be useful to examine the ratios between reported malaria cases, admissions and deaths to determine the proportion of cases admitted and the proportion of deaths. Such an analysis may provide an insight into the availability, accessibility and quality of care. However, in many situations the reporting systems for outpatient attendances are different to those for admissions and deaths (covering different types of health facility or with different reporting completeness fractions), which makes such comparisons difficult.

The graphs in the profiles show the number of reported malaria cases, admissions and deaths per 1000 population per year. The graph of reported case incidence also shows the estimated number of malaria cases per 1000 population per year, if the estimate was derived from the reported cases (after adjustments were made for reporting completeness, health service utilization and the extent of case confirmation, **Annex 1**). If the estimate was made from a relationship between malaria transmission risk and case incidence, estimates for years other than 2006 were not made since the method does not lend itself well to assessing change in the malaria burden over time.

If an NMCP provided an age breakdown of cases of less than and greater than or equal to 5 years of age, this is also shown. In areas of high transmission, a large fraction of cases, admissions and deaths occur in children under 5 years as compared to older ages. In areas of low transmission, the risks of malaria infection, disease and death are more uniform across age groups, which therefore show similar case rates per capita.

Slide examination, case confirmation, *Plasmodium* spp. The table shows the reported number of slides examined, the number positive and the number with a *P. falciparum* infection (including mixed *P. falciparum* and *P. vivax*). The graph shows four indicators:

1. Percentage of cases microscopically examined: this is the number of cases examined by microscope for every 100 suspected malaria cases. It indicates the extent to which a programme is able to provide diagnostic services to patients attending health facilities.
2. Percentage of cases confirmed: this is the number of confirmed malaria cases per 100 reported (probable and confirmed) malaria cases. This indicates the extent to which a country programme depends on the confirmation of malaria cases for diagnosis, treatment and epidemiological assessment.
3. Slide positivity rate (SPR): this is the number of parasitologically positive cases per 100 cases examined (by RDT or microscopically). SPR measures the prevalence of malaria parasites among those that seek care and are examined in health facilities.
4. Percentage of cases with *P. falciparum* infection: this is the number of *P. falciparum* cases per 100 microscopically-confirmed malaria cases.

II. Intervention policies and targets

This section of the profile shows the policies and strategies adopted by each country with regard to malaria prevention, diagnosis and treatment. Policies may vary according to: (1) epidemiological setting; (2) socioeconomic factors; and (3) the capacity of a national malaria programme and/or country health system. Adoption of policies does not necessarily imply immediate implementation. Nor does it indicate full and continuous implementation nationwide. Policies and strategies are divided into those recommended by WHO and those that are optional. WHO-recommended policies and strategies include (see also chapter 2):

1. provision of free or highly-subsidized LLINs to all age groups at risk of malaria (*3*);
2. use of IRS, including DDT (*4*);
3. use of IPT in highly-endemic countries with comparatively low levels of resistance to SP (*5*);
4. parasitological confirmation for all age groups;
5. banning of oral artemisinin monotherapies;
6. provision of artemisinin-based combination therapy (ACT) for malaria cases infected with *P. falciparum* free or highly subsidized in the public sector (*6*).[1]

Optional policies or strategies are policies adopted by countries taking local epidemiological and other circumstances

[1] Currently tolerability data are insufficient to recommend it for use in African children.

into account. "Yes" implies that the policy or strategy is adopted regardless of the scale of implementation; "no" implies that the policy is not adopted; and "not applicable" implies that the policy is irrelevant to the context of the country situation. The year of adoption of a policy shows the year in which the policy or strategy was approved by an NMCP, but does not take into account any change that may have occurred after the reports were received.

III. Implementing malaria control

Coverage of ITNs, from survey data. The percentage of households that own at least one mosquito net, and the percentage of children under 5 years who slept under a net, are taken from nationally representative household surveys such as the MICS, DHS and MIS. The results of subnational surveys undertaken to support local project implementation are difficult to interpret nationwide, and hence are not presented in the profiles, although they can be very useful in assessing progress locally. It should be noted that most MICS and DHS surveys are conducted during the dry season for logistic reasons, and estimates may not reflect usage during peak malaria transmission (during which ITN use may be higher).

Coverage of IRS and ITNs, from programme data. Because many countries do not have recent national survey data, NMCP data on the number of mosquito nets distributed and houses sprayed were used to estimate the operational coverage of ITNs and IRS. ITN operational coverage is calculated as the number of ITNs distributed, divided by the population at risk (sum of population living in low- and high-transmission areas) divided by two (a ratio of one ITN for every two persons, following WHO recommendations) and multiplied by 100 (*4*). On average, LLINs distributed are considered to have a useful lifespan of three years, hence the cumulative total of mosquito nets distributed over the past three years is taken as the numerator for any particular year. Other ITN are considered to have an average lifespan of one year; some nets will be effective over a longer period if retreated with insecticide. Retreatment is not taken into account in this report, and is in any case becoming less frequent with the advent of LLIN. It should be noted that such operational estimates contain no information about the geographical distribution of ITNs, or their distribution within households. ITNs may be clustered in certain subpopulations, thus depriving others at risk, and the number of ITNs delivered to a household may exceed or fall short of the recommended ratio of one net per two people.

The operational coverage of IRS is calculated as the number of people living in a household where IRS has been conducted during the preceding 12 months, divided by the population at risk (the sum of populations living in low- and high-transmission areas) multiplied by 100. Respondents were asked to convert, where necessary, records of the number of built structures sprayed to the number of households, where the average household consists of more than one structure. The number of people protected by IRS was determined by multiplying the number of households sprayed by 5 (the average household size was found to be 4.9 in an analysis of the latest DHS data from 52 malaria-endemic countries across the world; and 5.0 in 24 countries in the WHO African Region). Programme data are the most important source of information for estimating IRS coverage, as household surveys have not generally included questions on IRS. In addition, IRS is often carried out on a limited geographical scale over which nationally representative household surveys may not provide an adequate sample size for coverage to be measured accurately. The percentage of people protected by IRS measures the extent to which IRS is implemented nationwide. It should be noted that the data show neither the quality of spraying nor the geographical distribution of IRS coverage in a country, which is typically focal.

Access by febrile children to effective treatment, from survey data. Estimates of the percentage of children under 5 years with fever that were treated with antimalarial medicines, together with the type of antimalarial medicine, were obtained from nationally representative household surveys such as MICS, DHS and MIS. These estimates should be interpreted with the following provisos:

1. not all fever cases are malaria, particularly in low-transmission areas, so one may not expect 100% of febrile children to receive an antimalarial, particularly if they seek formal health care and laboratory diagnosis excludes malaria;
2. most DHS and MICS surveys are conducted during the dry season and data may not reflect the year-round incidence of malarial disease, and the provision of antimalarial treatment during the period of peak incidence;
3. it may be difficult to exclude some non-malarious areas from the analysis, and rates of antimalarial treatment compared to estimated need may appear unduly low;
4. respondents in household surveys may not recall accurately the type of medicine provided to children; the graph in the profile shows the use of any antimalarial and use of ACT. Access to ACT may also appear unduly low in countries where chloroquine is used to treat *P. vivax*, especially where *P. vivax* causes a high proportion of malaria cases. As ACT was introduced comparatively recently, surveys commonly report only on the use of any antimalarial.

Access to effective treatment, from programme data. This is estimated as the number of ACT treatment courses delivered by a national malaria control programme per 100 cases requiring treatment in a year. The number requiring treatment in a year depends not only on the incidence of malaria but also on the rate of case confirmation. In countries that confirm all cases, the number requiring treatment will equal the number of confirmed cases. In countries that do not undertake case confirmation, it will be equal to the number of fever cases suspected of being malaria. In general:

$T = F \times e \times s + (F \times (1-e))$
$= MC + (F \times (1-e))$

where:

T = the number of treatment courses required per year
F = the estimated fever cases suspected of being malaria per year
e = the proportion of suspected cases tested
s = the slide positivity rate
MC = the estimated confirmed malaria cases per year.

The graphical presentation in the country profiles makes the simple assumption that all fever cases (F) need treatment in every region of the world except Europe, where all cases are assumed to be confirmed. This is therefore a crude assessment (typically an underestimate) of the extent to which an NMCP has made effective antimalarial medicines available to those who need treatment in any given year. It should also be noted that the need is estimated across the public and private sectors and for cases to be treated in the community, whereas a national malaria control programme may focus only on supplying health facilities in the public sector. The number of ACT treatment courses delivered by the NMCP may not reflect the number of cases actually treated with ACT, particularly if medicines are held in store.

IV. Financing malaria control

Government and external financing. NMCP budgets and expenditures may be used to assess the extent to which national malaria programmes are able to maintain or scale up access to malaria prevention, diagnosis and treatment. The data shown are those reported by the national malaria control programme. The first graph shows financial contributions by source or name of agency by year. The government contribution is normally the declared government expenditure for the year. If government expenditure was not reported by a programme, the government budget was used.[1] External contributions are contributions allocated to the programme by external agencies that may or may not be disbursed. Additional information about the contributions from specific donors, as reported by the donors themselves, is given in Annex 7.

Breakdown of expenditure by intervention. The graph shows how malaria funding was spent on different activities: ITNs, IRS, diagnosis, treatment, and other programme-related expenses. Figures do not distinguish expenditures on commodities, human resources, transport and other costs involved in specific activities. All countries were requested to convert local currencies to 2006 US$. Quantities have not been adjusted for purchasing power parity. If annual plans are completed as anticipated, the amounts shown should be about the same as the total amount received by the programme. However, some divergence may occur through unexpectedly slow or fast disbursement of donor contributions or implementation, or through changes in plans, prices and other factors. There may also be differences in the completeness of data, and expenditures on the activities listed may not include all items of expenditure. Despite the various uncertainties associated with these data, the graphs are able to highlight major changes in programme funding and expenditure.

V. Sources of information

Sources of data are shown at the end of each profile. The WHO Global Malaria Programme has created an Access database containing the information used in compiling this report. The data, together with profiles for all 109 malaria endemic countries, are available from www.who.int/topics/malaria/en/.

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6. Global Malaria Programme. *Guidelines for the treatment of malaria*. Geneva, World Health Organization, 2006 (WHO/HTM/MAL/2006.1108).

[1] The government budget is not the amount required for full implementation of malaria control, but represents the amount of domestic resources allocated by a government's treasury.

Angola

Angola had an estimated 3.5 million malaria cases in 2006. Transmission occurs all year round, but is seasonal in the south. Less than half of all suspected cases are confirmed as malaria. Case and death reports were variable between 2001 and 2006 and there was no evidence of any systematic decline. Implementation of IRS, which began in 2003, is not consistent over the years. The NMCP distributed about 2.5 million LLINs in 2006 and 2007, adequate to cover only 30% of the 16 million people at risk. In the 2006–2007 survey, 33% of households had a mosquito net, but only 18% of children slept under an ITN. The programme delivered 1.7 million ACT courses in 2006 and 2.03 million in 2007. Funding increased from US$ 16 million in 2004 to over US$ 46 million in 2007, financed by the government, Global Fund, UN agencies, World Bank, bilateral agencies and others.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

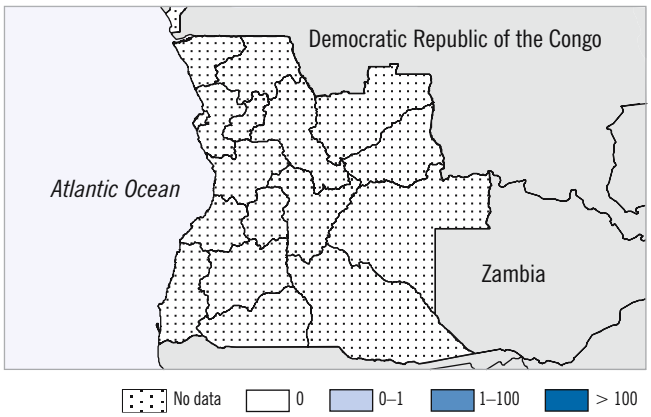
Population (000)	2006	%
All age groups	16 557	
< 5 years	3 082	19
≥ 5 years	13 475	81

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	16 557	100
Low transmission (0–1/1000)	0	0
Malaria-free (0 cases)	0	0
Rural population	7 620	46

Vector and parasite profile

Major *Anopheles* species: *arabiensis*, *coustani*, *flavicosta, funestus*, *gambiae*, *melas*, *nili, paludis*, *pharoensis*
Plasmodium species: *falciparum*, *vivax*

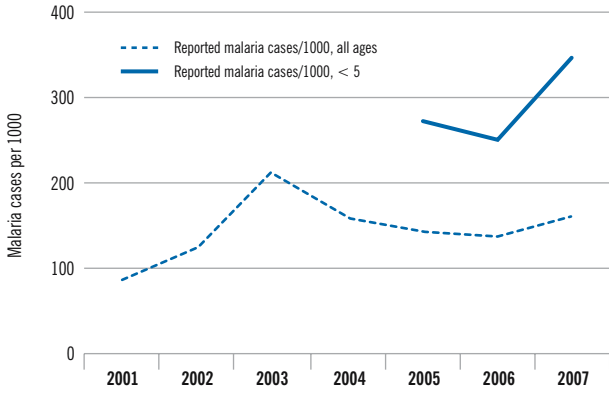
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	10 062 000	7 007 000	13 223 000	608	423	799
	< 5 years	5 300 000	1 254 000	9 833 000	1 719	407	3 190
Malaria cases	All ages	3 555 000	2 475 000	4 672 000	215	149	282
	< 5 years	1 872 000	443 000	3 474 000	607	144	1 127
Malaria deaths	All ages	21 000	12 000	32 000	1.3	0.73	1.9
	< 5 years	17 000	9 700	26 000	5.5	3.1	8.4
Malaria case-fatality rate (%)	All ages	0.59			—	—	—
	< 5 years	0.91			—	—	—

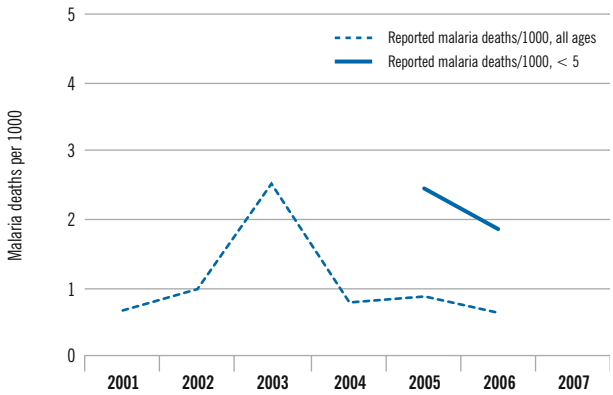
Trends in malaria morbidity and mortality

Reported malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	1 249 767	1 862 662	3 246 258	2 489 170	2 329 316	2 283 097	2 726 530
Reported malaria cases, < 5 years					815 314	770 639	1 097 783
All-cause outpatient consultations, all ages	1 971 655	2 919 857	4 293 505	3 829 317	3 608 468	3 833 556	
All-cause outpatient consultations, < 5 years							

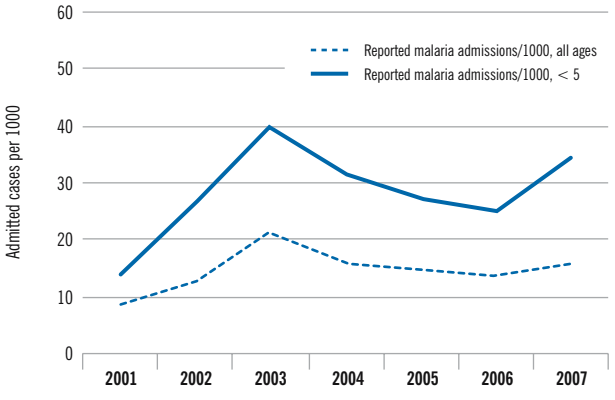
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	9 473	14 434	38 598	12 459	13 768	10 220	9 812
Reported malaria deaths, < 5 years					7 354	5 634	5 452
All-cause deaths, all ages	15 206	24 503	46 406	19 419	20 896	20 646	16 560
All-cause deaths, < 5 years					10 720		

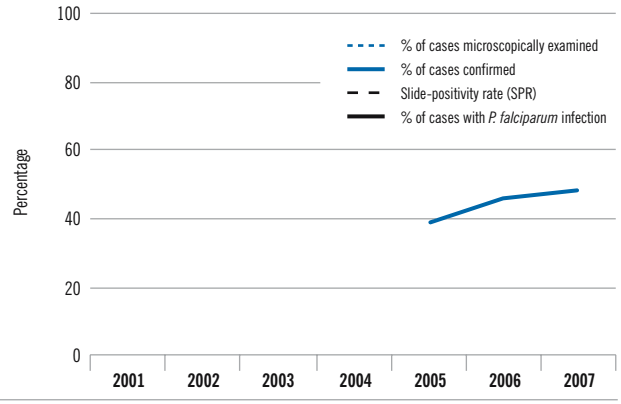
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	124 977	186 266	324 626	248 917	232 932	228 310	272 653
Reported malaria admissions (< 5)	36 307	72 102	112 913	91 039	81 531	77 064	109 778
All-cause admissions, all ages							
All-cause admissions, < 5 years							

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined							
Positive					889 572	1 029 198	1 295 535
P. falciparum							

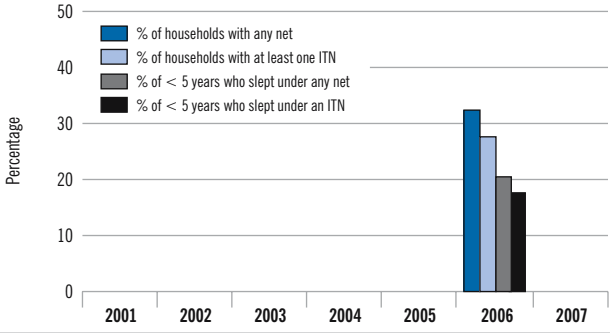
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	2001	Distribution – Antenatal care	Yes	2001
	Targeting – All age groups	No	—	Distribution – EPI routine and campaign	Yes	2005
	Targeting – Children under 5 years and pregnant women	Yes	2000			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	Yes	2005	IRS is the primary vector-control intervention	Yes	2003
				IRS is used for prevention and control of epidemics	Yes	2003
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	2003
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2005	IPT implemented countrywide	Yes	2005
Case management	ACT is free or highly subsidized in public sectors	Yes	2005	Free malaria diagnosis and first-line treatment of malaria	Yes	—
	Oral artemisinin monotherapies banned	Yes	2004	Home management of malaria	No	—
	Parasitological confirmation for all age groups	Yes	2001	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	No	—
				RDTs in areas without microscopy	Yes	2005

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AL	2006
First-line treatment of *P. falciparum* (confirmed)	AL	2006
Treatment failure of *P. falciparum*	QN(7d)	2006
Treatment of severe malaria	QN(7d)	2006
Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

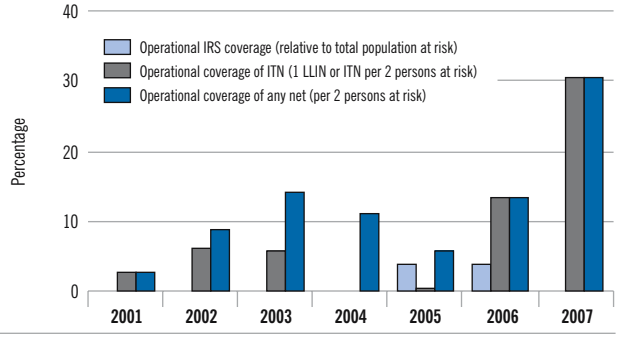
Coverage of ITN: survey data



	2001	2002	2003	2004	2005	2006	2007
% of pregnant women who slept under any net						25	
% of pregnant women who slept under an ITN						22	

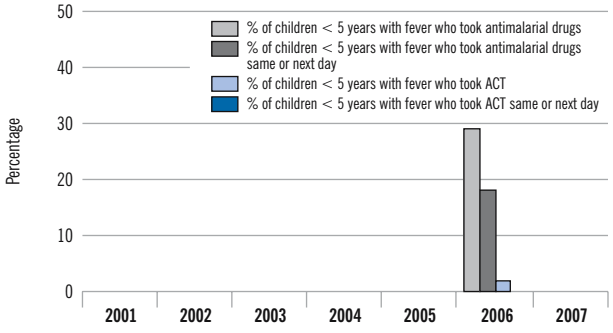
Source: MIS 2006–2007.

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS					118 000	132 436	
No. of ITNs and/or LLINs	204 600	450 000	430 000		45 889	1 051 286	1 495 165

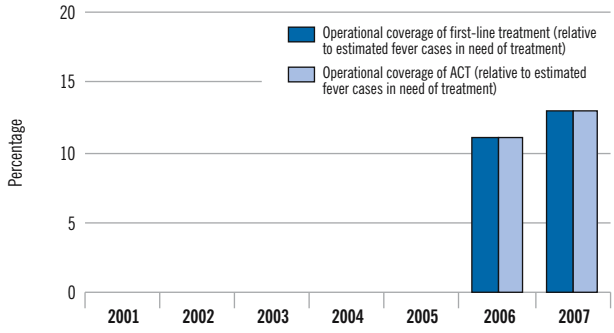
Access by febrile children to effective treatment: survey data



	2001	2002	2003	2004	2005	2006	2007
% of children < 5 years with fever	25						
% of febrile children < 5 years who sought treatment in health facility	62						

Source: MIS 2006–2007.

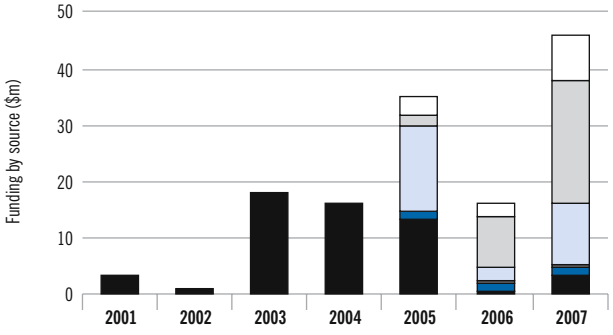
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received						1 700 000	2 031 760
No. of ACT treatment courses received						1 736 200	2 031 760

IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others					3 500 000	2 200 000	8 000 000
Bilaterals					2 100 000	9 000 000	21 500 000
European Union					0	0	
GFATM					15 107 895	2 354 259	11 011 200
World Bank					0	330 000	500 000
UN agencies					1 062 266	1 540 225	1 243 000
Gov. malaria expenditure	3 449 000	1 169 000	18 024 239	16 135 633	13 509 356	632 722	3 482 407

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	Min. Santé	Surveillance data	Insecticide-treated nets (ITN)	MIS 2006–07
Operational coverage of ITNs, IRS and access to medicines	OMS, GF, PMI	Programme report	Treatment	MIS 2006–07
Financial data	Min. Santé	Programme report	Use of health services	Imputed

Bangladesh

Bangladesh had an estimated 2.9 million malaria cases and 15 000 deaths in 2006. Although 72% of the population are at some risk of malaria, the risk is greatest in the east and north-east of the country in areas bordering India and Myanmar. The majority of suspected cases are unconfirmed; among those that are identified as malaria, more than 70% are *P. falciparum*. With large annual fluctuations in reported cases, there is no evidence of a systematic decline in malaria between 2001 and 2006. No malaria deaths were reported over this period. IRS has been used selectively; ITN coverage is also low. ACT was adopted as treatment policy in 2004, but the number of courses of treatment available in 2005 and 2006 were far fewer than the number of reported cases. Malaria control is financed mainly by government, the World Bank and the Global Fund, exceeding US$ 20 million in 2006.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

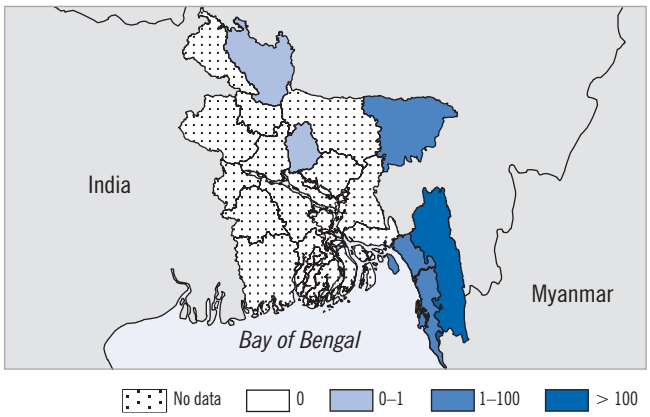
Population (000)	2006	%
All age groups	155 991	
< 5 years	18 951	12
≥ 5 years	137 040	88

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	17 868	11
Low transmission (0–1/1000)	95 403	61
Malaria-free (0 cases)	42 720	27
Rural population	116 227	75

Vector and parasite profile

Major *Anopheles* species: *dirus*, *minimus*, *philippinensis*, *sundaicus*
Plasmodium species: *falciparum*, *vivax*

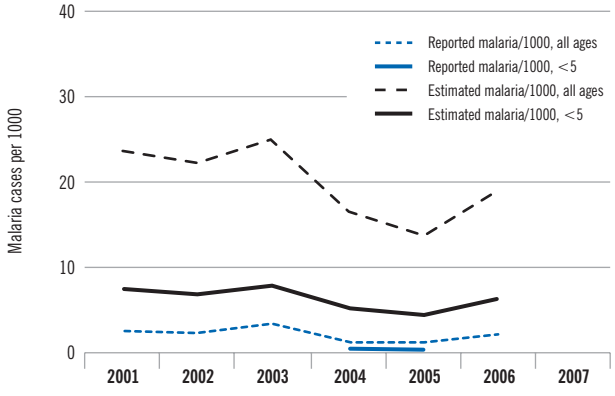
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	18 910 000	6 341 000	44 962 000	121	41	288
	< 5 years	749 000	251 000	1 782 000	40	13	94
Malaria cases	All ages	2 975 000	1 108 000	6 677 000	19	7.0	43
	< 5 years	118 000	44 000	265 000	6.0	2.0	14
Malaria deaths	All ages	6 600	2 200	12 000	0.04	0.01	0.78
	< 5 years	3 900	1 300	7 000	0.21	0.07	0.37
Malaria case-fatality rate (%)	All ages	0.22			—	—	—
	< 5 years	3.3			—	—	—

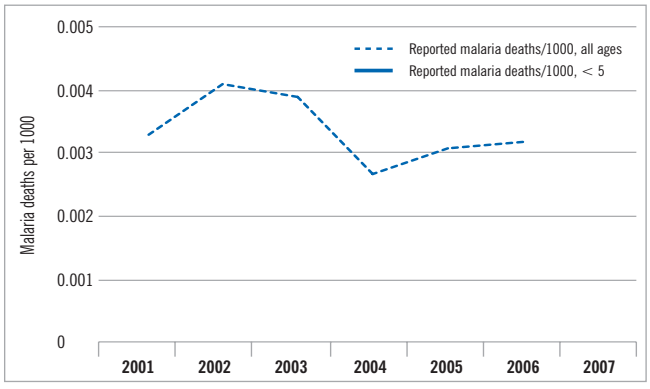
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	361 586	307 236	491 602	215 678	190 724	362 042	
Reported malaria cases, < 5 years				8 967	7 186		
All-cause outpatient consultations, all ages							
All-cause outpatient consultations, < 5 years							

Reported malaria deaths, per 1000



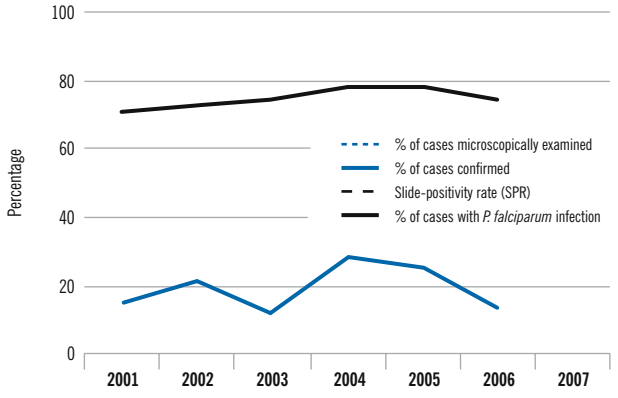
	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	470	598	574	411	481	506	
Reported malaria deaths, < 5 years							
All-cause deaths, all ages							
All-cause deaths, < 5 years							

I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000

No data

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined							
Positive	55 646	63 516	56 879	59 853	48 096	48 248	
P. falciparum	39 555	46 363	42 012	46 637	37 754	35 487	

II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	—	Distribution – Antenatal care	No	—
	Targeting – All age groups	Yes	—	Distribution – EPI routine and campaign	No	—
	Targeting – Children under 5 years and pregnant women	Yes	—			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	No	—	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	Yes	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	—
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	No	—	IPT implemented countrywide	No	—
Case management	ACT is free or highly subsidized in public sectors	Yes	—	Free malaria diagnosis and first-line treatment of malaria	Yes	—
	Oral artemisinin monotherapies banned	Yes	—	Home management of malaria	No	—
	Parasitological confirmation for all age groups	Yes	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	No	—
				RDTs in areas without microscopy	Yes	—

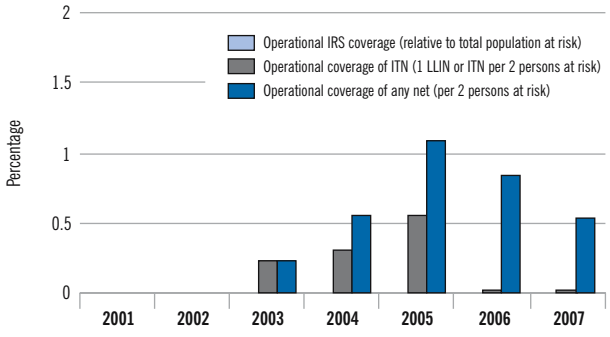
	Antimalarial medicines	Type of medicine	Year adopted
	First-line treatment of *P. falciparum* (unconfirmed)	CQ+PQ	2004
	First-line treatment of *P. falciparum* (confirmed)	AL	2004
	Treatment failure of *P. falciparum*	QN+T or d	2004
	Treatment of severe malaria	QN/AM	2004
	Treatment of *P. vivax*	CQ+PQ(14d)	—

III. IMPLEMENTING MALARIA CONTROL

Coverage of ITN: survey data

No data

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS							
No. of ITNs and/or LLINs			129 660	168 500	305 000		

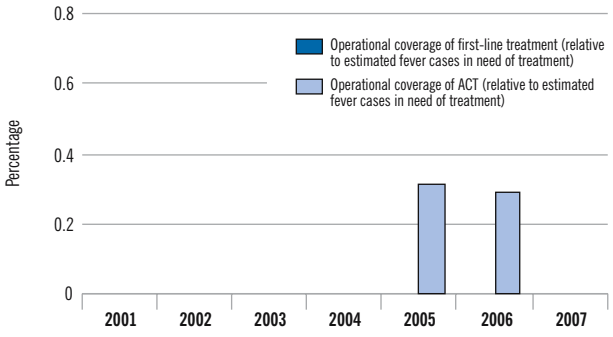
Access by febrile children to effective treatment: survey data

No data

	2001	2002	2003	2004	2005	2006	2007
% of children < 5 years with fever						26	
% of febrile children < 5 years who sought treatment in health facility						29	

Source: MICS 2006.

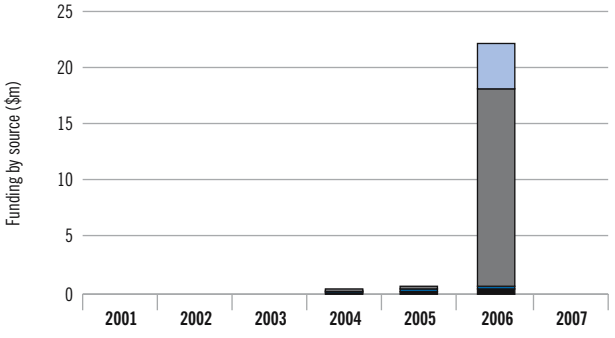
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received							
No. of ACT treatment courses received					37 754	35 448	

IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others							
Bilaterals							
European Union							
GFATM						4 107 720	
World Bank				84 000	292 000	17 445 000	
UN agencies				185 000	185 000	225 000	
Gov. malaria expenditure				65 000	68 000	360 000	

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data		Survey and other data	
Reported cases	Surveillance data	Insecticide-treated nets (ITN)	No surveys
Operational coverage of ITNs, IRS and access to medicines	Programme report	Treatment	No surveys
Financial data	Programme report	Use of health services	DHS 2004

Brazil

Brazil had an estimated 1.4 million malaria cases in 2006, over half of the total for the WHO Region of the Americas. More than 350 000 cases were reported annually over the period 2001–2007, with a maximum exceeding 600 000 in 2005. Transmission occurs mainly in the Legal Amazon Region where 10–15% of the population is at risk. Almost all reported malaria cases are confirmed, and 19% were *P. falciparum* in 2007. IRS is the principal method of mosquito control, but is applied sporadically. The last round of IRS was in 2005. There is no national policy on the use of ITNs. First-line antimalarial drugs are apparently sufficient to treat all reported cases, and ACT was introduced in 2007. Funding for malaria control increased to more than US$ 100 million in 2006, provided exclusively by the government.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

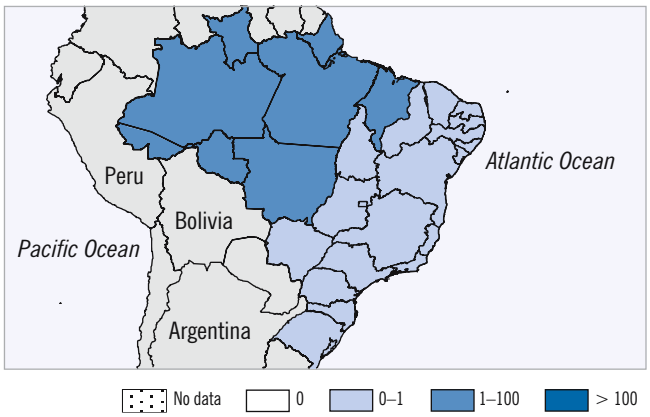
Population (000)	2006	%
All age groups	189 323	
< 5 years	18 092	10
≥ 5 years	171 231	90

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	23 928	13
Low transmission (0–1/1000)	0	0
Malaria-free (0 cases)	165 395	87
Rural population	28 883	15

Vector and parasite profile

Major *Anopheles* species: *albitarsis*, *albimanus*, *darlingi*, *nuneztovari*
Plasmodium species: *falciparum*, *vivax*

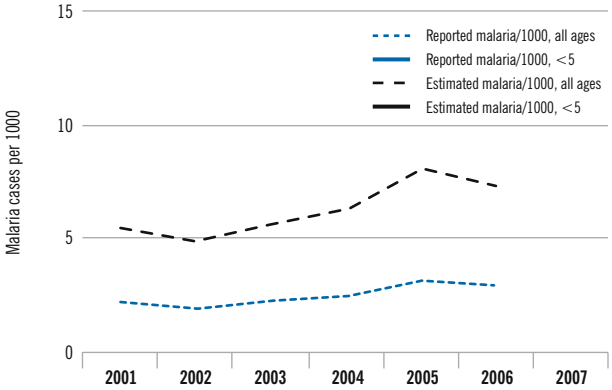
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	11 195 000	6 874 000	15 833 000	59	36	84
	< 5 years					—	—
Malaria cases	All ages	1 379 000	1 018 000	1 770 000	7.0	5.0	9.0
	< 5 years					—	—
Malaria deaths	All ages	1 000	630	1 500	0.01	0.00	0.01
	< 5 years	280	170	410	0.02	0.01	0.02
Malaria case-fatality rate (%)	All ages	0.07			—	—	—
	< 5 years				—	—	—

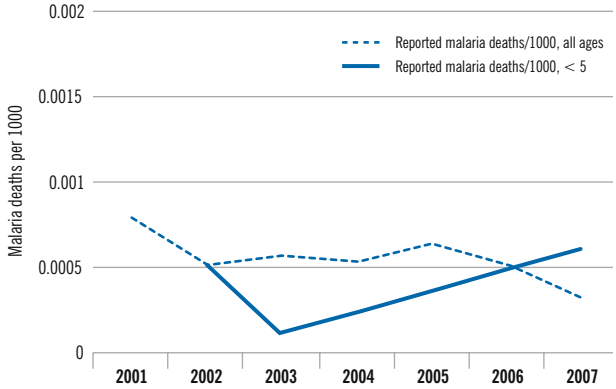
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	388 303	348 259	408 821	464 602	603 026	549 184	458 041
Reported malaria cases, < 5 years							53 763
All-cause outpatient consultations, all ages							973 195 070
All-cause outpatient consultations, < 5 years							

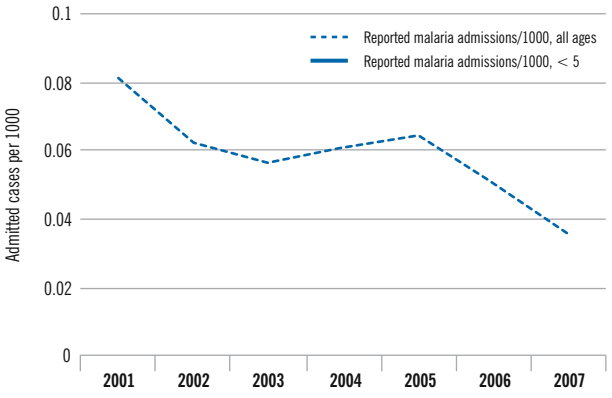
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	142	93	103	100	122	97	64
Reported malaria deaths, < 5 years		9	2				11
All-cause deaths, all ages	961 492	982 807	1 002 340	1 024 073	1 006 827	1 001 419	855 014
All-cause deaths, < 5 years							42 516

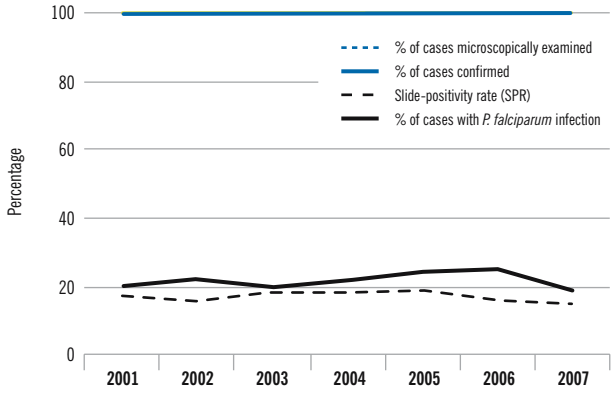
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	14 326	11 158	10 291	11 287	12 028	9 470	6 736
Reported malaria admissions (< 5)							901
All-cause admissions, all ages						11 337 831	11 299 863
All-cause admissions, < 5 years							1 356 404

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined	2 274 610	2 118 491	2 269 359	2 584 397	3 196 788	3 504 379	2 979 566
Positive	388 303	348 259	408 821	464 602	603 026	549 184	458 041
P. falciparum	77 549	76 337	83 765	104 287	146 815	136 837	88 249

II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/No	Year adopted	Policy/strategy	Yes/No	Year adopted
Insecticide-treated nets (ITN)	Distribution – Free	Yes	2007	Distribution – Antenatal care	No	—
	Targeting – All age groups	Yes	2007	Distribution – EPI routine and campaign	No	—
	Targeting – Children under 5 years and pregnant women	No	—			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	Yes	2004	IRS is the primary vector-control intervention	Yes	—
				IRS is used for prevention and control of epidemics	Yes	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	—
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	No	—	IPT implemented countrywide	No	—
Case management	ACT is free or highly subsidized in public sectors	Yes	2006	Free malaria diagnosis and first-line treatment of malaria	Yes	—
	Oral artemisinin monotherapies banned	Yes	2007	Home management of malaria	No	—
	Parasitological confirmation for all age groups	Yes	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	No	—
				RDTs in areas without microscopy	Yes	2005

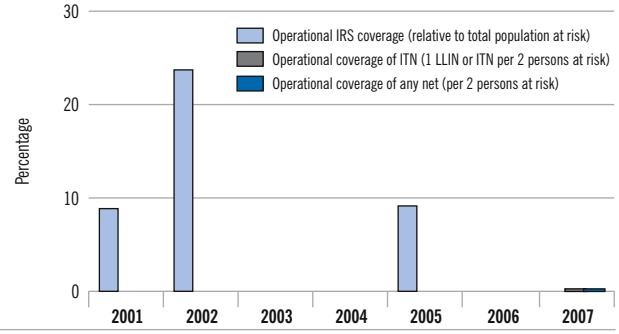
Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	—	2006
First-line treatment of *P. falciparum* (confirmed)	AL	2006
Treatment failure of *P. falciparum*	—	2006
Treatment of severe malaria	AS or AM or QN	2006
Treatment of *P. vivax*	CQ+PQ(7d)	—

III. IMPLEMENTING MALARIA CONTROL

Coverage of ITN: survey data

Not applicable

Coverage of IRS and ITN: programme data

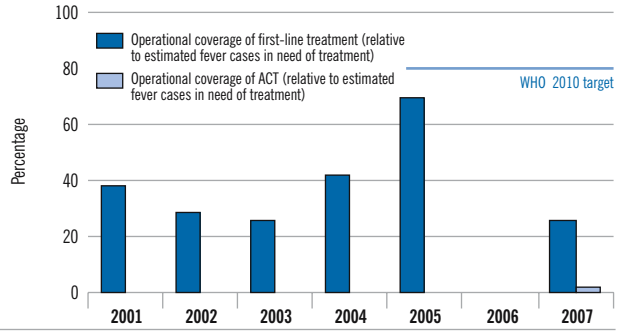


	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS	400 000	1 071 340			437 417		
No. of ITNs and/or LLINs							10 000

Access by febrile children to effective treatment: survey data

Not applicable

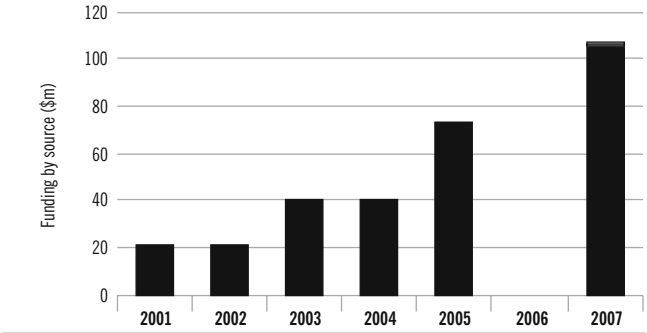
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received	665 253	504 563	457 136	744 099	1 223 538		458 041
No. of ACT treatment courses received							35 382

IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others							125 000
Bilaterals							0
European Union							0
GFATM							0
World Bank							350 000
UN agencies							0
Gov. malaria expenditure	21 517 299	21 411 765	40 695 955	40 695 955	73 469 000		10 600 000

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	PAHO MCQ	Surveillance data	Insecticide-treated nets (ITN)	No surveys
Operational coverage of ITNs, IRS and access to medicines	PAHO MCQ	Programme report	Treatment	No surveys
Financial data	PAHO MCQ	Programme report	Use of health services	DHS 1996

Burkina Faso

Burkina Faso has around 3% of all malaria cases in the WHO African Region. Malaria is endemic in the southern third of the country, occurring seasonally between December and April. Almost all cases are caused by *P. falciparum*, though most are unconfirmed despite recent improvements in diagnostic services. The numbers of reported cases and deaths have increased in recent years; it is not known if this reflects a real increase in malaria burden or improved reporting. The NMP distributed approximately 800 000 ITNs in 2005 and 2006, of which 520 000 were LLINs. This is far below the number needed to protect 14 million people at risk. IRS is not a national policy. The NMP reported delivery of 811 507 ACT courses only in 2007, inadequate to cover all estimated cases in need of treatment. Malaria control has been funded mainly by the government, the Global Fund and the World Bank.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

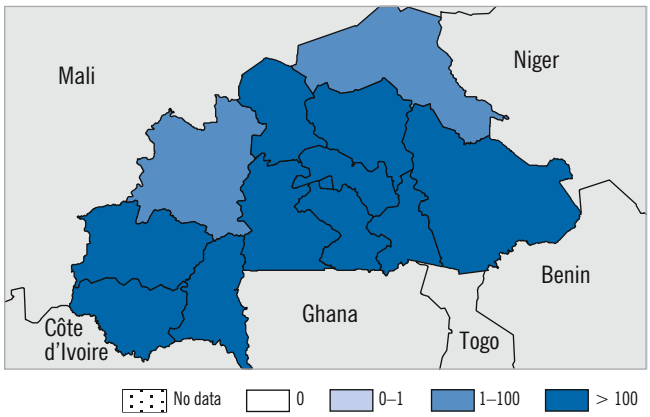
Population (000)	2006	%
All age groups	14 359	
< 5 years	2 605	18
≥ 5 years	11 754	82

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	14 359	100
Low transmission (0–1/1000)	0	0
Malaria-free (0 cases)	0	0
Rural population	11 679	81

Vector and parasite profile

Major *Anopheles* species: *arabiensis*, *brochieri*, *coustani*, *flavicosta, funestus*, *gambiae*, *hancocki*, *nili, paludis*, *pharoensis*
Plasmodium species: *falciparum*, *vivax*

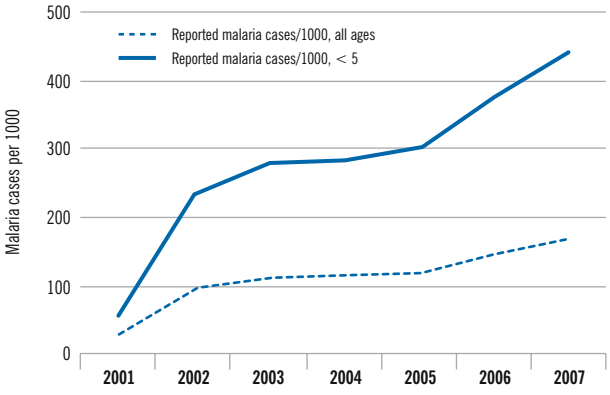
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	23 015 000	12 001 000	34 724 000	1 603	836	2 418
	< 5 years	14 013 000	2 343 000	27 055 000	5 380	899	10 386
Malaria cases	All ages	6 227 000	3 247 000	9 394 000	434	226	654
	< 5 years	3 791 000	634 000	7 320 000	1 455	243	2 810
Malaria deaths	All ages	26 000	12 000	43 000	1.8	0.84	3.0
	< 5 years	25 000	12 000	42 000	9.6	4.6	16
Malaria case-fatality rate (%)	All ages	0.42			—	—	—
	< 5 years	0.69			—	—	—

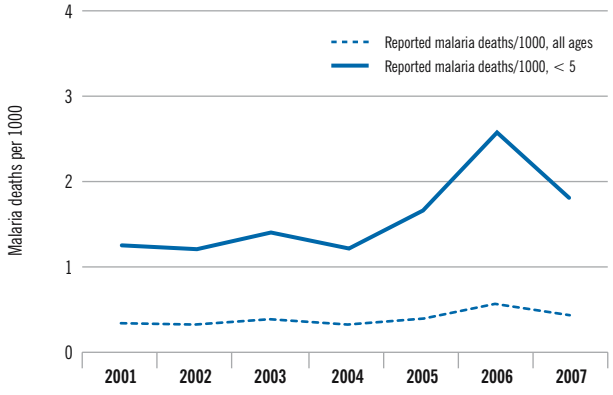
Trends in malaria morbidity and mortality

Reported malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	352 587	1 188 870	1 443 184	1 546 644	1 615 695	2 060 867	2 487 633
Reported malaria cases, < 5 years	124 403	546 940	671 643	701 935	770 986	977 988	1 180 926
All-cause outpatient consultations, all ages	2 604 791	3 753 393	4 402 278	4 462 249	5 346 113	5 307 006	6 108 633
All-cause outpatient consultations, < 5 years	1 071 939	1 519 812	1 810 555	1 791 775	2 035 035	2 366 588	2 336 670

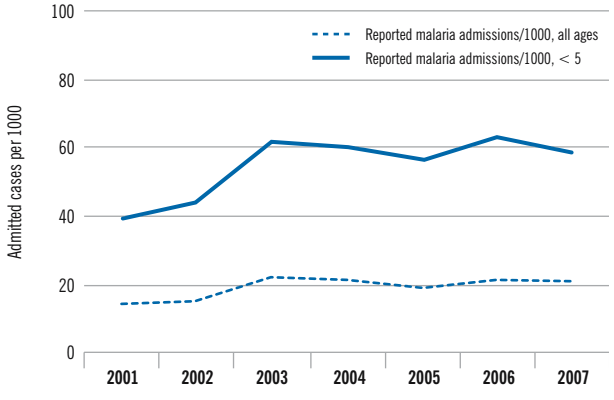
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	4 233	4 032	4 860	4 205	5 224	8 083	6 472
Reported malaria deaths, < 5 years	2 878	2 883	3 387	3 021	4 189	6 762	4 865
All-cause deaths, all ages	13 120	10 357	14 454	14 726	13 932	15 563	10 193
All-cause deaths, < 5 years	6 388	4 400	7 445	7 139	7 412	8 968	5 623

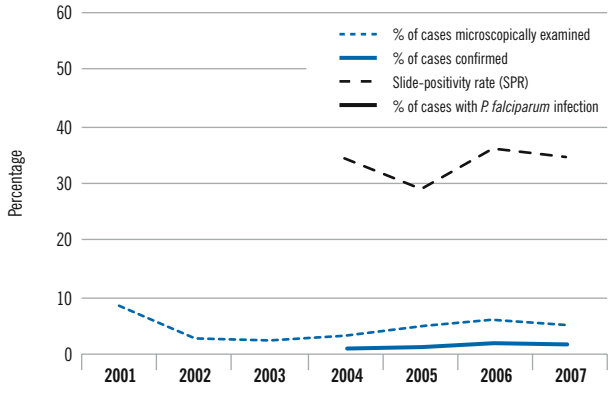
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	167 654	192 587	286 464	284 578	261 927	306 392	306 747
Reported malaria admissions (< 5)	90 531	104 298	150 373	148 024	141 839	163 451	156 287
All-cause admissions, all ages	218 215						627 070
All-cause admissions, < 5 years							

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined	30 006	32 796	31 256	52 874	73 262	122 047	127 120
Positive				18 256	21 335	44 265	44 246
P. falciparum							

II. INTERVENTION POLICIES AND TARGETS

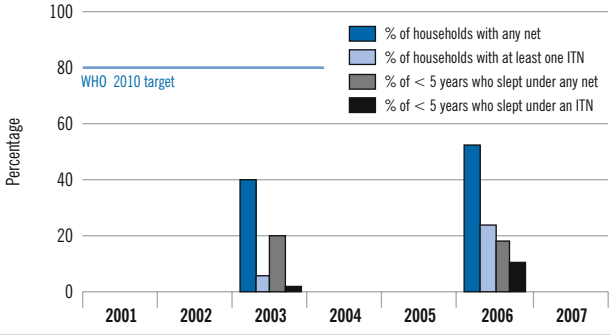
Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution – Free	Yes	2004	Distribution – Antenatal care	Yes	2005
	Targeting – All age groups	Yes	1998	Distribution – EPI routine and campaign	Yes	
	Targeting – Children under 5 years and pregnant women	Yes	2004			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	Yes	1998	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	No	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	No	—
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2005	IPT implemented countrywide	Yes	2006
Case management	ACT is free or highly subsidized in public sectors	No	—	Free malaria diagnosis and first-line treatment of malaria	No	—
	Oral artemisinin monotherapies banned	Yes	2005	Home management of malaria	Yes	1998
	Parasitological confirmation for all age groups	Yes	1998	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	No	—
				RDTs in areas without microscopy	No	—

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AL	—
First-line treatment of *P. falciparum* (confirmed)	AL	—
Treatment failure of *P. falciparum*	QN(7d)	—
Treatment of severe malaria	QN(7d)	—
Treatment of *P. vivax*	—	—

BURKINA FASO

III. IMPLEMENTING MALARIA CONTROL

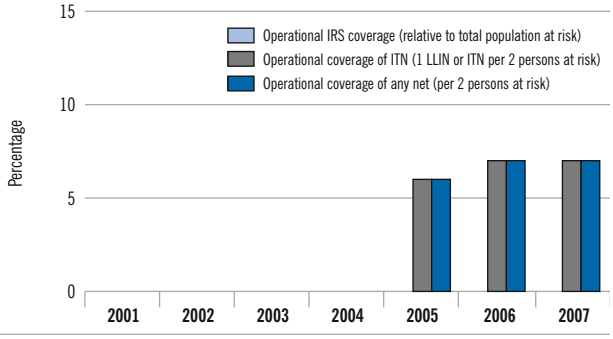
Coverage of ITN: survey data



	2001	2002	2003	2004	2005	2006	2007
% of pregnant women who slept under any net			24				
% of pregnant women who slept under an ITN			3				

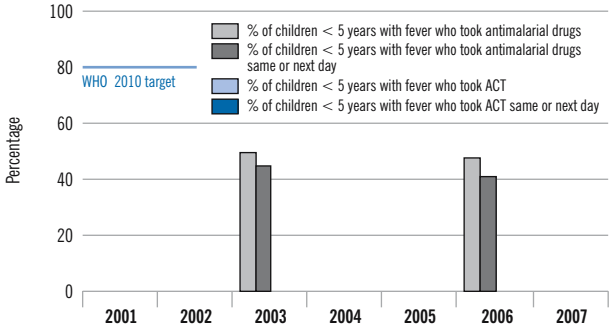
Source: DHS 2003, MICS 2006.

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS							
No. of ITNs and/or LLINs					401 500	121 100	13 000

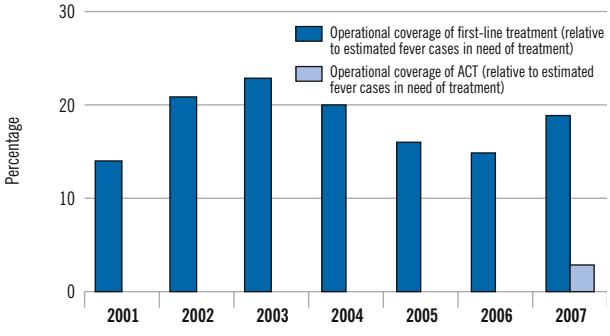
Access by febrile children to effective treatment: survey data



	2001	2002	2003	2004	2005	2006	2007
% of children < 5 years with fever			37				
% of febrile children < 5 years who sought treatment in health facility			33				

Source: DHS 2003, MICS 2006.

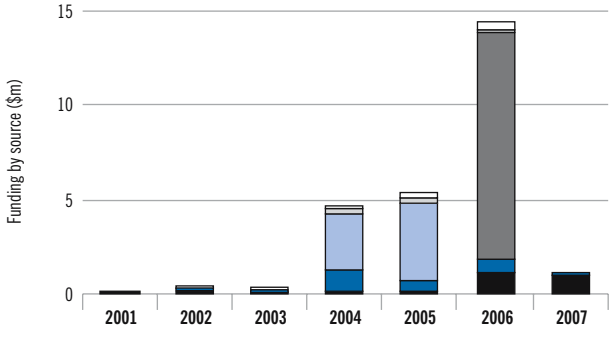
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received	3 643 062	5 621 064	6 084 223	5 191 738	4 167 908	3 930 296	4 981 270
No. of ACT treatment courses received							811 507

IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others	0	100 974	38 740	207 561	359 861	325 000	0
Bilaterals	0	0	0	200 000	215 247	200 000	0
European Union	0	0	0	0	0	0	0
GFATM	0	0	0	2 925 513	4 193 558	0	0
World Bank	0	0	0	0	0	12 000 000	0
UN agencies	0	241 701	177 551	1 153 484	457 411	747 985	117 037
Gov. malaria expenditure	56 393	95 868	151 567	197 387	200 000	1 119 648	1 058 476

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	DEP/MS	Surveillance data	Insecticide-treated nets (ITN)	DHS 2003, MICS 2006
Operational coverage of ITNs, IRS and access to medicines	PNLP/MS	Programme report	Treatment	DHS 2003, MICS 2006
Financial data	PNLP/MS	Programme report	Use of health services	DHS 1998

Cambodia

Approximately 2 million people live in or around forested areas that have intense malaria transmission. Soldiers, forestry workers and gem miners are at high risk; children living in forest villages are also particularly vulnerable. Cambodia had an estimated 262 000 cases and 580 deaths in 2006, but the reported numbers of cases, hospital admissions and deaths were falling over the period 2001–2006. A 2005 survey found that most households own a mosquito net but few are ITNs. Under national treatment policy, artesunate and mefloquine are distributed together in blister packs through public and private sectors, though resistance to these drugs has been recorded on the Cambodia-Thailand border. National policy also promotes the use of rapid diagnostic tests so that antimalarial treatment is targeted to malaria patients. Funding for malaria control appears to have increased, especially through support from the Global Fund in 2007.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

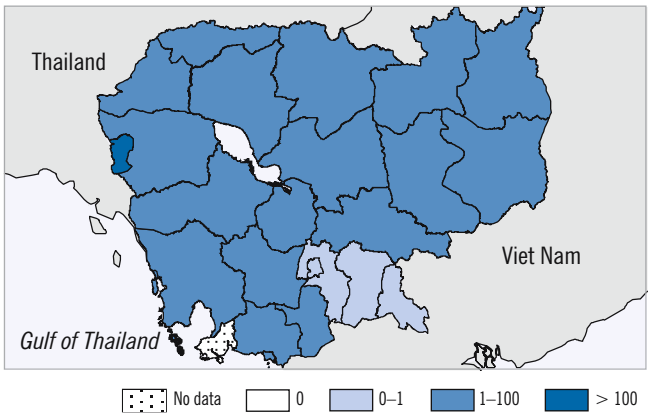
Population (000)	2006	%
All age groups	14 197	
< 5 years	1 690	12
≥ 5 years	12 506	88

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	6 232	44
Low transmission (0–1/1000)	1 334	9
Malaria-free (0 cases)	6 630	47
Rural population	11 312	80

Vector and parasite profile

Major *Anopheles* species: *dirus*, *minimus*, *sundaicus*
Plasmodium species: *falciparum*, *vivax*

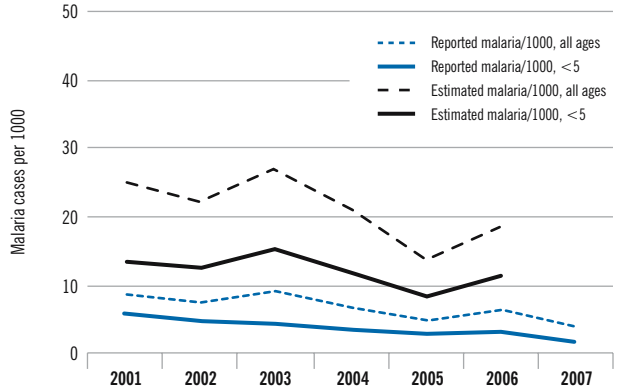
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	820 000	587 000	1 100 000	58	41	77
	< 5 years	58 000	42 000	78 000	34	25	46
Malaria cases	All ages	262 000			18	14	24
	< 5 years	19 000	14 000	24 000	11	8.0	14
Malaria deaths	All ages	580	350	840	0.04	0.03	0.06
	< 5 years	230	140	340	0.14	0.08	0.2
Malaria case-fatality rate (%)	All ages	0.22			—	—	—
	< 5 years	1.21			—	—	—

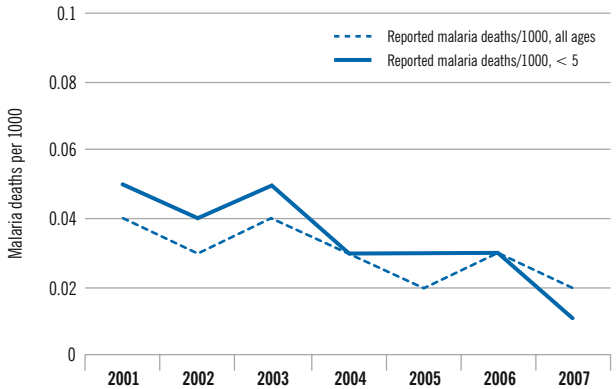
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	110 161	100 194	119 712	91 855	67 036	89 109	59 848
Reported malaria cases, < 5 years	9 854	8 057	7 415	6 163	4 566	5 135	3 031
All-cause outpatient consultations, all ages		4 200 432	4 514 158	5 302 431	5 976 718	6 813 409	6 106 629
All-cause outpatient consultations, < 5 years		689 728	747 870	988 026	1 201 908	1 466 784	3 965

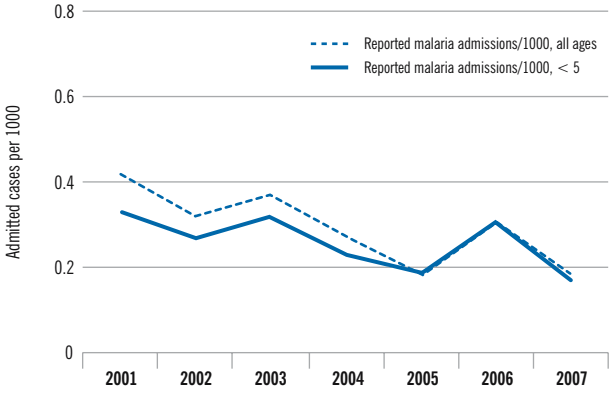
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	76	457	492	382	296	396	241
Reported malaria deaths, < 5 years	84	67	77	50	49	59	25
All-cause deaths, all ages	6 459	6 222	5 215	4 958	4 738	7 008	3 486
All-cause deaths, < 5 years		625	649	622	736	765	683

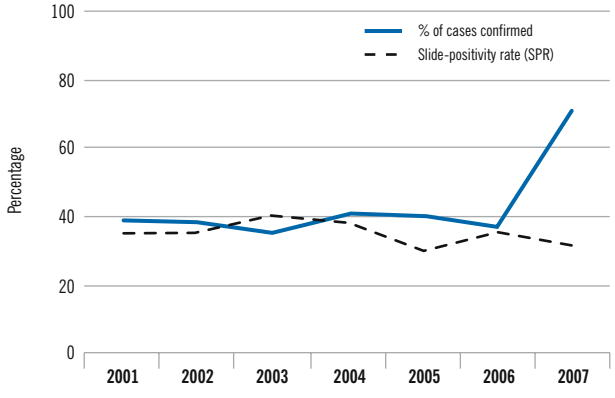
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	5 453	4 214	4 936	3 719	2 560	4 392	2 648
Reported malaria admissions (< 5)	573	450	542	387	325	519	295
All-cause admissions, all ages	283 140	250 314	305 654	314 627	287 151	388 890	204 681
All-cause admissions, < 5 years	83 669	61 415	94 447	96 039	77 639	97 773	41 454

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined	121 691	108 967	106 330	99 593	88 991	94 460	135 731
Positive	42 150	38 048	42 234	37 389	26 914	33 010	42 518
P. falciparum	48 556	41 170	63 022	52 731	40 004	69 925	16 518

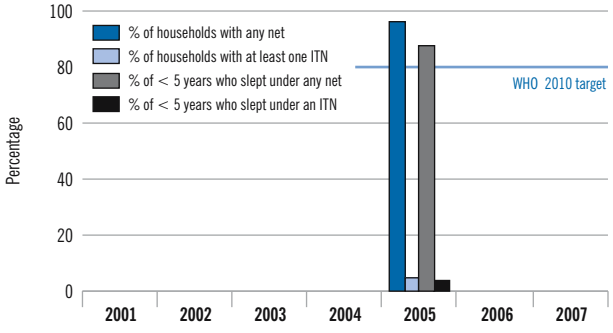
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/No	Year adopted	Policy/strategy	Yes/No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	2000	Distribution – Antenatal care	Yes	2006
	Targeting – All age groups	Yes	2000	Distribution – EPI routine and campaign	No	—
	Targeting – Children under 5 years and pregnant women	Yes	2000			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	No	—	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	No	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	No	—
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	No	—	IPT implemented countrywide	No	—
Case management	ACT is free or highly subsidized in public sectors	Yes	2000	Free malaria diagnosis and first-line treatment of malaria	Yes	2000
	Oral artemisinin monotherapies banned	Yes	—	Home management of malaria	Yes	2002
	Parasitological confirmation for all age groups	Yes	2000	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	Yes	2000
				RDTs in areas without microscopy	Yes	2000

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AS+MQ	2000
First-line treatment of *P. falciparum* (confirmed)	AS+MQ	2000
Treatment failure of *P. falciparum*	QN(7d) +T(7d)	2000
Treatment of severe malaria	AM+MQ	2000
Treatment of *P. vivax*	CQ	—

III. IMPLEMENTING MALARIA CONTROL

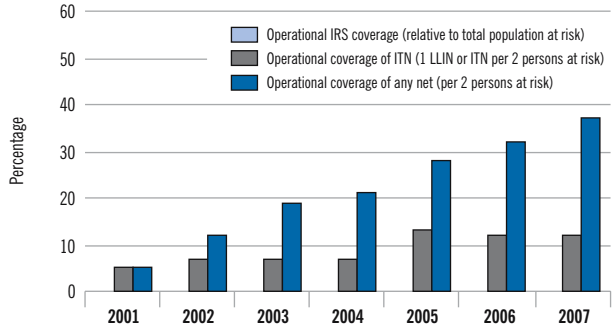
Coverage of ITN: survey data



	2005
% of pregnant women who slept under any net	86
% of pregnant women who slept under an ITN	4

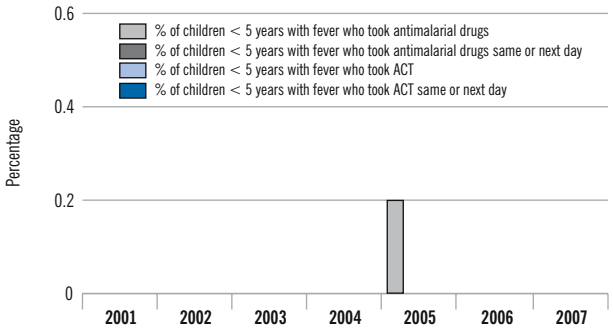
Source: DHS 2005.

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS							
No. of ITNs and/or LLINs	163 412	246 836	269 490	267 144	500 318	452 316	456 581

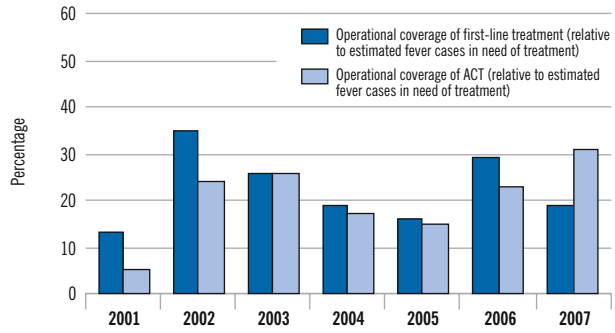
Access by febrile children to effective treatment: survey data



	2005
% of children < 5 years with fever	34
% of febrile children < 5 years who sought treatment in health facility	24

Source: DHS 2005.

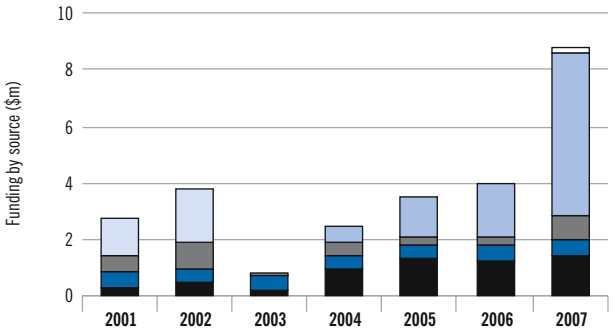
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received	61 550	169 784	127 982	89 993	77 782	141 535	91 839
No. of ACT treatment courses received	24 430	116 184	127 382	84 421	75 082	112 495	150 819

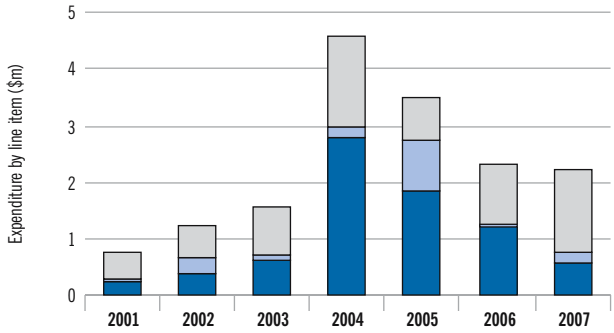
IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others							106 927
Bilaterals							
European Union	1 257 000	1 900 000	0	0	0	0	
GFATM	0	0	0	537 378	1 345 572	1 901 220	5 762 926
World Bank	643 000	900 000	50 000	490 014	283 494	306 709	918 403
UN agencies	500 000	500 000	500 000	520 000	500 000	500 000	500 000
Gov. malaria expenditure	316 000	465 000	240 000	933 156	1 332 647	1 282 500	1 456 419

Breakdown of expenditure by intervention



	2001	2002	2003	2004	2005	2006	2007
Others							
Treatment	476 747	564 101	830 379	1 581 353	745 350	1 069 913	1 475 696
Diagnosis	20 902	286 748	117 480	185 610	914 953	16 707	166 126
IRS							
ITN	248 826	369 806	617 545	2 808 450	1 839 856	1 225 594	578 440

V. SOURCES OF INFORMATION

Programme data		Survey and other data		
Reported cases	HIS	Surveillance data	Insecticide-treated nets (ITN)	DHS 2005
Operational coverage of ITNs, IRS and access to medicines	HIS	Programme report	Treatment	DHS 2005
Financial data	HIS	Programme report	Use of health services	DHS 2005

Cameroon

Cameroon had an estimated 5 million malaria cases in 2006. Transmission occurs all year round but is more intense in the south. None of the 635 000 cases reported in 2006 were confirmed as malaria. Cases were reported only in 2005 and 2006, and there is no information about malaria deaths over the period 2001–2006. IRS is not national policy. The NMCP distributed over 1 million ITNs in 2006 of which only 17 000 were LLINs, far fewer than are needed to protect the 18 million people at risk. A 2006 survey found that 32% of households owned a mosquito net and 20% an ITN, but only 13% of children slept under an ITN. 58% of children with fever received an antimalarial drug, but only 2% were given ACT. Funding for malaria control was around US$ 12.5 million in 2006, provided mostly by government and supported by the Global Fund.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

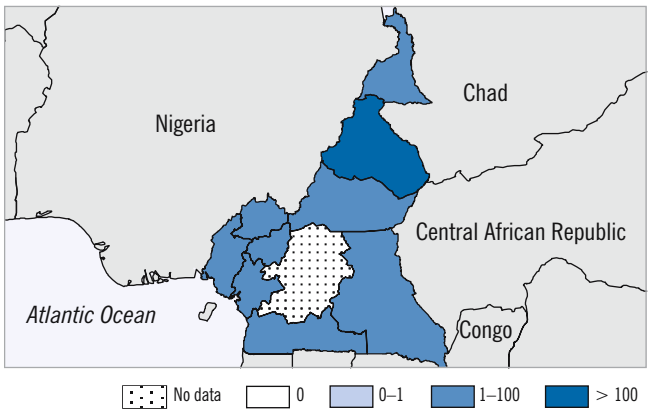
Population (000)	2006	%
All age groups	18 175	
< 5 years	2 851	16
≥ 5 years	15 324	84

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	12 889	71
Low transmission (0–1/1000)	5 286	29
Malaria-free (0 cases)	0	0
Rural population	8 087	44

Vector and parasite profile

Major *Anopheles* species: *arabiensis*, *brochieri*, *coustani*, *flavicosta, funestus*, *gambiae*, *hancocki*, *hargreavesi*, *melas*, *moucheti*, *nili, paludis*, *pharoensis*
Plasmodium species: *falciparum*, *vivax*

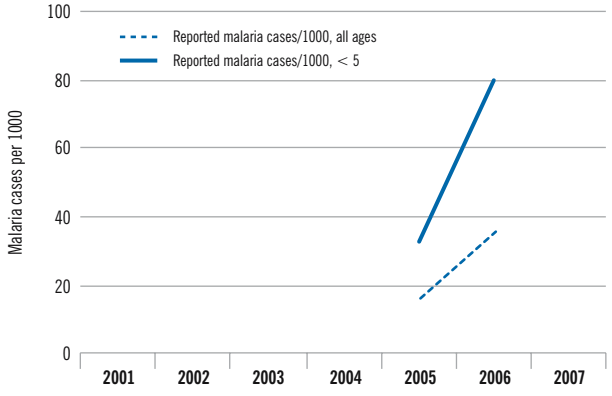
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	14 705 000	9 668 000	19 921 000	809	532	1 096
	< 5 years	7 993 000	1 505 000	15 253 000	2 804	528	5 350
Malaria cases	All ages	5 091 000	3 347 000	6 897 000	280	184	379
	< 5 years	2 767 000	521 000	5 281 000	971	183	1 852
Malaria deaths	All ages	21 000	12 000	33 000	1.2	0.67	1.8
	< 5 years	18 000	10 000	28 000	6.3	3.5	9.8
Malaria case-fatality rate (%)	All ages	0.41			—	—	—
	< 5 years	0.65			—	—	—

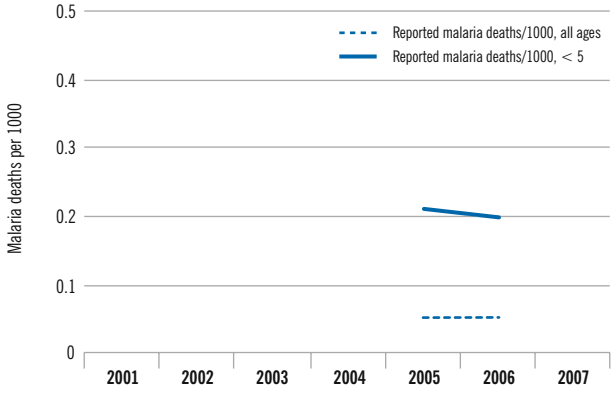
Trends in malaria morbidity and mortality

Reported malaria cases, per 1000



	2005	2006
Reported malaria cases, all ages	277 413	634 507
Reported malaria cases, < 5 years	89 041	227 284
All-cause outpatient consultations, all ages	697 665	1 748 905
All-cause outpatient consultations, < 5 years	197 771	462 140

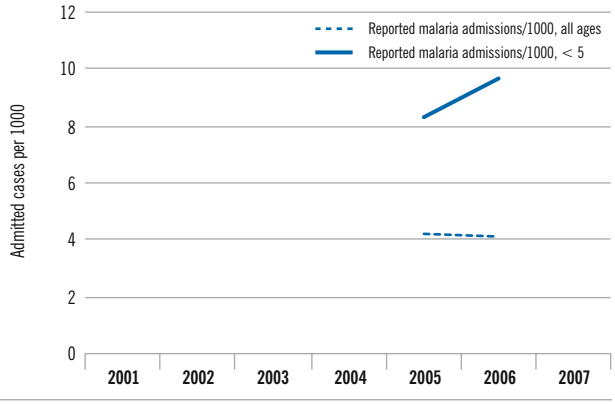
Reported malaria deaths, per 1000



	2005	2006
Reported malaria deaths, all ages	836	930
Reported malaria deaths, < 5 years	603	578
All-cause deaths, all ages	254 308	261 175
All-cause deaths, < 5 years	1 203	

I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)					75 738	75 904	
Reported malaria admissions (< 5)					23 418	27 636	
All-cause admissions, all ages					138 617	204 498	
All-cause admissions, < 5 years					37 928	66 873	

Slide examination, case confirmation, *Plasmodium* spp

No data

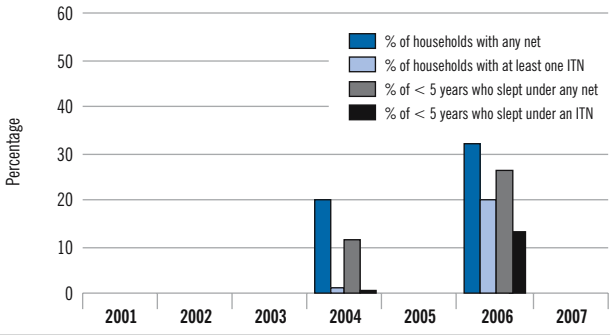
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	2003	Distribution – Antenatal care	Yes	2003
	Targeting – All age groups	No	—	Distribution – EPI routine and campaign	Yes	2006
	Targeting – Children under 5 years and pregnant women	Yes	2003			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	Yes	2005	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	No	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	No	—
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2004	IPT implemented countrywide	Yes	2006
Case management	ACT is free or highly subsidized in public sectors	No	2007	Free malaria diagnosis and first-line treatment of malaria	No	—
	Oral artemisinin monotherapies banned	Yes	2007	Home management of malaria	No	—
	Parasitological confirmation for all age groups	Yes	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	No	—
				RDTs in areas without microscopy	No	—

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AS+AQ	2004
First-line treatment of *P. falciparum* (confirmed)	AS+AQ	2004
Treatment failure of *P. falciparum*	QN(7d)	2004
Treatment of severe malaria	QN(7d)	2004
Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

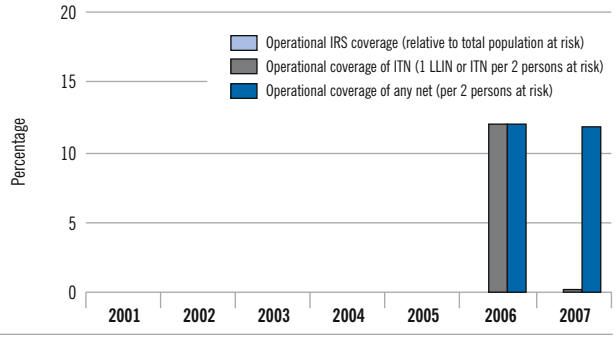
Coverage of ITN: survey data



% of pregnant women who slept under any net	12
% of pregnant women who slept under an ITN	1

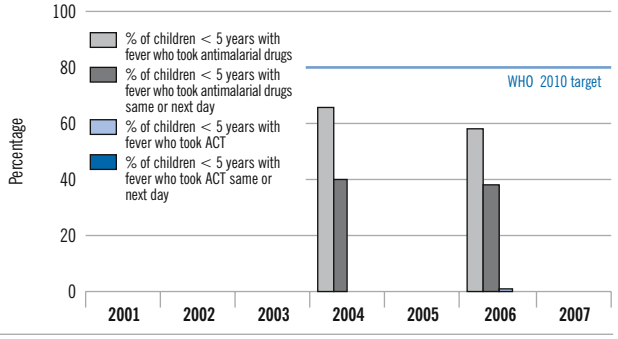
Source: DHS 2004, MICS 2006.

Coverage of IRS and ITN: programme data



No. of households protected by IRS	
No. of ITNs and/or LLINs	1 097 510

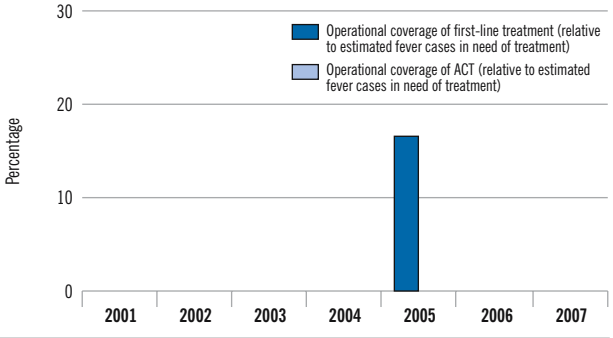
Access by febrile children to effective treatment: survey data



% of children < 5 years with fever	25
% of febrile children < 5 years who sought treatment in health facility	40

Source: DHS 2004, MICS 2006.

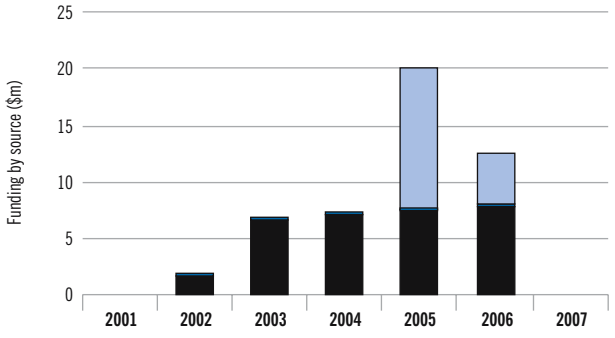
Access to effective treatment: programme data



No. of first-line treatment courses received	3 583 332
No. of ACT treatment courses received	

IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others							
Bilaterals							
European Union							
GFATM					12416102	4472742	
World Bank							
UN agencies	170000	170000	195000	195000	280000		
Gov. malaria expenditure	1714290	6626706	7147000	7504000	7880000		

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data		Survey and other data		
Reported cases	PNLP	Surveillance data	Insecticide-treated nets (ITN)	MICS 2000, DHS 2004, MICS 2006
Operational coverage of ITNs, IRS and access to medicines	PNLP	Programme report	Treatment	MICS 2000, DHS 2004, MICS 2006
Financial data	PNLP	Programme report	Use of health services	DHS 2004

Chad

Chad accounts for around 1% of cases in the WHO African Region. Malaria transmission is more intense in the south, occurring seasonally between May and December. Almost all cases are caused by *P. falciparum*, but most are unconfirmed despite recent improvements in diagnostic services. Numbers of reported cases and deaths have increased in recent years; it is not known whether this reflects a real increase in malaria burden or improved reporting. The NMP distributed approximately 350 000 ITNs in 2005 and again in 2006, of which 300 000 were LLINs, many fewer than are needed to protect 10 million people at risk. Although IRS is not a national policy, about 40 000 households were sprayed in 2006. Courses of ACT used in 2006 were far below the estimated number of cases. Malaria control has been funded mainly by the government, UN agencies and bilateral organizations.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

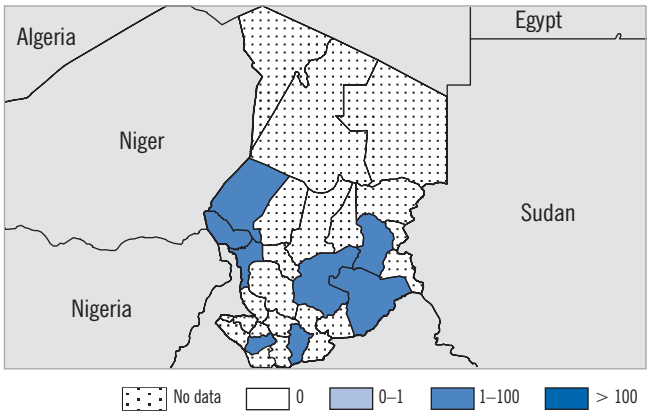
Population (000)	2006	%
All age groups	10 468	
< 5 years	1 943	19
≥ 5 years	8 525	81

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	4 862	46
Low transmission (0–1/1000)	5 485	52
Malaria-free (0 cases)	122	1
Rural population	7 779	74

Vector and parasite profile

Major *Anopheles* species: *arabiensis*, *coustani*, *funestus*, *nili*, *pharoensis*
Plasmodium species: *falciparum*, *vivax*

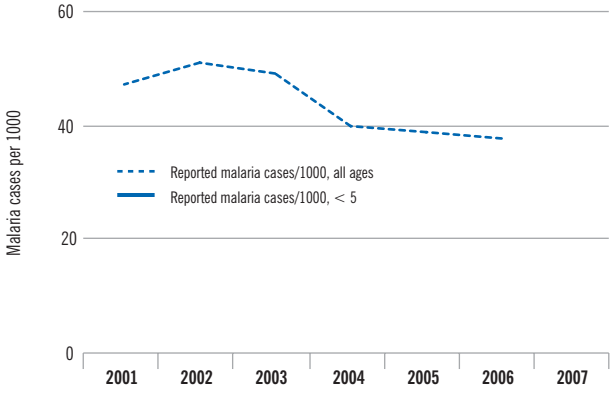
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	7 095 000	3 965 000	10 400 000	678	379	993
	< 5 years	4 301 000	760 000	8 250 000	2 214	391	4 246
Malaria cases	All ages	4 179 000	2 335 000	6 126 000	399	223	585
	< 5 years	2 533 000	447 000	4 859 000	1 304	230	2 501
Malaria deaths	All ages	18 000	8 900	30 000	1.7	0.85	2.9
	< 5 years	17 000	8 300	28 000	8.7	4.3	14
Malaria case-fatality rate (%)	All ages	0.43			—	—	—
	< 5 years	0.67			—	—	—

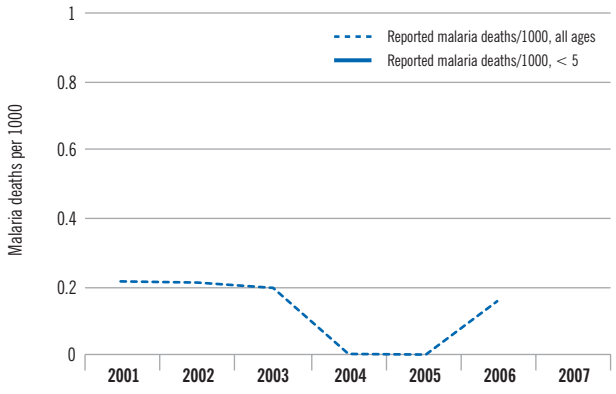
Trends in malaria morbidity and mortality

Reported malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	414 149	462 730	463 324	395 001	398 447	400 134	
Reported malaria cases, < 5 years							
All-cause outpatient consultations, all ages							
All-cause outpatient consultations, < 5 years							

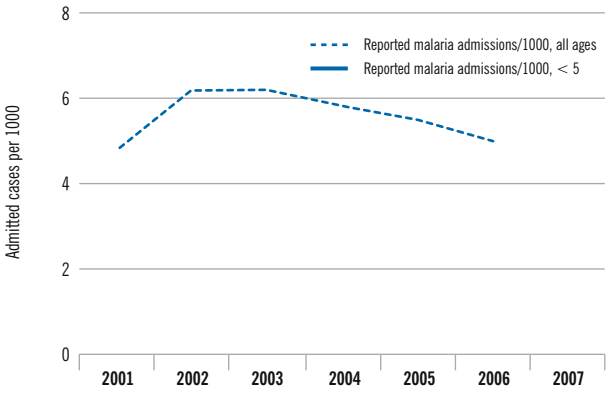
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	1 872	1 888	1 940			1 630	
Reported malaria deaths, < 5 years							
All-cause deaths, all ages	5 263	5 460	5 756			4 923	
All-cause deaths, < 5 years							

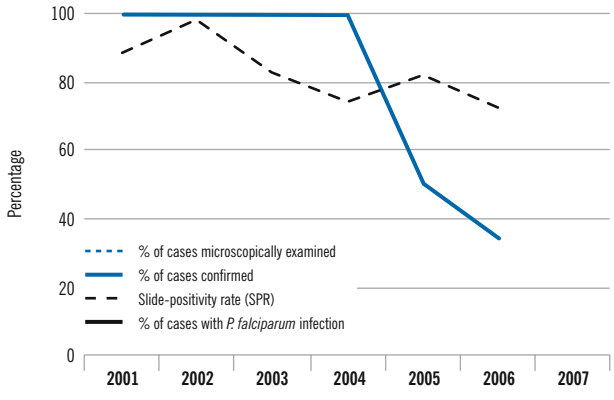
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	42 221	56 496	58 608	56 908	56 027	52 348	
Reported malaria admissions (< 5)							
All-cause admissions, all ages							
All-cause admissions, < 5 years							

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined	43 180	44 689	54 381	42 859	50 363	63 815	
Positive	38 287	43 933	45 195	31 929	41 237	46 233	
P. falciparum							

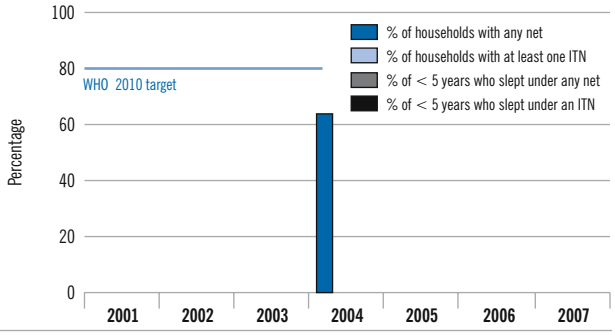
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	2005	Distribution – Antenatal care	Yes	2005
	Targeting – All age groups	Yes	1998	Distribution – EPI routine and campaign	Yes	2005
	Targeting – Children under 5 years and pregnant women	Yes	1998			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	No	—	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	No	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	No	—
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2005	IPT implemented countrywide	No	—
Case management	ACT is free or highly subsidized in public sectors	Yes	2005	Free malaria diagnosis and first-line treatment of malaria	Yes	2005
	Oral artemisinin monotherapies banned	Yes	2006	Home management of malaria	No	—
	Parasitological confirmation for all age groups	No	2005	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	No	—
				RDTs in areas without microscopy	Yes	2005

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AS+AQ/AL	—
First-line treatment of *P. falciparum* (confirmed)	AS+AQ/AL	—
Treatment failure of *P. falciparum*	QN(7d)	—
Treatment of severe malaria	QN(7d)	—
Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

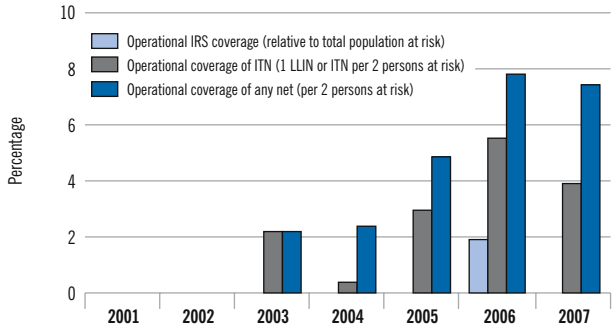
Coverage of ITN: survey data



	2001	2002	2003	2004	2005	2006	2007
% of pregnant women who slept under any net							
% of pregnant women who slept under an ITN							

Source: DHS 2004.

Coverage of IRS and ITN: programme data



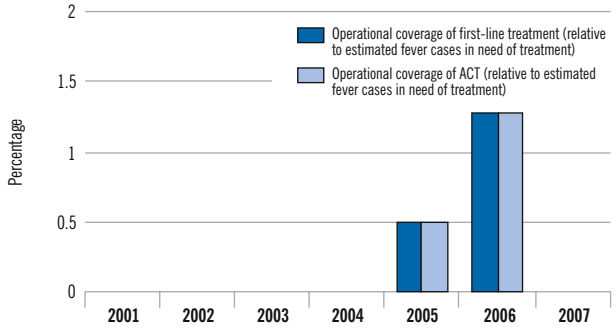
	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS						39 500	
No. of ITNs and/or LLINs			104 118	10 000	128 293	267 000	

Access by febrile children to effective treatment: survey data

No data

	2001	2002	2003	2004	2005	2006	2007
% of children < 5 years with fever			29				
% of febrile children < 5 years who sought treatment in health facility			14				

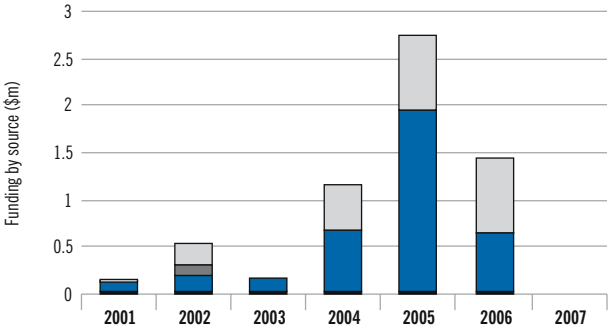
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received					40 586	104 717	
No. of ACT treatment courses received					40 586	104 717	

IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others							
Bilaterals	1 160	207 490		487 626	794 348	808 109	
European Union							
GFATM							
World Bank		125 649					
UN agencies	106 019	159 746	125 000	634 000	1 921 000	604 000	
Gov. malaria expenditure	40 000	40 000	40 000	40 000	40 00	40 000	

Breakdown of expenditure by interventions

No data

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	DSIS	Surveillance data	Insecticide-treated nets (ITN)	MICS 2000, DHS 2004
Operational coverage of ITNs, IRS and access to medicines	PNLP	Programme report	Treatment	MICS 2000
Financial data	PNLP	Programme report	Use of health services	DHS 2004

Colombia

Colombia had an estimated 408 000 malaria cases in 2006, approximately 20% of all episodes in the WHO Region of the Americas. One quarter (24%) of the population is at risk of malaria, and transmission is highest in the upper Sinú River and lower Cauca River regions, in Urabá, and at the Pacific coast. A total of 121 000 cases and 106 deaths were reported in 2006, and case numbers have been falling since 2001. Almost all reported cases are confirmed as malaria, and 28% were *P. falciparum* in 2007. IRS is implemented selectively, protecting 20 000–30 000 households in 2006–2007. 170 000 ITNs were distributed in 2005 and 87 000 in 2007. First-line antimalarial drugs are sufficient to treat all reported cases, and ACT was introduced in 2007. The government has been the principal source of funding for malaria control, with additional support from the Global Fund in 2007.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

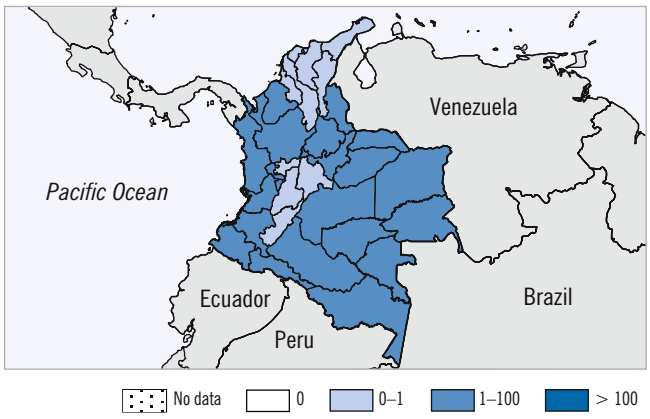
Population (000)	2006	%
All age groups	45 558	
< 5 years	4 438	10
≥ 5 years	41 120	90

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	5 772	13
Low transmission (0–1/1000)	9 675	21
Malaria-free (0 cases)	30 111	66
Rural population	12 302	27

Vector and parasite profile

Major *Anopheles* species: *albitarsis*, *albimanus*, *darlingi*, *nuneztovari*
Plasmodium species: *falciparum*, *vivax*

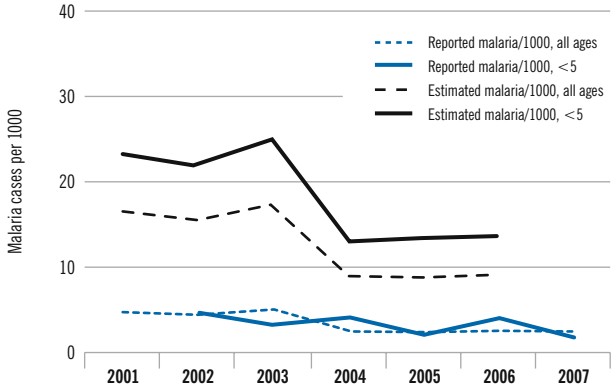
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	1 892 000	1 171 000	2 830 000	42	26	62
	< 5 years	285 000	177 000	427 000	64	40	96
Malaria cases	All ages	408 000	293 000	566 000	9.0	6.0	12
	< 5 years	62 000	44 000	85 000	14	10	19
Malaria deaths	All ages	440	260	660	0.01	0.01	0.01
	< 5 years	120	70	180	0.03	0.02	0.04
Malaria case-fatality rate (%)	All ages	0.11			—	—	—
	< 5 years	0.19			—	—	—

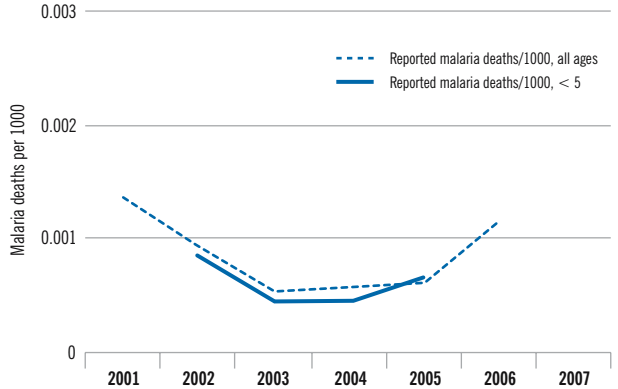
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	206 195	195 719	221 834	116 872	118 163	120 096	110 389
Reported malaria cases, < 5 years		21 831	13 936	17 849	10 195	18 113	8 831
All-cause outpatient consultations, all ages							
All-cause outpatient consultations, < 5 years							

Reported malaria deaths, per 1000



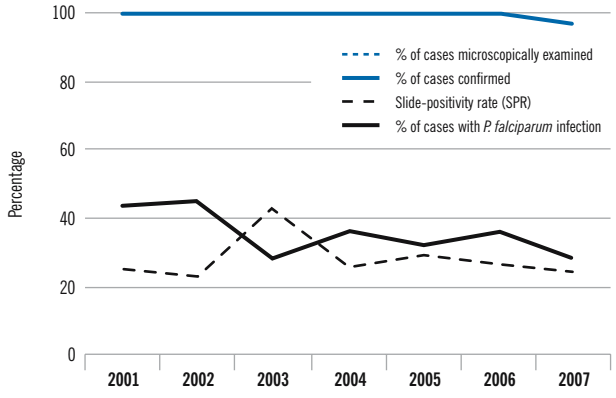
	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	58	40	24	25	28	53	
Reported malaria deaths, < 5 years		4	2	2	3		
All-cause deaths, all ages							
All-cause deaths, < 5 years							

I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000

No data

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined	824 780	846 062	520 980	451 240	410 300	451 240	441 556
Positive	206 195	195 719	221 834	116 872	118 163	120 096	107 189
P. falciparum	91 406	87 751	61 975	42 137	38 105	43 547	30 065

II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution – Free	No	—	Distribution – Antenatal care	No	—
	Targeting – All age groups	Yes	2005	Distribution – EPI routine and campaign	No	—
	Targeting – Children under 5 years and pregnant women	No	—			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	Yes	2005	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	No	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	2005
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	No	—	IPT implemented countrywide	No	2006
Case management	ACT is free or highly subsidized in public sectors	No	—	Free malaria diagnosis and first-line treatment of malaria	No	—
	Oral artemisinin monotherapies banned	No	—	Home management of malaria	No	—
	Parasitological confirmation for all age groups	Yes	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	No	—
				RDTs in areas without microscopy	No	—

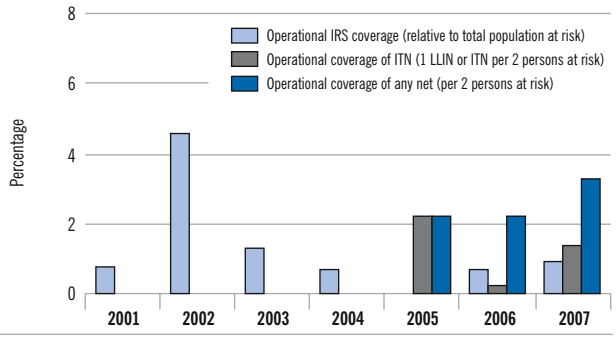
	Antimalarial medicines	Type of medicine	Year adopted
	First-line treatment of *P. falciparum* (unconfirmed)	—	2004
	First-line treatment of *P. falciparum* (confirmed)	AQ+SP; AS+MQ, AL	2004
	Treatment failure of *P. falciparum*	QN(3d)+CL(5d)	2004
	Treatment of severe malaria	QN(7d)	2004
	Treatment of *P. vivax*	CQ+PQ	—

III. IMPLEMENTING MALARIA CONTROL

Coverage of ITN: survey data

Not applicable

Coverage of IRS and ITN: programme data



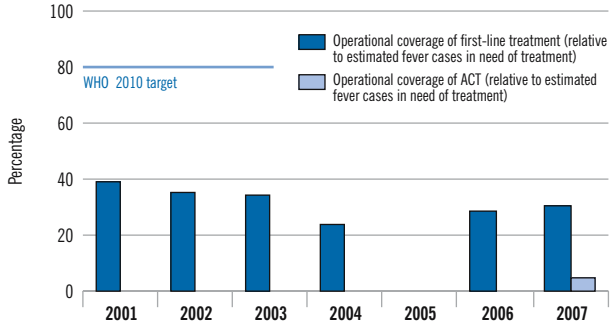
	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS	23 028	132 900	38 295	20 526		20 526	28 728
No. of ITNs and/or LLINs					170 000		87 394

Access by febrile children to effective treatment: survey data

Not applicable

	2001	2002	2003	2004	2005	2006	2007
% of children < 5 years with fever			25				
% of febrile children < 5 years who sought treatment in health facility			57				

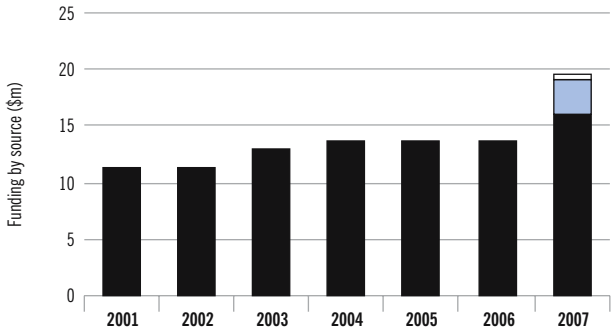
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received	196 200	178 904	169 816	122 804		145 525	155 132
No. of ACT treatment courses received							27 132

IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others							500 000
Bilaterals							
European Union							
GFATM							3 000 000
World Bank							
UN agencies							
Gov. malaria expenditure	11 363 636	11 363 636	13 049 962	13 702 460	13 702 460	13 702 460	16 000 000

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	PAHO MCQ	Surveillance data	Insecticide-treated nets (ITN)	DHS 2000
Operational coverage of ITNs, IRS and access to medicines	PAHO MCQ	Programme report	Treatment	No surveys
Financial data	PAHO MCQ	Programme report	Use of health services	DHS 2004

Côte d'Ivoire

Côte d'Ivoire had an estimated 7 million malaria cases in 2006, 3% of all cases in the WHO African Region. Transmission occurs all year round throughout the country, but is more seasonal in the north. None of the 1.3 million cases reported in 2006 were confirmed as malaria. There was no evidence of a systematic decline in malaria cases in 2001–2006. The number of deaths increased, perhaps due to improved reporting. IRS is not carried out in Côte d'Ivoire. The NMCP distributed only 370 000 LLINs in 2006. Only 27% of households owned a mosquito net in 2006, and just 6% had an ITN. Despite the adoption of ACT as treatment policy in 2003, a 2006 survey reported that only 3% of febrile children were given ACT. Funding for malaria control was around US$ 6 million in 2006, which is not adequate to reach targets for prevention and cure nationwide.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

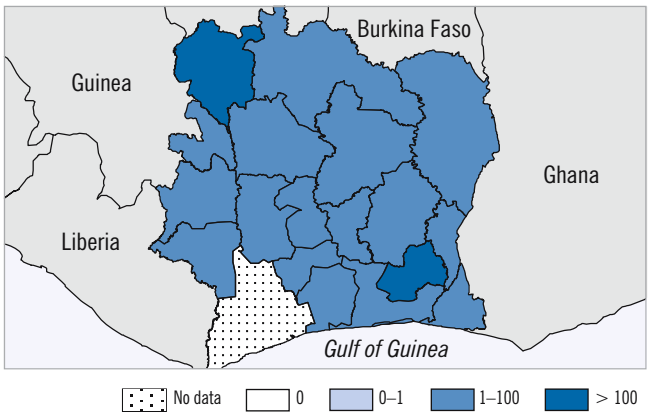
Population (000)	2006	%
All age groups	18 914	
< 5 years	2 849	15
≥ 5 years	16 065	85

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	18 914	100
Low transmission (0–1/1000)	0	0
Malaria-free (0 cases)	0	0
Rural population	10 327	55

Vector and parasite profile

Major *Anopheles* species: *arabiensis*, *brochieri*, *coustani*, *funestus*, *gambiae*, *hancocki*, *hargreavesi, melas*, *moucheti, nili, paludis*, *pharoensis*
Plasmodium species: *falciparum*, *vivax*

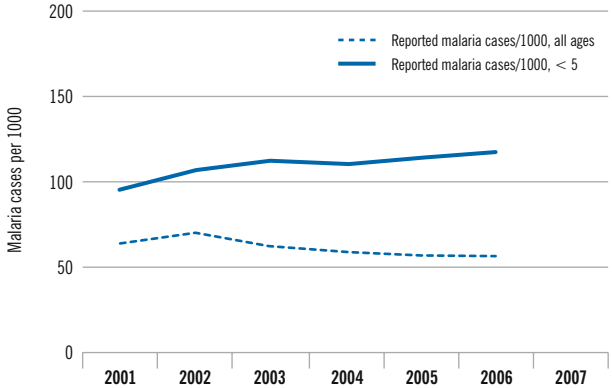
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	21 572 000	13 289 000	30 133 000	1 141	703	1 593
	< 5 years	12 056 000	2 016 000	23 275 000	4 232	708	8 169
Malaria cases	All ages	7 029 000	4 330 000	9 818 000	372	229	519
	< 5 years	3 928 000	657 000	7 584 000	1 379	231	2 662
Malaria deaths	All ages	20 000	10 000	30 000	1.1	0.53	1.6
	< 5 years	18 000	9 400	28 000	6.3	3.3	9.8
Malaria case-fatality rate (%)	All ages	0.28			—	—	—
	< 5 years	0.46			—	—	—

Trends in malaria morbidity and mortality

Reported malaria cases, per 1000



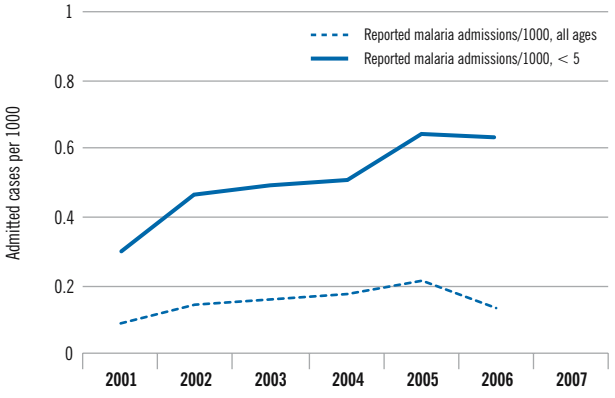
	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	1 116 327	1 231 909	1 107 179	1 095 363	1 051 366	1 075 017	
Reported malaria cases, < 5 years	259 649	291 416	310 334	311 899	321 611	332 643	
All-cause outpatient consultations, all ages	1 969 077	2 318 879	2 368 584	2 349 636	2 664 516	3 632 014	
All-cause outpatient consultations, < 5 years	397 679	519 240	450 098	452 086	441 055	465 391	

Reported malaria deaths, per 1000

Data not available

I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	1 513	2 407	2 862	3 085	3 934	2 527	
Reported malaria admissions (< 5)	808	1 268	1 365	1 430	1 799	1 806	
All-cause admissions, all ages							
All-cause admissions, < 5 years							

Slide examination, case confirmation, *Plasmodium* spp

No data

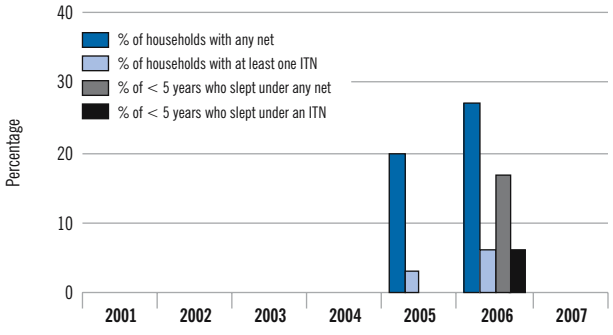
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	2006	Distribution – Antenatal care	Yes	2006
	Targeting – All age groups	No	—	Distribution – EPI routine and campaign	No	—
	Targeting – Children under 5 years and pregnant women	Yes	2005			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	Yes	1998	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	No	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	No	—
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2005	IPT implemented countrywide	No	—
Case management	ACT is free or highly subsidized in public sectors	No	—	Free malaria diagnosis and first-line treatment of malaria	No	—
	Oral artemisinin monotherapies banned	Yes	2005	Home management of malaria	No	—
	Parasitological confirmation for all age groups	No	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	No	—
				RDTs in areas without microscopy	No	—

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AS+AQ	2003
First-line treatment of *P. falciparum* (confirmed)	AS+AQ	2003
Treatment failure of *P. falciparum*	AL	2003
Treatment of severe malaria	QN(7d)	2003
Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

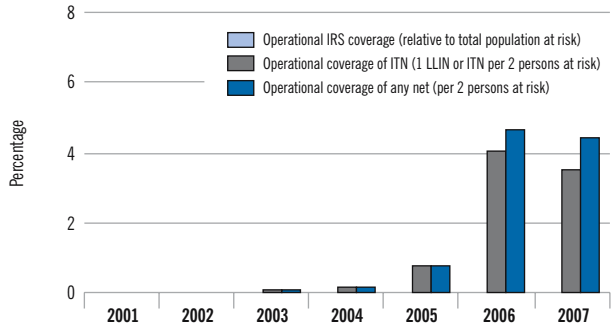
Coverage of ITN: survey data



% of pregnant women who slept under any net	
% of pregnant women who slept under an ITN	

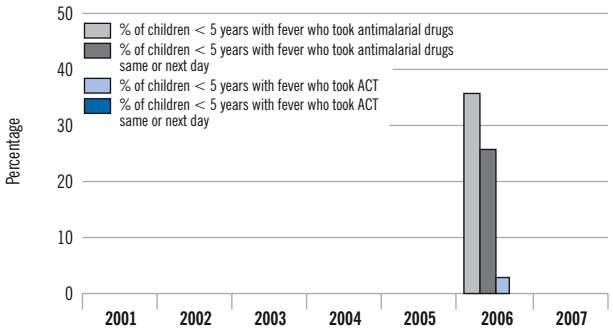
Source: AIS 2005, MICS 2006.

Coverage of IRS and ITN: programme data



No. of households protected by IRS						
No. of ITNs and/or LLINs			5 000	12 000	53 696	371 816

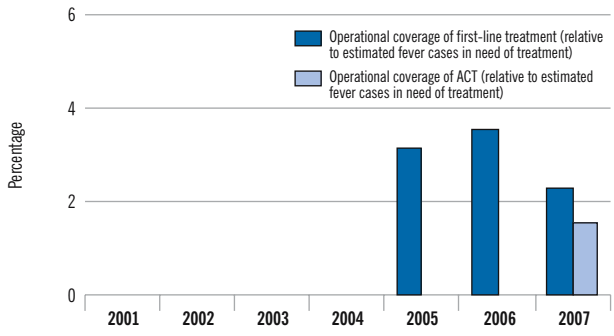
Access by febrile children to effective treatment: survey data



% of children < 5 years with fever					26	
% of febrile children < 5 years who sought treatment in health facility					29	

Source: MICS 2006.

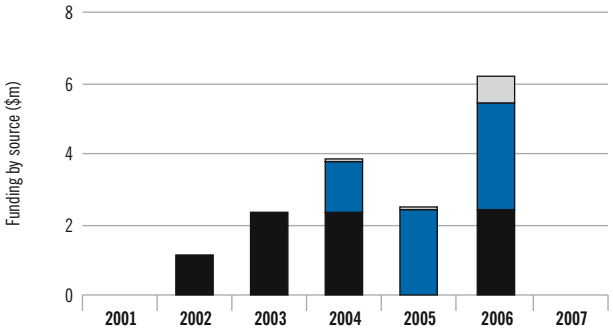
Access to effective treatment: programme data



No. of first-line treatment courses received					971 683	1 102 879	721 314
No. of ACT treatment courses received						4 875	476 203

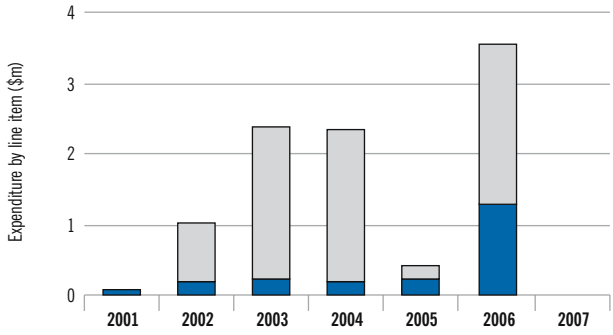
IV. FINANCING MALARIA CONTROL

Governmental and external financing



Others					
Bilaterals			60 642	60 642	73 8245
European Union					
GFATM					
World Bank					
UN agencies			1 460 519	2 409 826	3 016 659
Gov. malaria expenditure	1 129 683	2 352 953	2 341 786		2 427 239

Breakdown of expenditure by intervention



Others						
Treatment		846 669	2 184 073	2 139 786	191 955	2 252 520
Diagnosis						
IRS						
ITN	62 924	186 448	213 788	185 956	214 796	1 304 000

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	DIPE	Surveillance data	Insecticide-treated nets (ITN)	MICS 2000, AIS 2005, MICS 2006
Operational coverage of ITNs, IRS and access to medicines	DIPE	Programme report	Treatment	MICS 2000, MICS 2006
Financial data	DIPE	Programme report	Use of health services	MICS 2006

Democratic Republic of the Congo

This country of 61 million people accounted for an estimated 11% of all malaria cases in the WHO African Region in 2006. Transmission occurs all year round, though with seasonal variation. Malaria is largely due to *P. falciparum*, but no cases are confirmed by microscopy. Cases and deaths were reported by the NMCP for 2006 only; routine surveillance has provided no information about how malaria is distributed across the country. IRS is not national policy. The number of ITNs distributed annually by the NMCP has grown significantly since 2001, reaching 2.4 million in 2006, but this is still insufficient to protect 23 million people at risk. A total of 1.7 million doses of first-line medicine were delivered through public facilities in 2006; covering only 7% of estimated cases. No data on funding for malaria control were provided by the NMCP.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

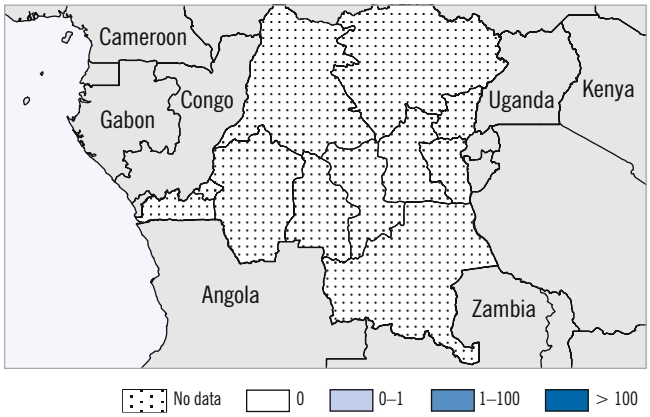
Population (000)	2006	%
All age groups	60 644	
< 5 years	11 843	20
≥ 5 years	48 800	80

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	60 644	100
Low transmission (0–1/1000)	0	0
Malaria-free (0 cases)	0	0
Rural population	40 832	67

Vector and parasite profile

Major *Anopheles* species: *arabiensis*, *brochieri*, *coustani*, *funestus*, *gambiae*, *hancocki*, *hargreavesi*, *melas*, *moucheti, paludis*, *pharoensis*
Plasmodium species: *falciparum*, *vivax*

Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	75 987 000	43 560 000	110 286 000	1 253	718	1 819
	< 5 years	47 662 000	8 276 000	91 633 000	2 406	418	4 625
Malaria cases	All ages	23 620 000	13 540 000	34 281 000	389	223	565
	< 5 years	14 815 000	2 573 000	28 483 000	748	130	1 438
Malaria deaths	All ages	96 000	50 000	157 000	1.6	0.82	2.6
	< 5 years	90 000	47 000	148 000	4.5	2.4	7.5
Malaria case-fatality rate (%)	All ages	0.41			—	—	—
	< 5 years	0.61			—	—	—

Trends in malaria morbidity and mortality

Reported malaria cases, per 1000

	2006
Reported malaria cases, all ages	5 008 956
Reported malaria cases, < 5 years	2 380 353
All-cause outpatient consultations, all ages	6 291 164
All-cause outpatient consultations, < 5 years	2 735 273

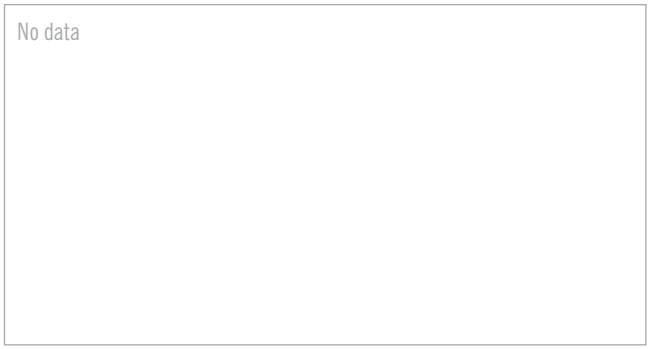
Reported malaria deaths, per 1000

	2006
Reported malaria deaths, all ages	24 347
Reported malaria deaths, < 5 years	15 032
All-cause deaths, all ages	28 605
All-cause deaths, < 5 years	18 567

I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)						139 789	
Reported malaria admissions (< 5)						66 957	
All-cause admissions, all ages						366 702	
All-cause admissions, < 5 years						149 841	

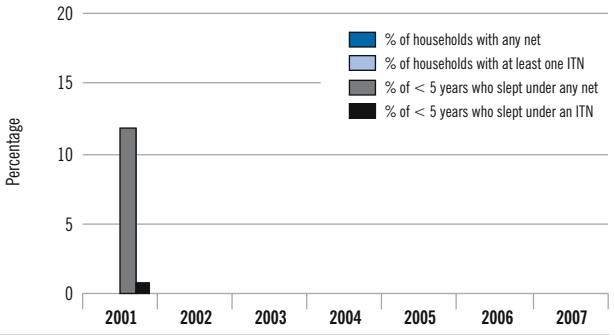
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/No	Year adopted	Policy/strategy	Yes/No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	2006	Distribution – Antenatal care	Yes	2002
	Targeting – All age groups	Yes	2000	Distribution – EPI routine and campaign	Yes	2006
	Targeting – Children under 5 years and pregnant women	Yes	2000			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	No	—	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	No	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	No	—
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2002	IPT implemented countrywide	Yes	2005
Case management	ACT is free or highly subsidized in public sectors	No	—	Free malaria diagnosis and first-line treatment of malaria	No	—
	Oral artemisinin monotherapies banned	No	—	Home management of malaria	No	—
	Parasitological confirmation for all age groups	Yes	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	No	—
				RDTs in areas without microscopy	No	—

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AS+AQ	2005
First-line treatment of *P. falciparum* (confirmed)	AS+AQ	2005
Treatment failure of *P. falciparum*	QN(7d)	2005
Treatment of severe malaria	QN(7d)	2005
Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

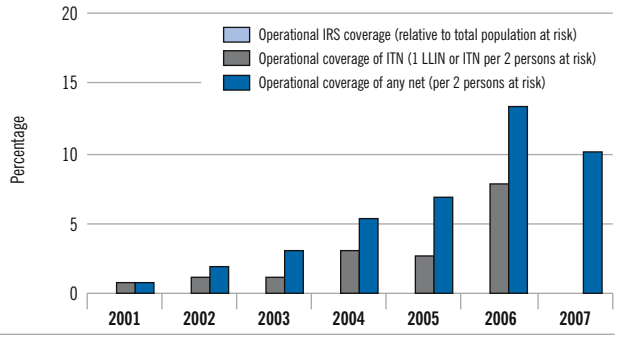
Coverage of ITN: survey data



% of pregnant women who slept under any net	
% of pregnant women who slept under an ITN	

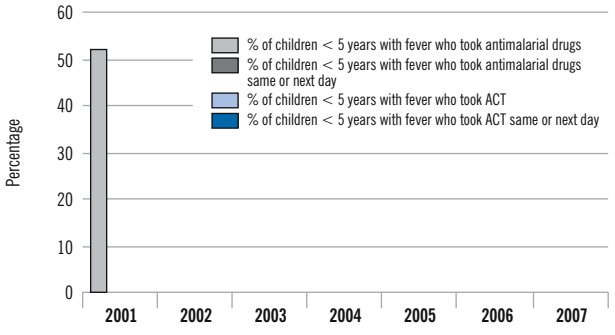
Source: MICS 2001.

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS							
No. of ITNs and/or LLINs	200 000	291 825	338 856	877 161	791 135	2 379 384	

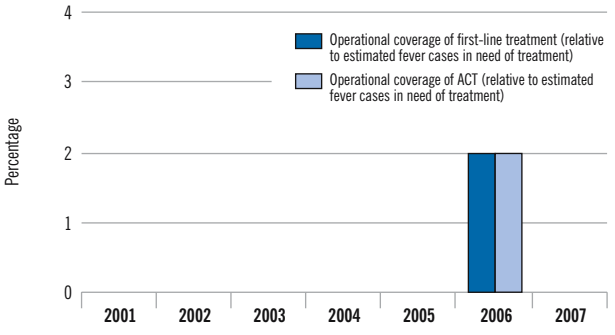
Access by febrile children to effective treatment: survey data



% of children < 5 years with fever	41
% of febrile children < 5 years who sought treatment in health facility	35

Source: MICS 2001.

Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received						1 681 211	
No. of ACT treatment courses received						1 681 211	

IV. FINANCING MALARIA CONTROL

Governmental and external financing

No data

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data		Survey and other data		
Reported cases	PNLP database	Surveillance data	Insecticide-treated nets (ITN)	MICS 2001
Operational coverage of ITNs, IRS and access to medicines	PNLP database	Programme report	Treatment	MICS 2001
Financial data	PNLP database	Programme report	Use of health services	MICS 2001

Ethiopia

Ethiopia had approximately 6% of malaria cases in the African Region in 2006. Malaria is present everywhere except the central highlands. Epidemics are frequent, the last in 2003–2004. Over half of the cases are caused by *P. falciparum*. The NMCP distributed 20 million LLINs between 2005 and 2007, targeting 40 million people at risk. The percentage of households with one ITN increased from 3% nationwide in 2005 to 53% in 2007. Nearly 7 million courses of ACT were delivered in 2006 and 4 million in 2007. Funding increased from US$ 2.7 million in 2001 to over US$ 120 million in 2006, provided by the government and other donors. A total of 1.2 million cases were reported in 2007, the lowest number in the period 2001–2007. The recent fall in cases coincides with the rapid expansion of control efforts, although intervention effects are not distinguishable from postepidemic decline in NMCP data.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

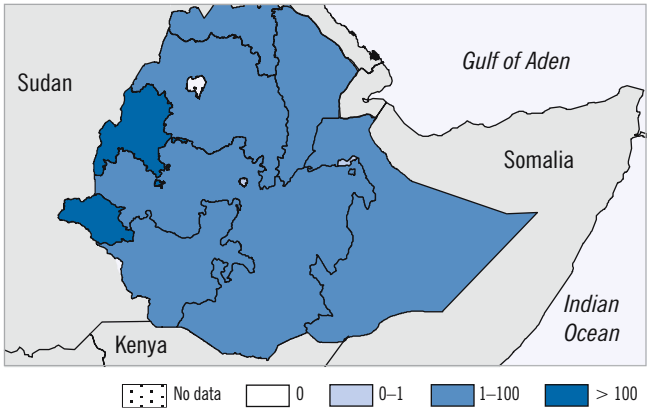
Population (000)	2006	%
All age groups	81 021	
< 5 years	13 439	17
≥ 5 years	67 582	83

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	55 094	68
Low transmission (0–1/1000)	0	0
Malaria-free (0 cases)	25 927	32
Rural population	67 879	84

Vector and parasite profile

Major *Anopheles* species: *arabiensis*, *coustani*, *funestus*, *nili*, *paludis*, *pharoensis*, *quadriannulatus*
Plasmodium species: *falciparum*, *vivax*

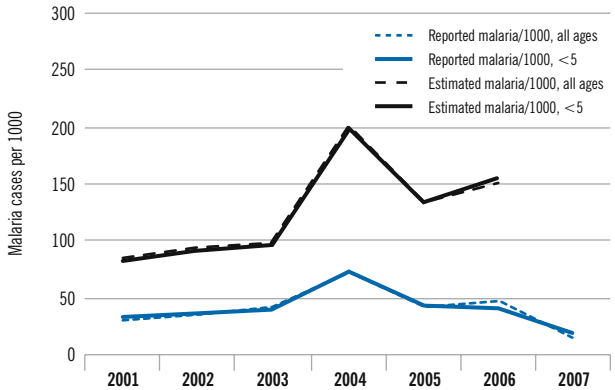
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	44 965 000	11 108 000	94 175 000	555	137	1 162
	< 5 years	7 514 000	1 856 000	15 737 000	559	138	1 171
Malaria cases	All ages	12 405 000	4 236 000	24 341 000	153	52	300
	< 5 years	2 073 000	708 000	4 068 000	154	53	303
Malaria deaths	All ages	41 000	14 000	75 000	0.51	0.17	0.93
	< 5 years	25 000	8 500	46 000	1.9	0.63	3.4
Malaria case-fatality rate (%)	All ages	0.33			—	—	—
	< 5 years	1.2			—	—	—

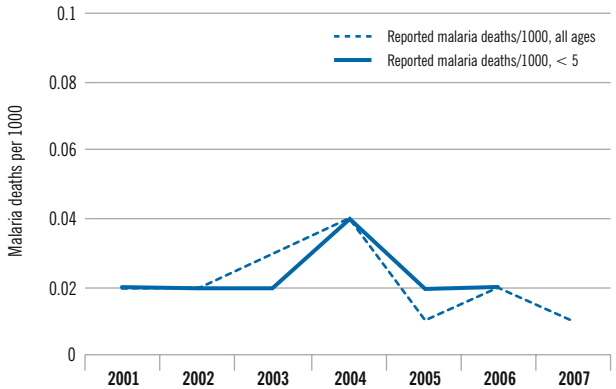
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	2 264 322	2 515 191	3 143 163	5 706 167	3 361 717	3 759 960	1 214 921
Reported malaria cases, < 5 years	428 089	441 811	522 491	948 587	554 262	528 603	268 854
All-cause outpatient consultations, all ages	9 165 962	8 451 463	9 519 293	10 541 257	11 316 226	10 143 121	24 737 524
All-cause outpatient consultations, < 5 years							

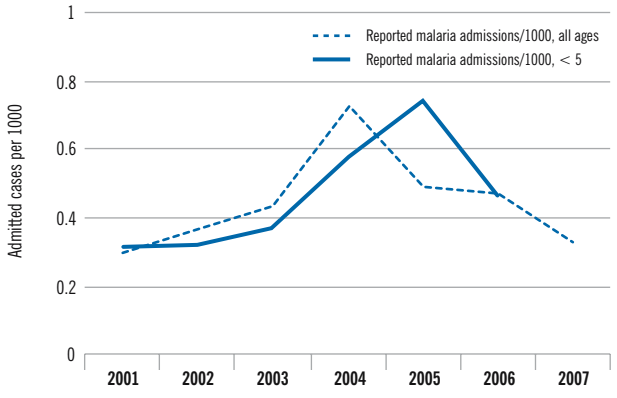
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	1 681	1 607	2 138	3 327	1 086	1 357	991
Reported malaria deaths, < 5 years	277	271	279	514	280	270	
All-cause deaths, all ages	11 113	10 573	10 796	9 242	6 918	11 828	37 508
All-cause deaths, < 5 years							

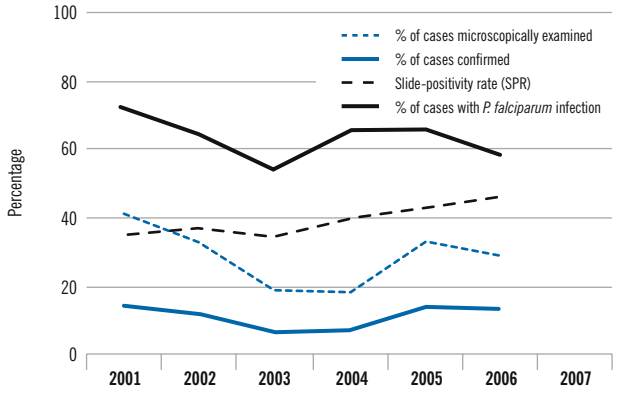
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	21 293	26 973	32 334	56 495	38 875	38 427	27 344
Reported malaria admissions (< 5)	3 931	4 054	4 747	7 556	9 822	6 204	
All-cause admissions, all ages	196 623	195 004	196 331	228 865	223 229	183 271	689 904
All-cause admissions, < 5 years							

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined	924 823	829 760	593 476	1 039 641	1 110 988	1 103 120	1 305 859
Positive	318 771	305 328	203 242	412 609	478 311	509 804	604 960
P. falciparum	231 827	195 497	109 140	270 931	315 918	297 766	384 564

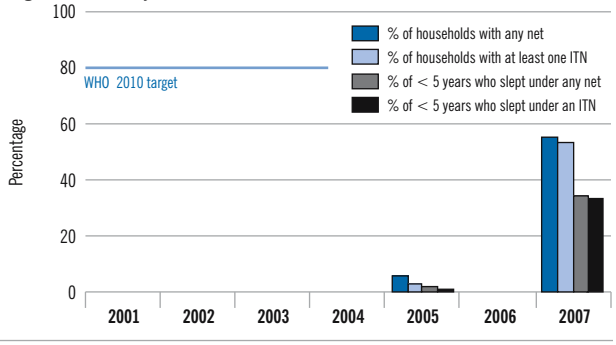
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution – Free	Yes	2003	Distribution – Antenatal care	Yes	2004
	Targeting – All age groups	Yes	2001	Distribution – EPI routine and campaign	Yes	2006
	Targeting – Children under 5 years and pregnant women	Yes	2001			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	Yes	1998	DDT is used alternately with other insecticides in the same area	Yes	—
	Insecticide-resistance management implemented	Yes	—	IRS is the primary vector-control intervention	Yes	1998
				IRS is used for prevention and control of epidemics	Yes	1998
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	1998
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2004	IPT implemented countrywide	No	—
Case management	ACT is free or highly subsidized in public sectors	Yes	1998	Free malaria diagnosis and first-line treatment of malaria	Yes	1998
	Oral artemisinin monotherapies banned	Yes	—	Home management of malaria	No	—
	Parasitological confirmation for all age groups	Yes	1998	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	Yes	—
				RDTs in areas without microscopy	Yes	2005

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AL	2004
First-line treatment of *P. falciparum* (confirmed)	AL	2004
Treatment failure of *P. falciparum*	QN(7d)	2004
Treatment of severe malaria	QN(7d)	2004
Treatment of *P. vivax*	CQ	—

III. IMPLEMENTING MALARIA CONTROL

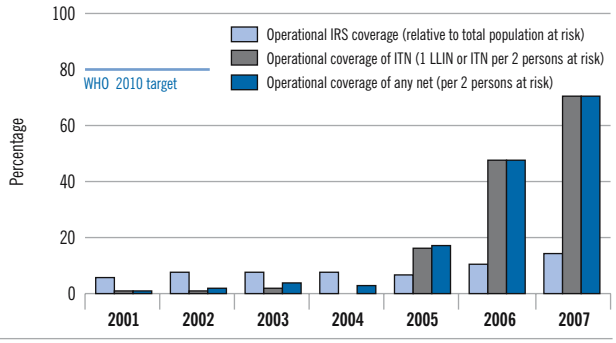
Coverage of ITN: survey data



	2005	2007
% of pregnant women who slept under any net	2	37
% of pregnant women who slept under an ITN	1	35

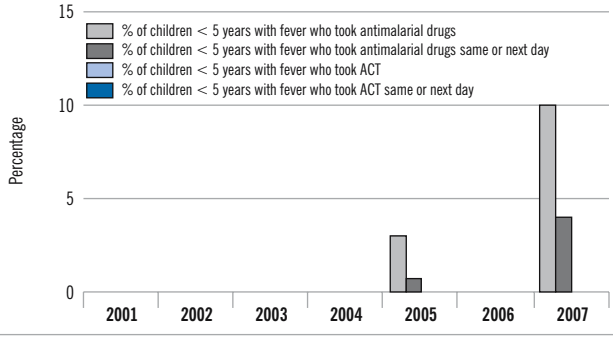
Source: DHS 2005, MIS 2007 provisional report.

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS	592 197	765 380	859 637	845 693	782 581	1 196 897	1 590 964
No. of ITNs and/or LLINs	280 000	320 000	430 000		4 243 157	9 070 718	7 178 443

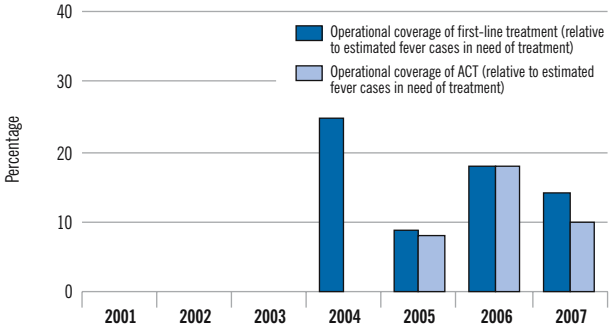
Access by febrile children to effective treatment: survey data



	2005	2007
% of children < 5 years with fever	19	22
% of febrile children < 5 years who sought treatment in health facility	18	

Source: DHS 2005, MIS 2007 provisional report.

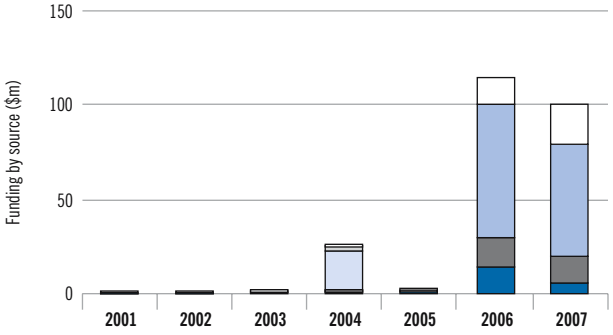
Access to effective treatment: programme data



	2004	2005	2006	2007
No. of first-line treatment courses received	9 725 000	3 500 000	6 950 000	5 450 400
No. of ACT treatment courses received	25 000	3 193 993	6 806 744	4 032 640

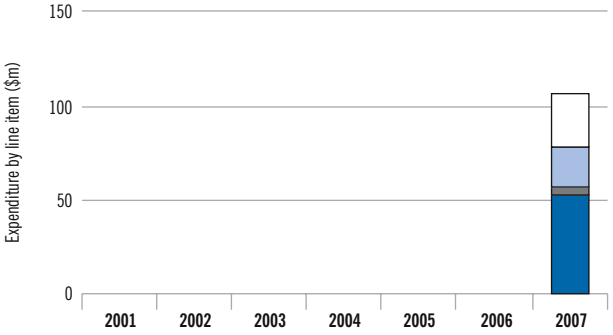
IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others	2 054	9 120	0	8 444	630 703	14 639 958	21 442 875
Bilaterals	131 258	245 694	279 827	1 624 311	685 738	0	
European Union	0	0	0	0	0	0	0
GFATM	0	0	0	21 757 639		71 421 627	58 609 473
World Bank	0	0	12 500	11 120	695 037	15 128 000	14 699 888
UN agencies	543 249	509 942	1 406 421	1 602 052	620 894	14 128 937	5 593 555
Gov. malaria expenditure							

Breakdown of expenditure by intervention



Others	28 154 041
Treatment	
Diagnosis	22 094 054
IRS	4 320 222
ITN	52 228 038

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	Regional Health Bureau	Surveillance data	Insecticide-treated nets (ITN)	DHS 2000, DHS 2005, MIS 2007
Operational coverage of ITNs, IRS and access to medicines	NMCP	Programme report	Treatment	DHS 2000, DHS 2005, MIS 2007
Financial data	NMCP	Programme report	Use of health services	DHS 1997

Ghana

Ghana had an estimated 7.2 million malaria cases in 2006, 3% of the total for the WHO African Region. Most cases are caused by *P. falciparum* but only 15–20% are confirmed. There was no evidence of a reduction in malaria cases between 2001 and 2007, and reported deaths have increased in 2007. IRS protected 134 000 and 154 000 households in 2006 and 2007 respectively in selected areas. The NMCP programme distributed 3.6 million LLINs in 2006–2007. 30% of households owned a mosquito net in 2006, but only 19% owned at least one ITN. 61% of febrile children received an antimalarial drug, but only 4% were given ACT. Funding for malaria control was close to US$ 60 million in 2006 and US$ 40 million in 2007, provided by government, the Global Fund, the World Bank and bilateral donors.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

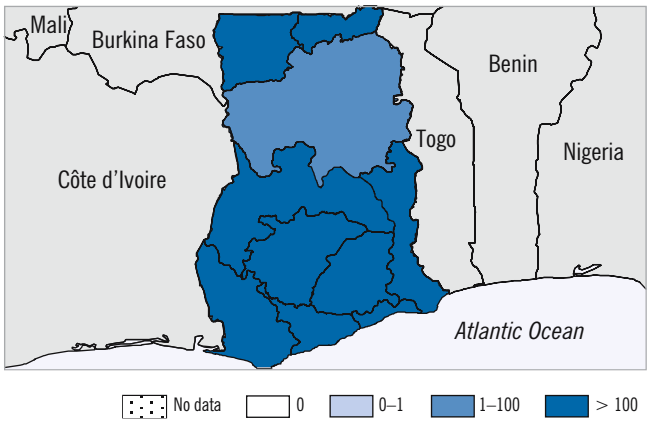
Population (000)	2006	%
All age groups	23 008	
< 5 years	3 195	14
≥ 5 years	19 813	86

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	23 008	100
Low transmission (0–1/1000)	0	0
Malaria-free (0 cases)	0	0
Rural population	11 830	51

Vector and parasite profile

Major *Anopheles* species: *brochieri, coustani, flavicosta, funestus, gambiae, hancocki, hargreavesi, melas, nili, paludis, pharoensis*
Plasmodium species: *falciparum*, *vivax*

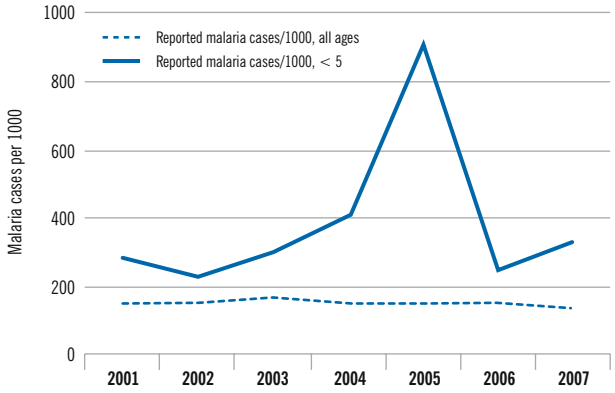
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	20 342 000	12 805 000	28 099 000	884	557	1 221
	< 5 years	10 992 000	1 850 000	21 212 000	3 440	579	6 639
Malaria cases	All ages	7 282 000	4 584 000	10 059 000	316	199	437
	< 5 years	3 935 000	662 000	7 594 000	1 232	207	2 377
Malaria deaths	All ages	25 000	14 000	38 000	1.1	0.61	1.7
	< 5 years	21 000	11 000	32 000	6.6	3.4	10
Malaria case-fatality rate (%)	All ages	0.34			—	—	—
	< 5 years	0.53			—	—	—

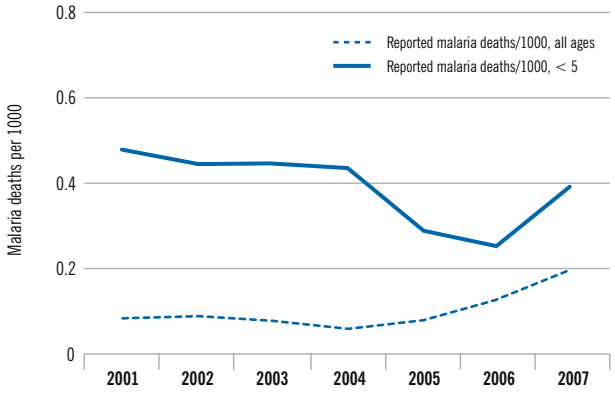
Trends in malaria morbidity and mortality

Reported malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	3 044 844	3 140 893	3 552 896	3 416 033	3 452 969	3 511 452	3 123 147
Reported malaria cases, < 5 years	856 872	705 288	920 140	1 289 874	2 876 465	789 952	1 056 331
All-cause outpatient consultations, all ages	6 904 408	7 253 794	8 129 510	7 540 470	7 753 845	9 114 401	9 259 343
All-cause outpatient consultations, < 5 years	1 518 970	1 679 257	1 900 809	1 318 900		1 712 728	

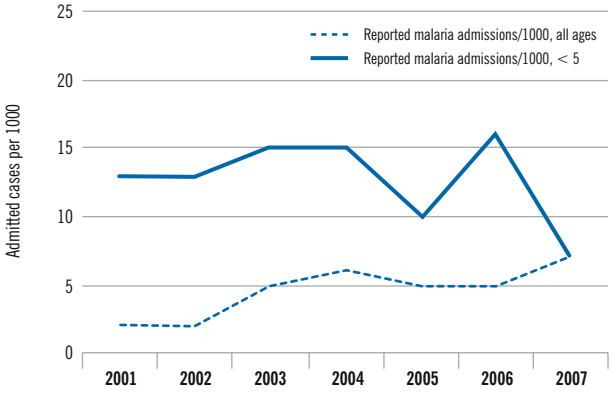
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	1 717	1 917	1 680	1 260	1 759	2 832	4 622
Reported malaria deaths, < 5 years	1 441	1 360	1 376	1 354	922	805	1 241
All-cause deaths, all ages	7 805	8 714	7 636	5 727	6 610	15 102	18 395
All-cause deaths, < 5 years	6 265	5 913	5 983	5 887	4 532	4 988	5 263

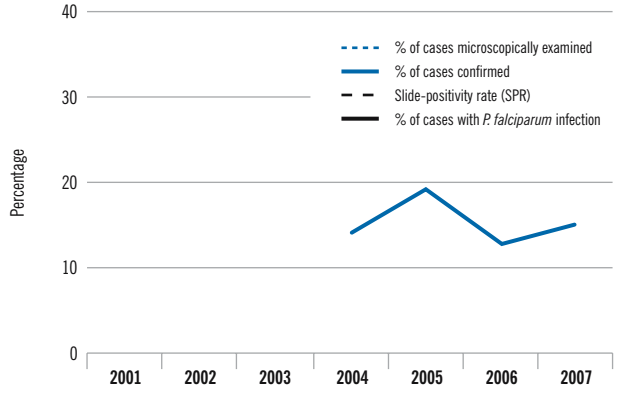
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	42 363	46 887	115 401	132 566	118 449	122 928	157 628
Reported malaria admissions (< 5)	38 911	38 340	45 648	46 886	31 644	51 407	22 019
All-cause admissions, all ages	121 037	133 963	517 566	844 091	483 038	356 000	556 036
All-cause admissions, <5 years	102 397	100 895	120 126	123 384	174 522	97 860	113 952

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined							
Positive				475 441	655 093	472 255	476 484
P. falciparum							

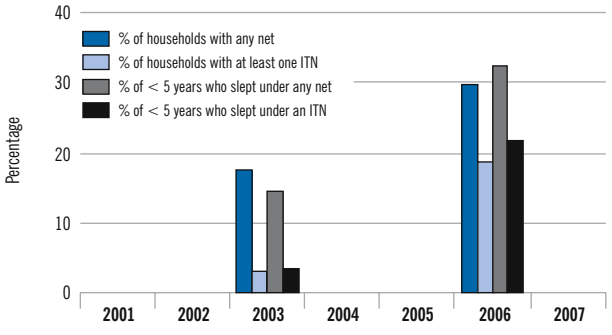
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	No	2006	Distribution – Antenatal care	Yes	1999
	Targeting – All age groups	No	—	Distribution – EPI routine and campaign	Yes	2000
	Targeting – Children under 5 years and pregnant women	Yes	1999			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	Yes	—	IRS is the primary vector-control intervention	Yes	2005
				IRS is used for prevention and control of epidemics	No	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	No	—
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2003	IPT implemented countrywide	Yes	2005
Case management	ACT is free or highly subsidized in public sectors	No	—	Free malaria diagnosis and first-line treatment of malaria	No	—
	Oral artemisinin monotherapies banned	Yes	2006	Home management of malaria	Yes	—
	Parasitological confirmation for all age groups	No	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	Yes	—
				RDTs in areas without microscopy	Yes	2007

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AS+AQ	2004
First-line treatment of *P. falciparum* (confirmed)	AS+AQ	2004
Treatment failure of *P. falciparum*	QN(7d)	2004
Treatment of severe malaria	QN(7d)	2004
Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

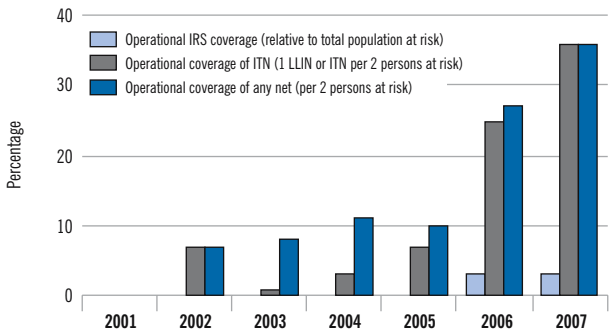
Coverage of ITN: survey data



	2001	2002	2003	2004	2005	2006	2007
% of pregnant women who slept under any net							
% of pregnant women who slept under an ITN			3				

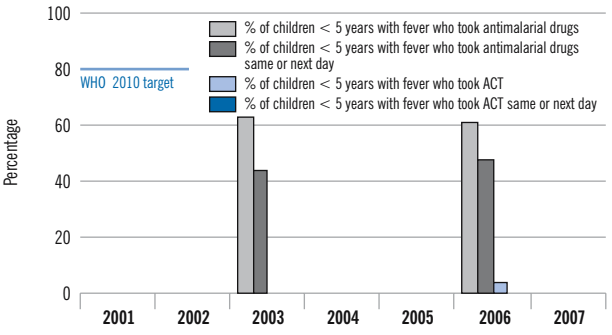
Source: DHS 2003, MICS 2006.

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS						134 000	154 000
No. of ITNs and/or LLINs		742 000	85 000	375 000	618 855	2 100 000	1 477 538

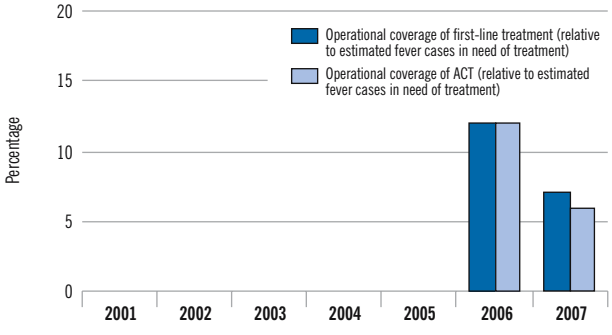
Access by febrile children to effective treatment: survey data



	2001	2002	2003	2004	2005	2006	2007
% of children < 5 years with fever			22				
% of febrile children < 5 years who sought treatment in health facility			48				

Source: DHS 2003, MICS 2006.

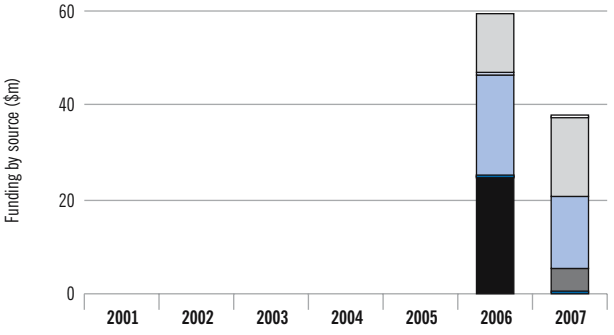
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received						3 600 000	2 018 967
No. of ACT treatment courses received						3 600 000	1 852 967

IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2006	2007
Others	0	13 233
Bilaterals	12 530 000	17 000 000
European Union	70 000	
GFATM	21 762 030	15 527 108
World Bank	0	5 000 000
UN agencies	4 000	22 840
Gov. malaria expenditure	24 830 000	0

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	NMCP, HMIS	Surveillance data	Insecticide-treated nets (ITN)	DHS 2003, MICS 2006
Operational coverage of ITNs, IRS and access to medicines	NMCP, Anglo Gold Ashanti (for IRS)	Programme report	Treatment	DHS 2003, MICS 2006
Financial data	NMCP, HMIS	Programme report	Use of health services	DHS 2003

India

India had an estimated 10.6 million malaria cases in 2006 that account for approximately 60% of cases in the WHO South-East Asia Region. With over 100 million slides examined every year, all reported cases are confirmed; about half are due to *P. falciparum*. However, the percentage of cases detected through active versus passive surveillance is not known. The states most affected are Uttar Pradesh, Bihar, Karnataka, Orissa, Rajasthan, Madhya Pradesh and Pondicherry. A survey carried out in 2005–2006 found that 36% of households owned a mosquito net. IRS has been the main method of mosquito control covering about 80 million households and protecting 40% of the population at risk. The programme delivered 8.5 million ITNs, more than 3 million first-line treatments and 800 000 courses of ACT during 2006 and 2007. Funding increased to more than US$ 140 million in 2007, provided by government, the Global Fund and the World Bank.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

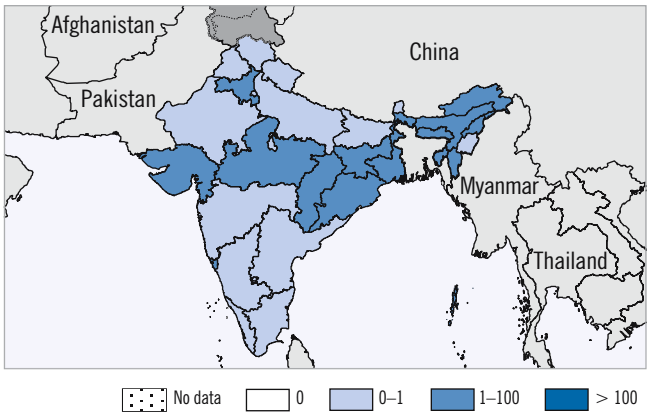
Population (000)	2006	%
All age groups	1 151 751	
< 5 years	126 843	11
≥ 5 years	1 024 908	89

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	312 316	27
Low transmission (0–1/1000)	663 064	58
Malaria-free (0 cases)	176 372	15
Rural population	818 112	71

Vector and parasite profile

Major *Anopheles* species: *culicifacies*, *dirus*, *fluviatilis*, *minimus*, *philippinensis*, *stephens*
Plasmodium species: *falciparum*, *vivax*

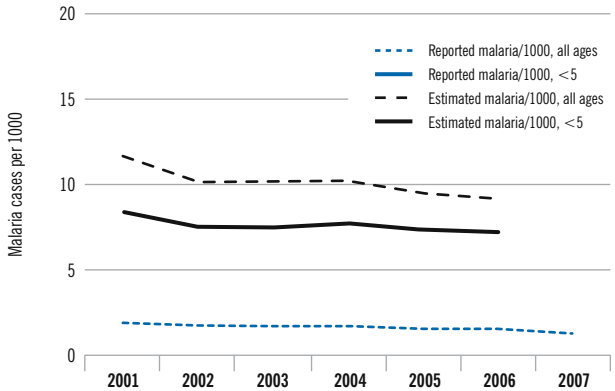
Stratification of burden (reported cases/1000)



Estimated burden of malaria	Age group	Estimated cases and deaths (2006) Numbers	Lower	Upper	Estimated cases and deaths per 1000 (2006) Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	635 991 000	556 475 000	883 196 000	552	483	767
	< 5 years	54 758 000	47 912 000	76 042 000	432	378	599
Malaria cases	All ages	10 650 000	9 003 000	12 414 000	9.0	8.0	11
	< 5 years	917 000	775 000	1 069 000	7.0	6.0	8.0
Malaria deaths	All ages	15 000	9 600	21 000	0.01	0.01	0.02
	< 5 years	4 900	3 100	6 800	0.04	0.02	0.05
Malaria case-fatality rate (%)	All ages	0.14			—	—	—
	< 5 years	0.53			—	—	—

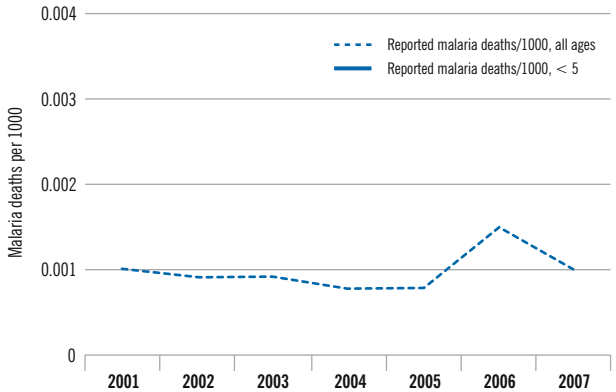
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	2 085 484	1 841 227	1 869 403	1 915 363	1 816 569	1 785 109	1 476 562
Reported malaria cases, < 5 years							
All-cause outpatient consultations, all ages							
All-cause outpatient consultations, < 5 years							

Reported malaria deaths, per 1000



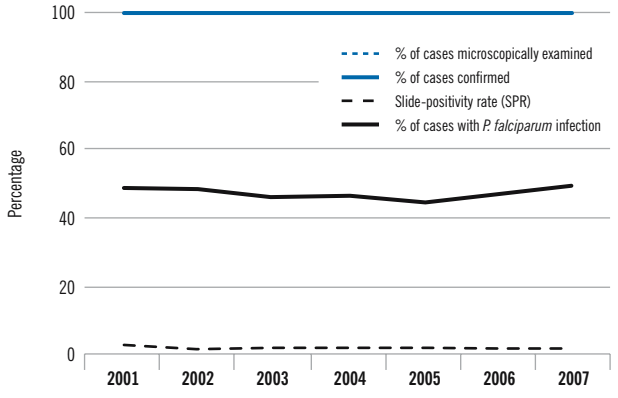
	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	1 015	973	1 006	949	963	1 708	1 173
Reported malaria deaths, < 5 years							
All-cause deaths, all ages							
All-cause deaths, < 5 years							

I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000

No data

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined	90 389 019	91 617 725	99 136 143	97 111 526	104 120 792	106 606 703	94 855 005
Positive	2 085 484	1 841 227	1 869 403	1 915 363	1 816 569	1 785 109	1 476 562
P. falciparum	1 005 236	897 446	857 101	890 152	805 077	838 555	725 502

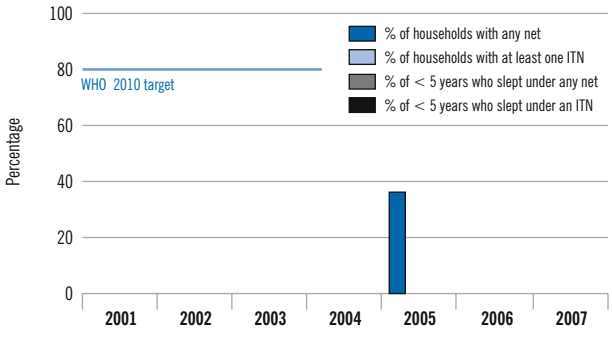
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution – Free	Yes	2001	Distribution – Antenatal care	Yes	2003
	Targeting – All age groups	No	—	Distribution – EPI routine and campaign	No	—
	Targeting – Children under 5 years and pregnant women	Yes	—			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	Yes	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	Yes	—	IRS is the primary vector-control intervention	Yes	—
				IRS is used for prevention and control of epidemics	Yes	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	2001
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	No	—	IPT implemented countrywide	No	—
Case management	ACT is free or highly subsidized in public sectors	Yes	—	Free malaria diagnosis and first-line treatment of malaria	Yes	—
	Oral artemisinin monotherapies banned	Yes	—	Home management of malaria	Yes	—
	Parasitological confirmation for all age groups	Yes	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	Yes	—
				RDTs in areas without microscopy	Yes	2004

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	CQ+PQ	2007
First-line treatment of *P. falciparum* (confirmed)	AS+AP	2007
Treatment failure of *P. falciparum*	—	2007
Treatment of severe malaria	QN/AM	2007
Treatment of *P. vivax*	CQ+PQ(14d)	—

III. IMPLEMENTING MALARIA CONTROL

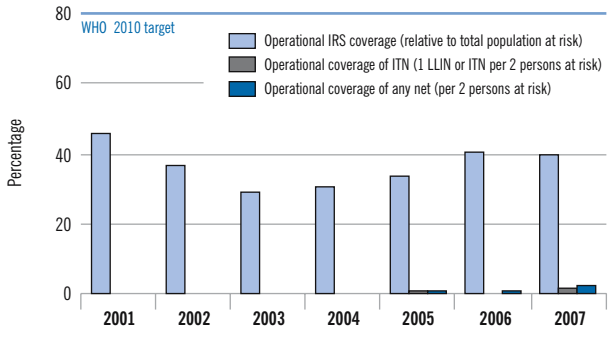
Coverage of ITN: survey data



	2001	2002	2003	2004	2005	2006	2007
% of pregnant women who slept under any net							
% of pregnant women who slept under an ITN							

Source: DHS 2005–2006.

Coverage of IRS and ITN: programme data

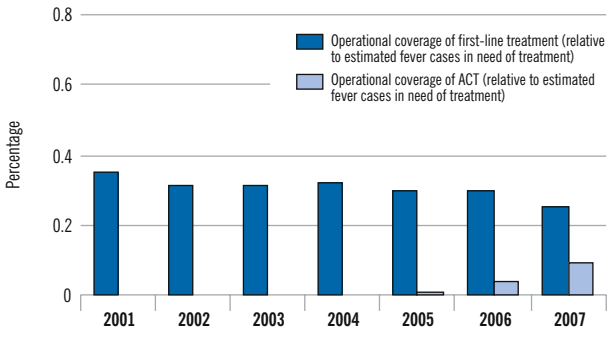


	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS	92 732 282	75 864 024	60 425 231	64 520 714	73 282 197	88 334 429	88 815 998
No. of ITNs and/or LLINs	175 000	90 000	230 000	1 200 000	2 720 000	1 495 000	7 000 000

Access by febrile children to effective treatment: survey data

No data

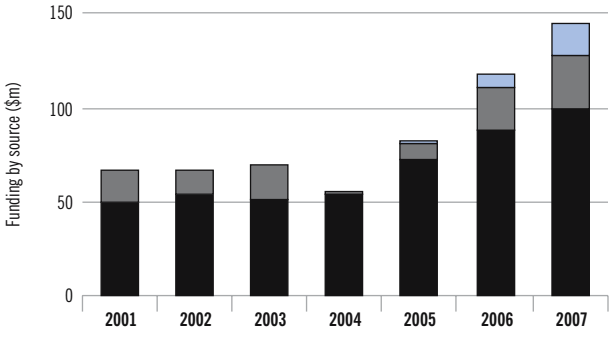
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received	2 085 484	1 842 019	1 869 403	1 915 363	1 816 342	1 780 777	1 476 562
No. of ACT treatment courses received					57 700	242 300	550 000

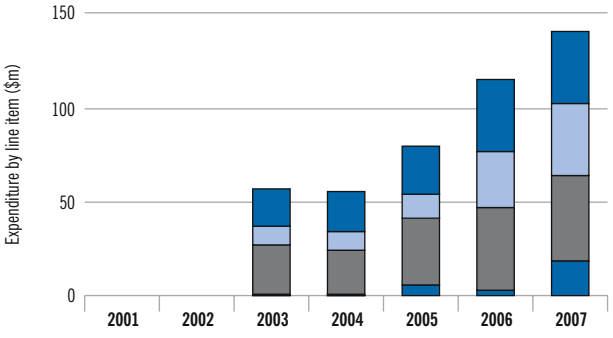
IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others							
Bilaterals							
European Union							
GFATM					912 325	8 227 900	15 727 050
World Bank	16 266 608	13 969 726	18 535 966	1 372 056	9 512 474	22 400 000	29 500 000
UN agencies							
Gov. malaria expenditure	50 495 000	53 750 000	52 000 000	54 750 000	72 397 500	87 895 000	99 010 000

Breakdown of expenditure by intervention



	2001	2002	2003	2004	2005	2006	2007
Others							
Treatment			19 581 760	21 297 213	25 670 343	37 852 753	39 000 000
Diagnosis			9 830 000	10 046 056	13 393 140	30 343 013	38 183 775
IRS			26 899 863	24 316 398	34 974 385	42 890 261	45 585 150
ITN			450 000	258 000	6 256 000	3 737 500	18 340 000

V. SOURCES OF INFORMATION

Programme data		Survey and other data	
Reported cases	Surveillance data	Insecticide-treated nets (ITN)	DHS 2005-06
Operational coverage of ITNs, IRS and access to medicines	Programme report	Treatment	MICS 2000
Financial data	Programme report	Use of health services	DHS 2005

Kenya

Kenya had an estimated 11.3 million malaria cases in 2006. The majority of cases are caused by *P. falciparum* but most are unconfirmed. The number of reported cases increased in 4 out of 5 years between 2001 and 2006; it is not known whether this represents improved reporting or an increase in incidence. No reports of malaria deaths were provided over this period, though estimates suggest that 27 000 people died in 2006. ITN covered 65% of the people at risk in 2006. The NMCP distributed 7.1 million ITNs in 2006, of which 6.3 million were LLINs. 5 million ACT courses were provided in 2006, far fewer than would be needed to treat all fever cases. Funding for malaria control was US$ 70 million in 2005 and US$ 46 million in 2006, provided mostly by the Global Fund and bilateral donors.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

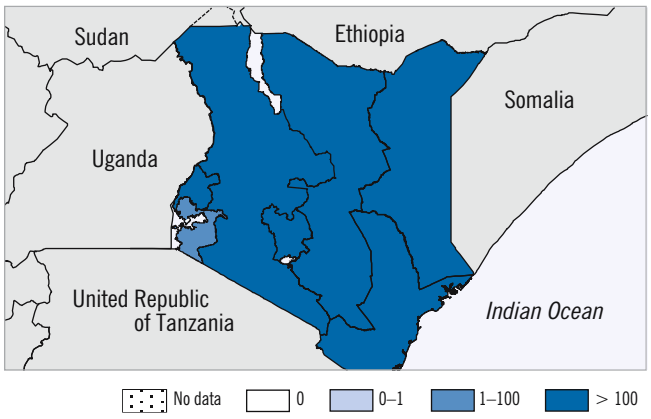
Population (000)	2006	%
All age groups	36 553	
< 5 years	6 161	17
≥ 5 years	30 392	83

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	13 193	36
Low transmission (0–1/1000)	14 537	40
Malaria-free (0 cases)	8 823	24
Rural population	28 879	79

Vector and parasite profile

Major *Anopheles* species: *arabiensis*, *funestus*, *gambiae*, *melas*, *nili, paludis*, *pharoensis*
Plasmodium species: *falciparum*, *vivax*

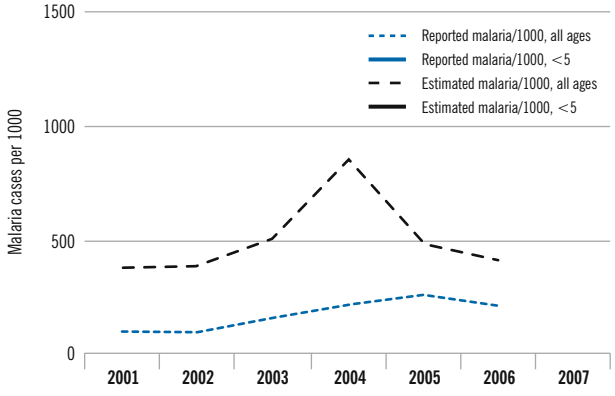
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	30 193 000	11 746 000	52 746 000	826	321	1 443
	< 5 years				—	—	—
Malaria cases	All ages	11 342 000	4 785 000	19 064 000	310	131	522
	< 5 years				—	—	—
Malaria deaths	All ages	27 000	11 000	48 000	0.74	0.30	1.3
	< 5 years	18 000	7 300	31 000	2.9	1.2	5.0
Malaria case-fatality rate (%)	All ages	0.24			—	—	—
	< 5 years				—	—	—

Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	3 262 931	3 319 399	5 090 639	7 545 541	9 181 224	7 958 704	
Reported malaria cases, < 5 years							
All-cause outpatient consultations, all ages	10 443 984	9 944 058	15 067 165	22 691 025	33 256 138	28 955 219	
All-cause outpatient consultations, < 5 years							

Reported malaria deaths, per 1000

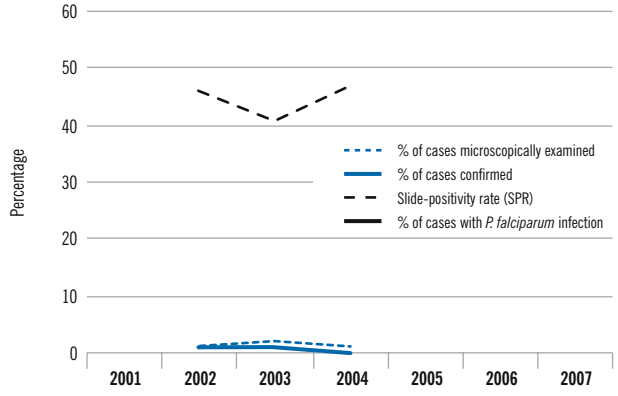
No data

I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000

No data

Slide examination, case confirmation, *Plasmodium* spp



	2002	2003	2004
Examined	43 643	96 893	59 995
Positive	20 049	39 383	28 328
P. falciparum	20 049	39 383	28 328

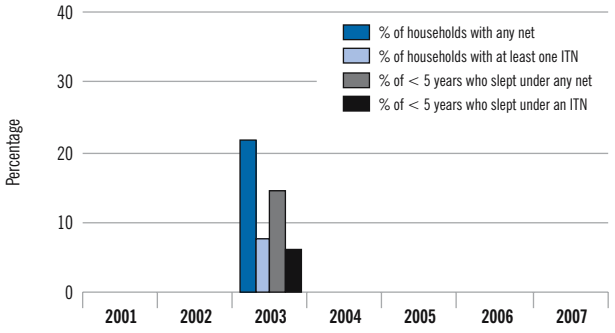
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	2006	Distribution – Antenatal care	Yes	2005
	Targeting – All age groups	No	—	Distribution – EPI routine and campaign	Yes	2006
	Targeting – Children under 5 years and pregnant women	Yes	2001			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	No	—	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	Yes	2003
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	—
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2001	IPT implemented countrywide	No	—
Case management	ACT is free or highly subsidized in public sectors	Yes	2006	Free malaria diagnosis and first-line treatment of malaria	No	—
	Oral artemisinin monotherapies banned	No	—	Home management of malaria	No	—
	Parasitological confirmation for all age groups	No	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	Yes	2006
				RDTs in areas without microscopy	No	—

	Antimalarial medicines	Type of medicine	Year adopted
	First-line treatment of *P. falciparum* (unconfirmed)	AL	2004
	First-line treatment of *P. falciparum* (confirmed)	AL	2004
	Treatment failure of *P. falciparum*	QN(7d)	2004
	Treatment of severe malaria	QN(7d)	2004
	Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

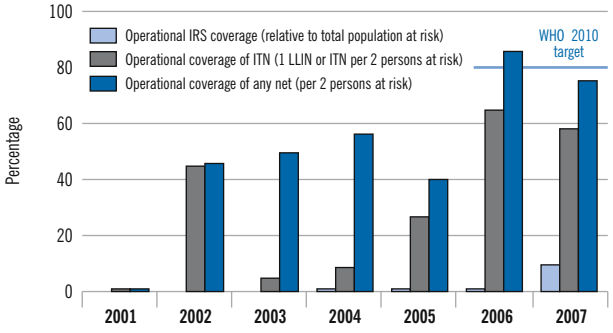
Coverage of ITN: survey data



	2001	2002	2003	2004	2005	2006	2007
% of pregnant women who slept under any net			13				
% of pregnant women who slept under an ITN			5				

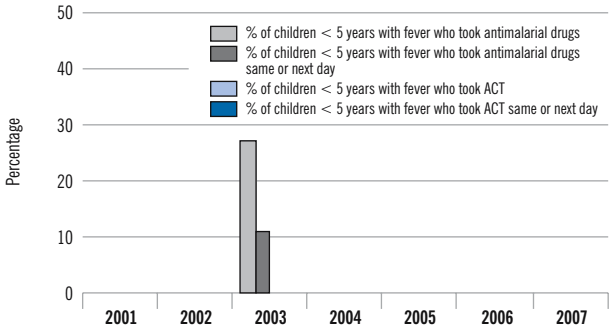
Source: DHS 2003.

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS				60 000	93 000	110 000	691 841
No. of ITNs and/or LLINs	120 010	5 550 563	643 218	1 169 600	3 655 576	7 102 752	

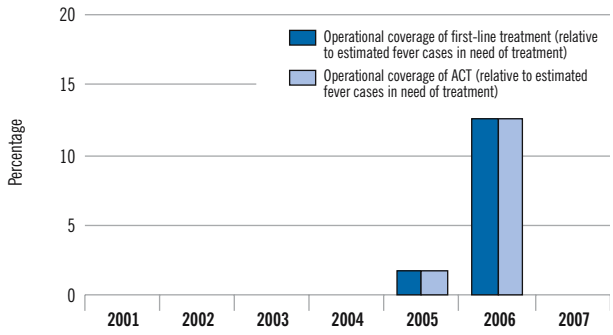
Access by febrile children to effective treatment: survey data



	2001	2002	2003	2004	2005	2006	2007
% of children < 5 years with fever			42				
% of febrile children < 5 years who sought treatment in health facility			43				

Source: DHS 2003.

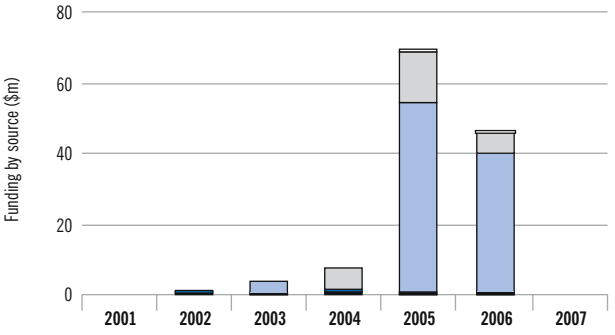
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received					723 333	5 049 000	
No. of ACT treatment courses received					723 333	5 049 000	

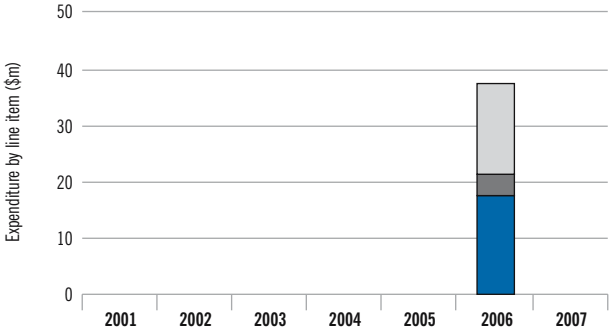
IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others	0	0	0	0	441 400	119 971	
Bilaterals	0	0	0	5 563 684	14 525 404	6 236 657	
European Union	0	0	0	0	0	0	
GFATM	0	0	3 976 069	0	53 698 910	39 858 515	
World Bank	0	0	0	0	0	0	
UN agencies		47 210		830 802	672 911	30 000	
Gov. malaria expenditure	27 631	774 984	84 882	1 233 505	379 494	308 660	

Breakdown of expenditure by intervention



	2006
Others	
Treatment	16 100 000
Diagnosis	
IRS	3 800 000
ITN	17 500 000

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	NMCP	Surveillance data	Insecticide-treated nets (ITN)	MICS 2000, DHS 2003
Operational coverage of ITNs, IRS and access to medicines	NCMP	Programme report	Treatment	MICS 2000, DHS 2003
Financial data	NMCP	Programme report	Use of health services	DHS 2003

Madagascar

Transmission occurs all year round in the north, with stronger seasonal peaks between September and June elsewhere. Reported malaria cases dropped from 2.2 million in 2003 to 790 000 in 2007, and there was a marked fall in malaria deaths over the same period, perhaps in response to the growing use of ITNs, IRS and ACT. The NMCP distributed nearly 5 million LLINs over the period 2006–2007, covering half the target population. IRS has also increased since 2003, covering 250 000 households and protecting 1.4 million people at risk in 2006. ACT became more widely available in 2007. Funding for malaria control increased every year in 2003–2006; support from the Global Fund, World Bank, UN and bilateral agencies exceeded US$ 53 million in 2006.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

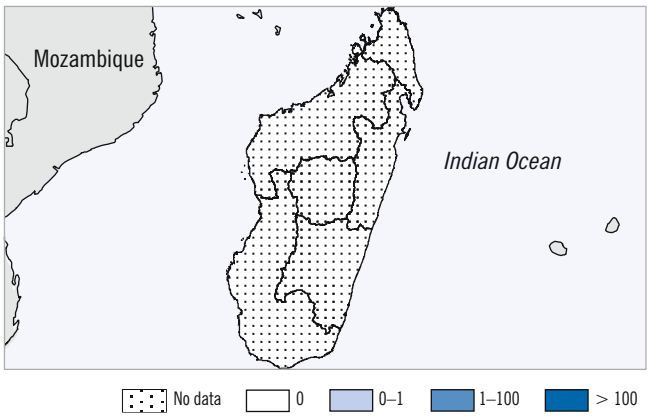
Population (000)	2006	%
All age groups	19 159	
< 5 years	3 142	16
≥ 5 years	16 017	84

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	9 977	52
Low transmission (0–1/1000)	9 182	48
Malaria-free (0 cases)	0	0
Rural population	13 979	73

Vector and parasite profile

Major *Anopheles* species: *arabiensis, coustani, flavicosta, funestus, gambiae, merus, pharoensis*
Plasmodium species: *falciparum*, *vivax*

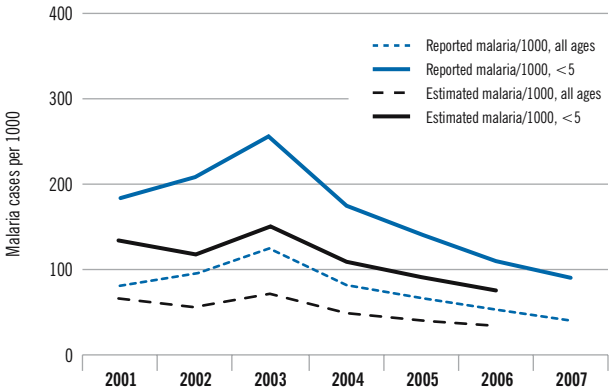
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	4 372 000	1 024 000	9 488 000	228	53	495
	< 5 years	1 594 000	373 000	3 459 000	507	119	1 101
Malaria cases	All ages	643 000	163 000	1 286 000	34	9.0	67
	< 5 years	234 000	59 000	469 000	74	19	149
Malaria deaths	All ages	2 300	630	4 200	0.12	0.03	0.22
	< 5 years	1 800	490	3 300	0.57	0.16	1.1
Malaria case-fatality rate (%)	All ages	0.36			—	—	—
	< 5 years	0.77			—	—	—

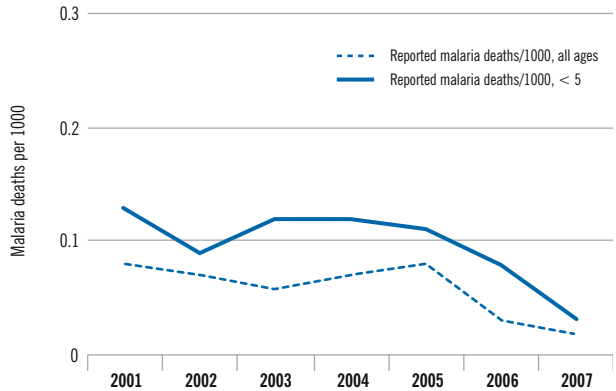
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	1 356 520	1 598 818	2 198 035	1 458 428	1 227 632	1 012 639	790 510
Reported malaria cases, < 5 years	536 811	612 724	774 142	534 201	434 074	340 640	294 230
All-cause outpatient consultations, all ages	7 425 845	8 189 035	11 713 586	8 182 883	7 321 105	6 601 290	
All-cause outpatient consultations, < 5 years	2 307 873	2 505 497	2 572 599	2 647 870	2 817 099	1 845 989	

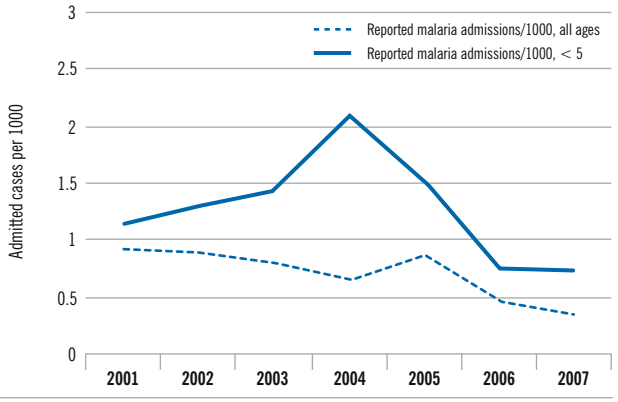
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	1 300	1 268	1 091	1 194	1 407	590	371
Reported malaria deaths, < 5 years	382	271	369	358	333	239	107
All-cause deaths, all ages							
All-cause deaths, < 5 years							

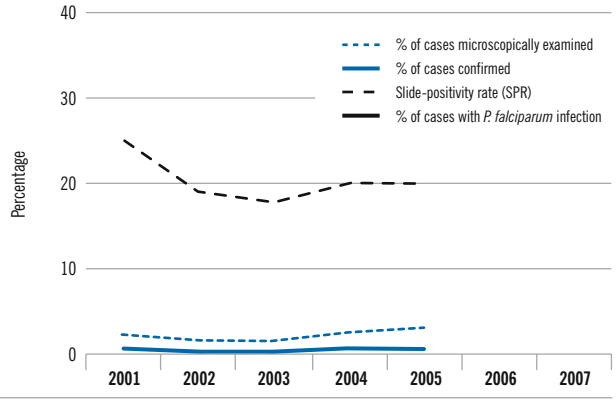
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	15 365	15 458	13 981	12 148	16 250	8 820	6 928
Reported malaria admissions (< 5)	3 298	3 802	4 313	6 384	4 713	2 343	2 343
All-cause admissions, all ages	311 952	283 726	432 123	413 470	407 361		
All-cause admissions, < 5 years							

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined	31 354	27 752	37 753	39 174	37 943		
Positive	7 838	5 273	6 796	7 834	7 588		
P. falciparum							

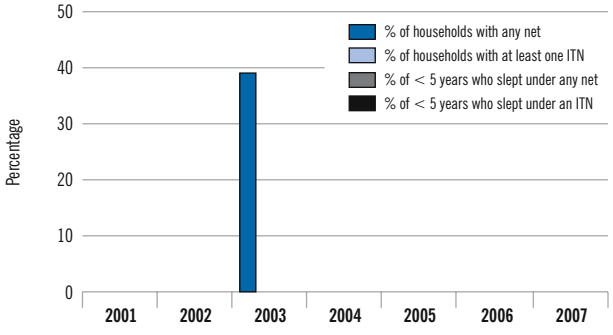
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	2004	Distribution – Antenatal care	Yes	2005
	Targeting – All age groups	Yes	2007	Distribution – EPI routine and campaign	Yes	2004
	Targeting – Children under 5 years and pregnant women	Yes	2000			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	2005	DDT is used alternately with other insecticides in the same area	No	2005
	Insecticide-resistance management implemented	Yes	1998	IRS is the primary vector-control intervention	Yes	1998
				IRS is used for prevention and control of epidemics	Yes	1998
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	1998
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2004	IPT implemented countrywide	No	2004
Case management	ACT is free or highly subsidized in public sectors	Yes	2006	Free malaria diagnosis and first-line treatment of malaria	Yes	2006
	Oral artemisinin monotherapies banned	Yes	2005	Home management of malaria	Yes	1998
	Parasitological confirmation for all age groups	Yes	2006	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	No	2006
				RDTs in areas without microscopy	Yes	2006

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AS+AQ	2006
First-line treatment of *P. falciparum* (confirmed)	AS+AQ	2006
Treatment failure of *P. falciparum*	QN(7d)	2006
Treatment of severe malaria	QN(7d)	2006
Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

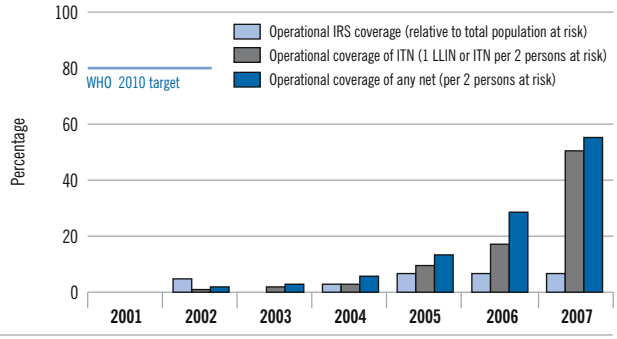
Coverage of ITN: survey data



	2001	2002	2003	2004	2005	2006	2007
% of pregnant women who slept under any net							
% of pregnant women who slept under an ITN							

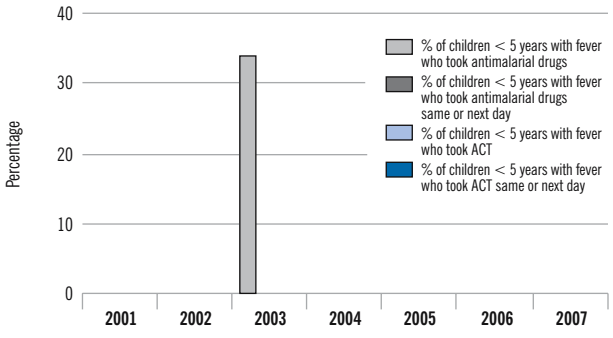
Source: DHS 2003–2004.

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS		174 386		102 400	250 000	250 000	248 269
No. of ITNs and/or LLINs	40 581	104 479	138 783	253 921	871 570	1 616 200	2 942 563

Access by febrile children to effective treatment: survey data



	2001	2002	2003	2004	2005	2006	2007
% of children < 5 years with fever			21				
% of febrile children < 5 years who sought treatment in health facility			38				

Source: DHS 2003.

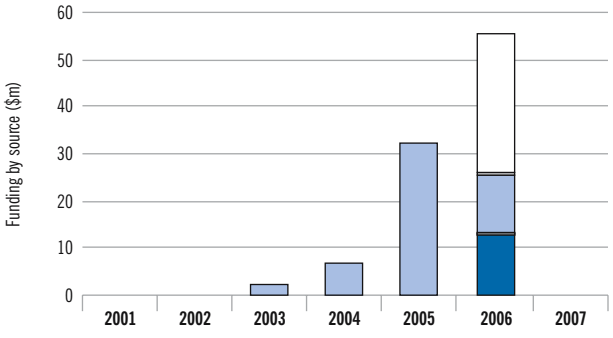
Access to effective treatment: programme data

No data

	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received							
No. of ACT treatment courses received							733 098

IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others						29 190 207	
Bilaterals						475 000	
European Union							
GFATM			2 000 063	6 744 844	31 927 971	12 786 722	
World Bank						90 000	
UN agencies						12 751 000	
Gov. malaria expenditure							

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	sss:minsanpfps	Surveillance data	Insecticide-treated nets (ITN)	MICS 2000, DHS 2003–2004
Operational coverage of ITNs, IRS and access to medicines	sss:minsanpfps	Programme report	Treatment	MICS 2000, DHS 2003–2004
Financial data	sss:minsanpfps	Programme report	Use of health services	DHS 2003

Malawi

Malaria is endemic in all parts of the country, with seasonal peaks between December and June. The majority of cases are caused by *P. falciparum*, but most are not confirmed. There is no evidence of a decline in malaria cases and deaths over the period 2001–2006, despite improvements in the coverage of ITNs. The NMCP distributed over 4.6 million ITNs between 2003 and 2006, and a 2006 survey found that 36% of households had at least one ITN. In 2006, 24% of febrile children under 5 years were treated with an antimalarial; ACT was adopted as the recommended method of treatment only in 2007. US$ 23 million was spent on malaria control in 2006, provided by government, the Global Fund, the World Bank and UN agencies.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

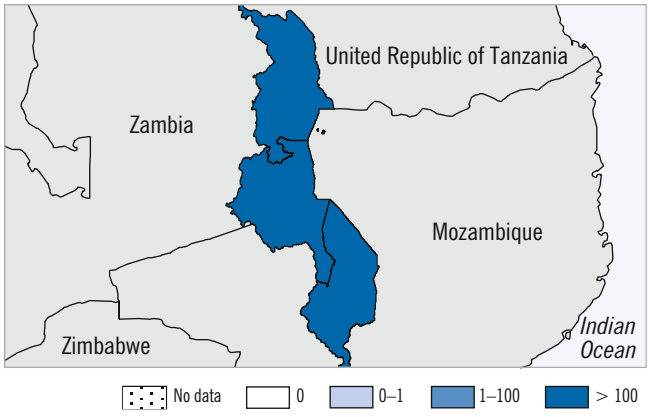
Population (000)	2006	%
All age groups	13 571	
< 5 years	2 425	18
≥ 5 years	11 145	82

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	13 571	100
Low transmission (0–1/1000)	0	0
Malaria-free (0 cases)	0	0
Rural population	11 183	82

Vector and parasite profile

Major *Anopheles* species: *coustani, funestus, gambiae, paludis, pharoensis*
Plasmodium species: *falciparum*, *vivax*

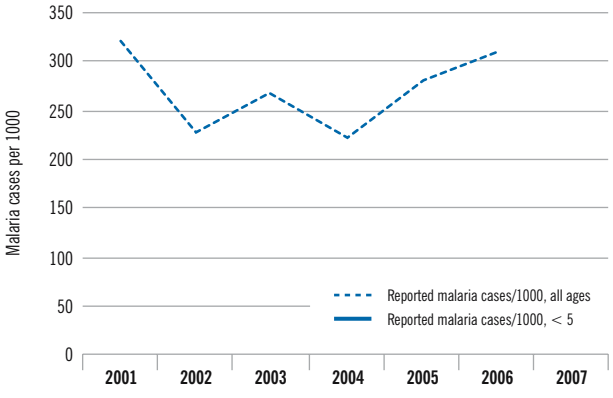
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	13 343 000	7 358 000	19 761 000	983	542	1 456
	< 5 years	7 610 000	1 441 000	14 517 000	3 1383	594	5 985
Malaria cases	All ages	4 528 000	2 497 000	6 705 000	334	184	494
	< 5 years	2 582 000	489 000	4 926 000	1 065	202	2 031
Malaria deaths	All ages	13 000	6 100	21 000	0.96	0.45	1.5
	< 5 years	11 000	5 200	18 000	4.5	2.1	7.4
Malaria case-fatality rate (%)	All ages	0.29			—	—	—
	< 5 years	0.43			—	—	—

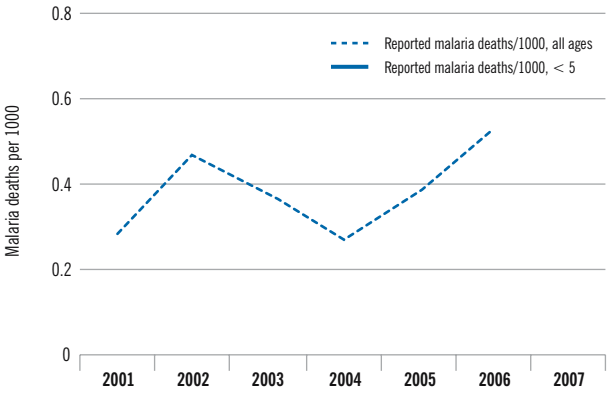
Trends in malaria morbidity and mortality

Reported malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	3 823 796	2 784 001	3 358 960	2 871 098	3 688 389	4 204 468	
Reported malaria cases, < 5 years						2 065 004	
All-cause outpatient consultations, all ages					15 753 331	14 014 893	
All-cause outpatient consultations, < 5 years							

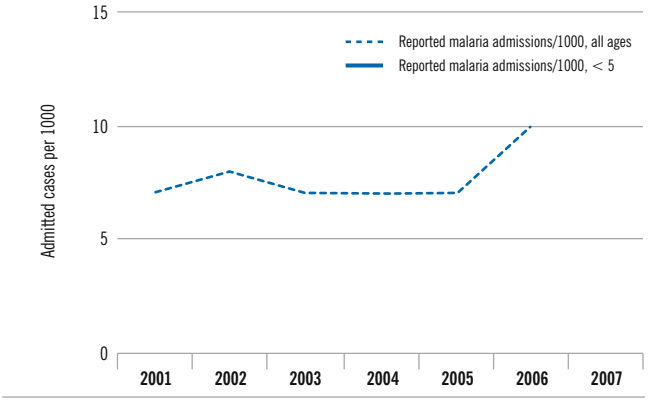
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	3 355	5 775	4 767	3 457	5 070	7 132	
Reported malaria deaths, < 5 years							
All-cause deaths, all ages							
All-cause deaths, < 5 years							

I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	78 862	96 074	89 406	84 044	92 517	141 710	
Reported malaria admissions (< 5)	17 466						
All-cause admissions, all ages							
All-cause admissions, < 5 years							

Slide examination, case confirmation, *Plasmodium* spp

No data

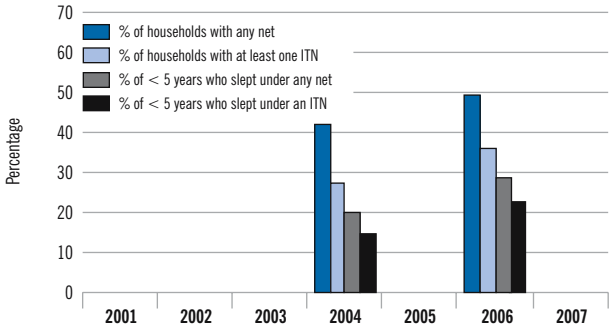
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	2006	Distribution – Antenatal care	Yes	2002
	Targeting – All age groups	No	—	Distribution – EPI routine and campaign	No	—
	Targeting – Children under 5 years and pregnant women	Yes	2002			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	No	—	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	No	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	2005
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	—	IPT implemented countrywide	Yes	—
Case management	ACT is free or highly subsidized in public sectors	Yes	2007	Free malaria diagnosis and first-line treatment of malaria	Yes	—
	Oral artemisinin monotherapies banned	Yes	2006	Home management of malaria	No	—
	Parasitological confirmation for all age groups	No	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	Yes	—
				RDTs in areas without microscopy	No	—

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AL	2007
First-line treatment of *P. falciparum* (confirmed)	AL	2007
Treatment failure of *P. falciparum*	AS+AQ	2007
Treatment of severe malaria	QN(7d)	2007
Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

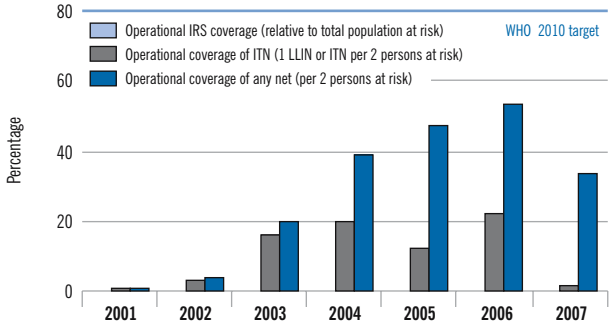
Coverage of ITN: survey data



% of pregnant women who slept under any net	19
% of pregnant women who slept under an ITN	15

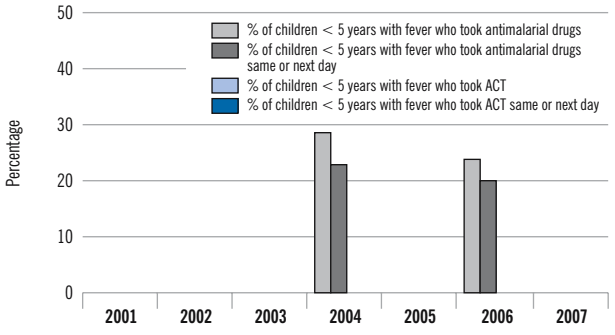
Source: DHS 2004, MICS 2006.

Coverage of IRS and ITN: programme data



No. of households protected by IRS						
No. of ITNs and/or LLINs	46 062	185 968	1 029 884	1 295 498	815 620	1 508 735

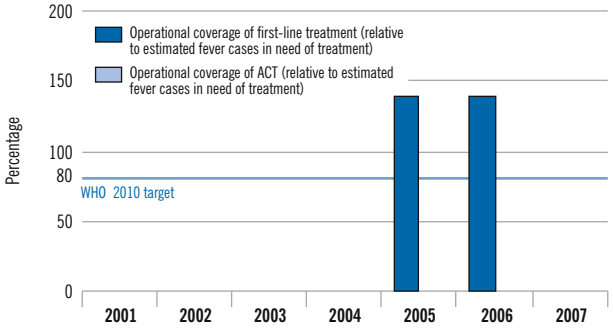
Access by febrile children to effective treatment: survey data



% of children < 5 years with fever	20
% of febrile children < 5 years who sought treatment in health facility	30

Source: DHS 2004, MICS 2006.

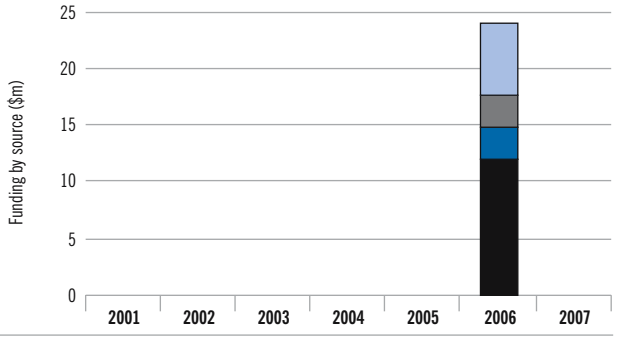
Access to effective treatment: programme data



No. of first-line treatment courses received					27 903 000	27 903 000
No. of ACT treatment courses received						

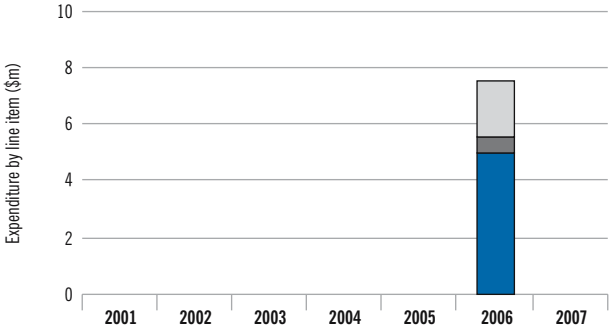
IV. FINANCING MALARIA CONTROL

Governmental and external financing



Others	
Bilaterals	
European Union	
GFATM	6 300 000
World Bank	3 000 000
UN agencies	2 700 000
Gov. malaria expenditure	12 000 000

Breakdown of expenditure by intervention



Others	
Treatment	2 000 000
Diagnosis	
IRS	50000
ITN	5 000 000

V. SOURCES OF INFORMATION

Programme data		Survey and other data		
Reported cases	HMIS /IDSR	Surveillance data	Insecticide-treated nets (ITN)	DHS 2000, DHS 2004, MICS 2006
Operational coverage of ITNs, IRS and access to medicines	HMIS /NMCP	Programme report	Treatment	DHS 2000, DHS 2004, MICS 2006
Financial data	HMIS /NMCP	Programme report	Use of health services	DHS 2004

Mali

Mali had an estimated 4.3 million malaria cases in 2006, 2% of the total for the WHO African Region. Malaria transmission is more intensive in the southern part of the country with seasonal peaks between May and November. Almost all cases are caused by *P. falciparum*, but the number confirmed is unknown despite recent improvements in diagnostic services. An exceptionally large number of cases was reported in 2004; reported deaths increased more than threefold between 2001 and 2006. In 2005 and 2006 combined, the NMCP distributed nearly 700 000 LLINs. However, this is still inadequate to cover 12 million people at risk. IRS is not national policy. Although Mali has adopted ACT, there are no data on the number of people treated. Government expenditure on malaria control is unknown, and no details have been given of disbursement from the Global Fund grant awarded in 2001 and 2006.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

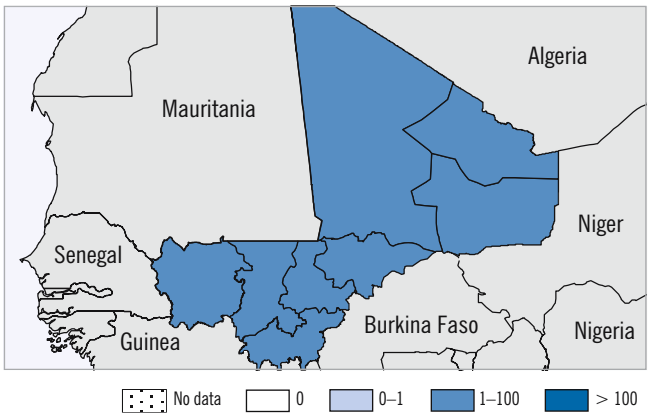
Population (000)	2006	%
All age groups	11 968	
< 5 years	2 247	19
≥ 5 years	9 721	81

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	10 910	91
Low transmission (0–1/1000)	1 059	9
Malaria-free (0 cases)	0	0
Rural population	8 256	69

Vector and parasite profile

Major *Anopheles* species: *arabiensis*, *brochieri*, *coustani*, *flavicosta, funestus*, *gambiae*, *hancocki*, *nili, paludis*, *pharoensis*
Plasmodium species: *falciparum*, *vivax*

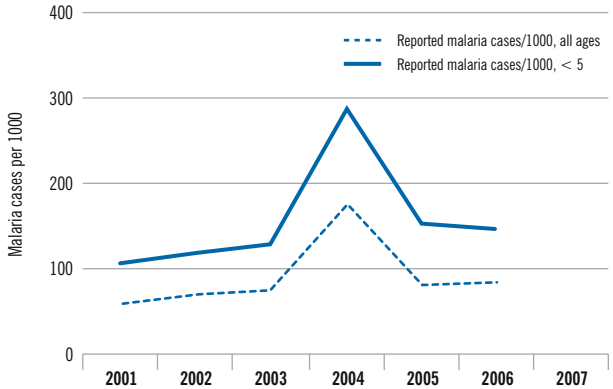
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	13 250 000	7 595 000	19 203 000	1 107	635	1 604
	< 5 years	8 010 000	1 402 000	15 379 000	3 565	624	6 844
Malaria cases	All ages	4 317 000	2 475 000	6 257 000	361	207	523
	< 5 years	2 610 000	457 000	5 011 000	1 162	203	2 230
Malaria deaths	All ages	24 000	12 000	39 000	2.0	1.0	3.3
	< 5 years	22 000	12 000	37 000	9.8	5.3	16
Malaria case-fatality rate (%)	All ages	0.56			—	—	—
	< 5 years	0.84			—	—	—

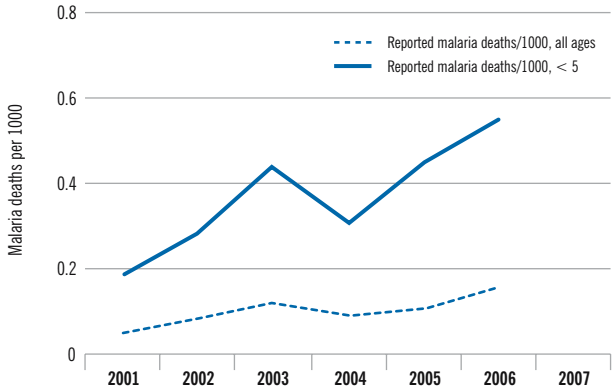
Trends in malaria morbidity and mortality

Reported malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	612 896	723 077	809 428	1 969 214	962 706	1 022 592	
Reported malaria cases, < 5 years	211 018	243 390	267 133	611 680	335 701	332 495	
All-cause outpatient consultations, all ages	2 065 677	2 289 524	2 533 291	2 626 206	2 652 526	3 126 181	
All-cause outpatient consultations, < 5 years	665 692	736 139	794 023	815 931	870 359	902 043	

Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	562	826	1 309	1 012	1 285	1 914	
Reported malaria deaths, < 5 years	382	574	908	659	971	1 233	
All-cause deaths, all ages	17 925	2 561	3 095	2 664	3 896	5 132	
All-cause deaths, < 5 years	7 303	999	1 461	1 073	1 637	2 207	

I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000

No data

Slide examination, case confirmation, *Plasmodium* spp

No data

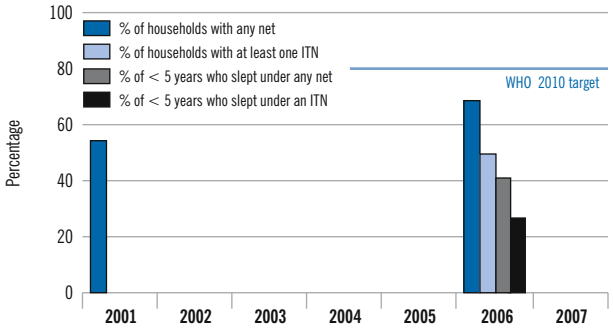
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	2005	Distribution – Antenatal care	Yes	2006
	Targeting – All age groups	No	—	Distribution – EPI routine and campaign	Yes	2005
	Targeting – Children under 5 years and pregnant women	Yes	2006			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	No	—	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	No	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	No	—
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2003	IPT implemented countrywide	Yes	2004
Case management	ACT is free or highly subsidized in public sectors	Yes	—	Free malaria diagnosis and first-line treatment of malaria	No	—
	Oral artemisinin monotherapies banned	No	—	Home management of malaria	Yes	—
	Parasitological confirmation for all age groups	Yes	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	No	—
				RDTs in areas without microscopy	Yes	2007

	Antimalarial medicines	Type of medicine	Year adopted
	First-line treatment of *P. falciparum* (unconfirmed)	AL	2004
	First-line treatment of *P. falciparum* (confirmed)	AL	2004
	Treatment failure of *P. falciparum*	AS+SP	2004
	Treatment of severe malaria	QN(7d)	2004
	Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

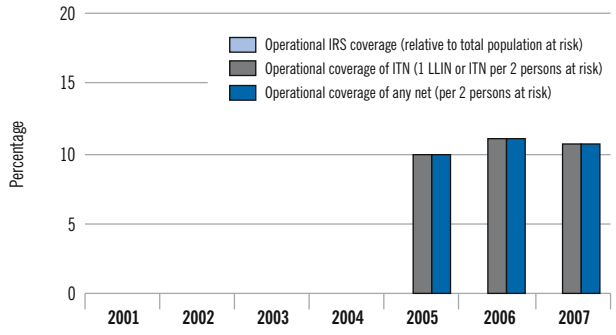
Coverage of ITN: survey data



% of pregnant women who slept under any net	
% of pregnant women who slept under an ITN	29

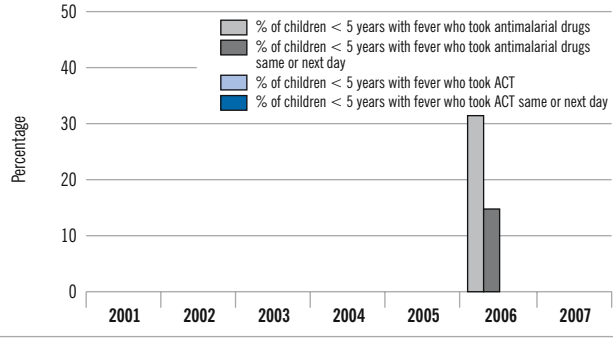
Source: DHS 2001, DHS 2006.

Coverage of IRS and ITN: programme data



No. of households protected by IRS		
No. of ITNs and/or LLINs	572 556	90 900

Access by febrile children to effective treatment: survey data



% of children < 5 years with fever	27
% of febrile children < 5 years who sought treatment in health facility	22

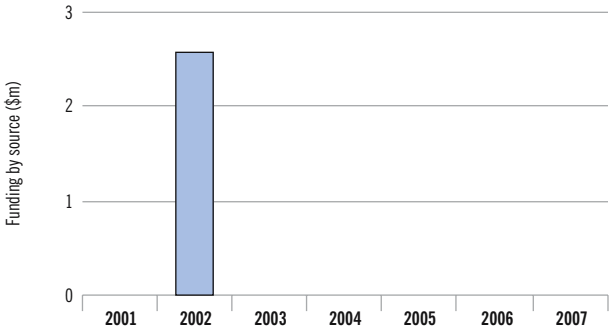
Source: DHS 2001, DHS 2006.

Access to effective treatment: programme data

No data

IV. FINANCING MALARIA CONTROL

Governmental and external financing



Others	
Bilaterals	
European Union	
GFATM	2592990
World Bank	
UN agencies	
Gov. malaria expenditure	

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data		Survey and other data		
Reported cases	SLIS	Surveillance data	Insecticide-treated nets (ITN)	DHS 2001, DHS 2006
Operational coverage of ITNs, IRS and access to medicines	SLIS	Programme report	Treatment	DHS 2001, DHS 2006
Financial data	SLIS	Programme report	Use of health services	DHS 2006

Mozambique

Mozambique had an estimated 7.4 million malaria cases in 2006. Transmission is seasonal, and mainly between November and July. The majority of malaria cases are caused by *P. falciparum* but most are unconfirmed. Reported cases increased between 2001 and 2006; reported deaths fluctuated around an average of 4000 (compared with 23 000 estimated). IRS has been a principal method of mosquito control, covering 1.5 million households in 2006 (37% of people at risk). The NMCP distributed about 700 000 ITNs in each of 2005 and 2006, far fewer than are needed to protect the 18 million people at risk. A 2007 survey reported that 37% of households owned a net, but only 16% had an ITN. ACT has been used since 2006 as a second-line treatment. The NMCP has provided no information about funding, though awards have been made by the Global Fund, the World Bank and other donors.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

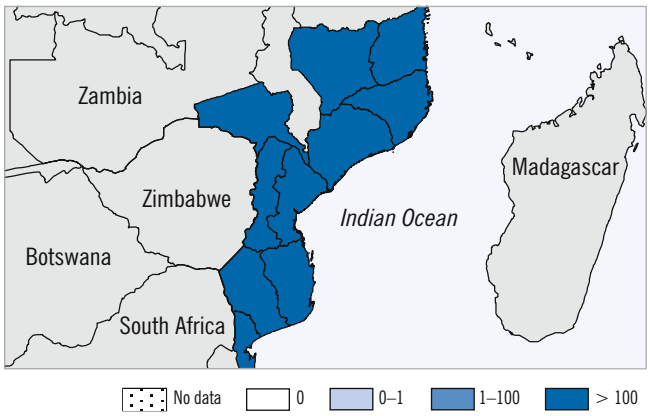
Population (000)	2006	%
All age groups	20 971	
< 5 years	3 670	18
≥ 5 years	17 301	82

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	20 971	100
Low transmission (0–1/1000)	0	0
Malaria-free (0 cases)	0	0
Rural population	13 573	65

Vector and parasite profile

Major *Anopheles* species: *funestus*, *s.l.*, *gambiae*, *s.l.*
Plasmodium species: *falciparum*, *vivax*

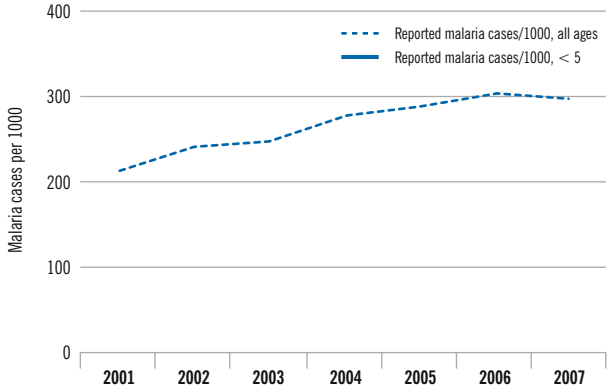
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	22 234 000	13 039 000	31 896 000	1 060	622	1 521
	< 5 years	13 371 000	2 275 000	25 758 000	3 643	620	7 018
Malaria cases	All ages	7 433 000	4 359 000	10 662 000	354	208	508
	< 5 years	4 470 000	760 000	8 611 000	1 218	207	2 346
Malaria deaths	All ages	19 000	10 000	31 000	0.91	0.48	1.5
	< 5 years	15 000	7 800	24 000	4.1	2.1	6.5
Malaria case-fatality rate (%)	All ages	0.26			—	—	—
	< 5 years	0.34			—	—	—

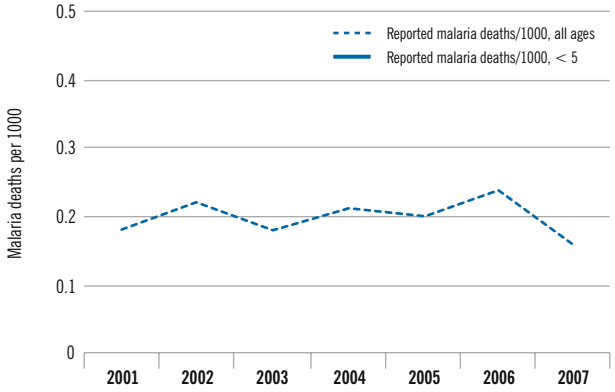
Trends in malaria morbidity and mortality

Reported malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	3 947 335	4 592 799	4 863 406	5 610 884	5 896 411	6 335 757	6 327 916
Reported malaria cases, < 5 years							
All-cause outpatient consultations, all ages							
All-cause outpatient consultations, < 5 years							

Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	3 400	4 214	3 488	4 150	4 209	5 042	3 366
Reported malaria deaths, < 5 years							
All-cause deaths, all ages							
All-cause deaths, < 5 years							

I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000

No data

Slide examination, case confirmation, *Plasmodium* spp

No data

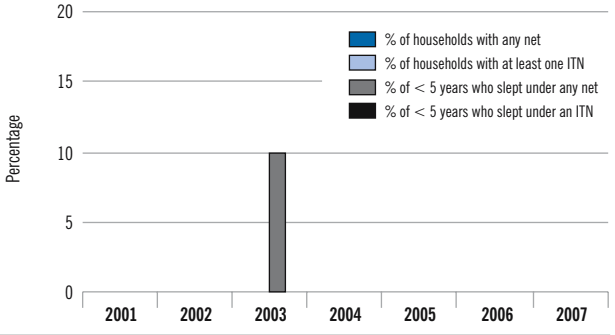
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	—	Distribution – Antenatal care	Yes	—
	Targeting – All age groups	No	—	Distribution – EPI routine and campaign	No	—
	Targeting – Children under 5 years and pregnant women	Yes	—			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	Yes	2005	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	No	—	IRS is the primary vector-control intervention	Yes	—
				IRS is used for prevention and control of epidemics	No	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	1999
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2005	IPT implemented countrywide	No	—
Case management	ACT is free or highly subsidized in public sectors	Yes	2006	Free malaria diagnosis and first-line treatment of malaria	Yes	—
	Oral artemisinin monotherapies banned	Yes	—	Home management of malaria	No	—
	Parasitological confirmation for all age groups	No	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	No	—
				RDTs in areas without microscopy	Yes	2006

	Antimalarial medicines	Type of medicine	Year adopted
	First-line treatment of *P. falciparum* (unconfirmed)	AL	2004
	First-line treatment of *P. falciparum* (confirmed)	AL	2004
	Treatment failure of *P. falciparum*	AS+AQ1	2004
	Treatment of severe malaria	QN(7d)	2004
	Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

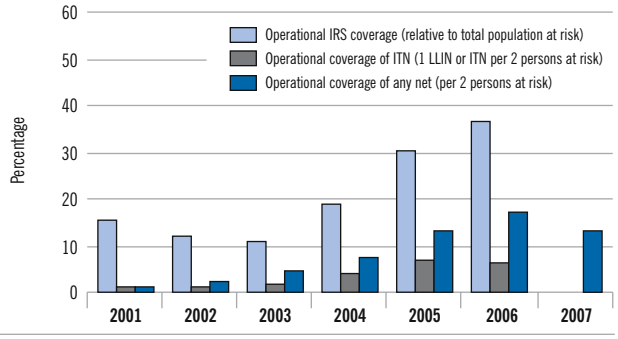
Coverage of ITN: survey data



	2001	2002	2003	2004	2005	2006	2007
% of pregnant women who slept under any net							
% of pregnant women who slept under an ITN							

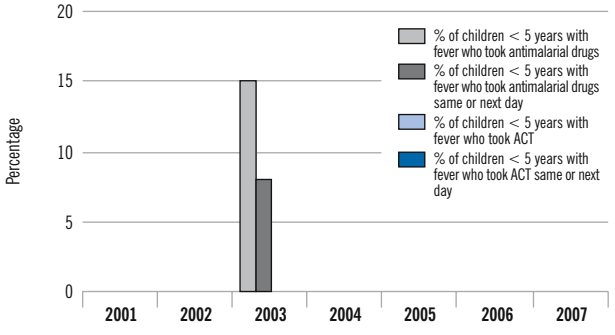
Source: DHS 2003 (National report).

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS	584 830	466 520	434 948	754 492	1 250 375	1 537 825	
No. of ITNs and/or LLINs	102 277	130 326	201 492	401 802	725 119	683 410	

Access by febrile children to effective treatment: survey data



	2001	2002	2003	2004	2005	2006	2007
% of children < 5 years with fever			27				
% of febrile children < 5 years who sought treatment in health facility			56				

Source: DHS 2003 (National report).

Access to effective treatment: programme data

No data

IV. FINANCING MALARIA CONTROL

Governmental and external financing

No data

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data		Survey and other data	
Reported cases	Surveillance data	Insecticide-treated nets (ITN)	DHS 2003 (National report)
Operational coverage of ITNs, IRS and access to medicines	Programme report	Treatment	DHS 2003 (National report)
Financial data	Programme report	Use of health services	DHS 2003

Myanmar

Myanmar had an estimated 4.2 million malaria cases in 2006, about 20% of all cases in the WHO South-East Asia Region. More than half of the suspected malaria cases are unconfirmed. Among those that are identified as malaria, 70% or more are caused by *P. falciparum*. Although much of the population is at risk of malaria, most vulnerable are non-immune migrant workers occupied with gem-mining in forests, logging, agriculture and construction. Reported numbers of cases and deaths were falling over the period 2002–2006, perhaps representing a real decline in the malaria burden. IRS has been used selectively. The number of ITNs distributed increased every year between 2001 and 2006, but population coverage is 5% or less. With increased support from UN agencies and other donors in 2005 and 2006, the availability of first-line drugs and ACT appears to have improved, and may be enough to treat all reported cases.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

Population (000)	2006	%
All age groups	48 379	
< 5 years	4 146	9
≥ 5 years	44 234	91

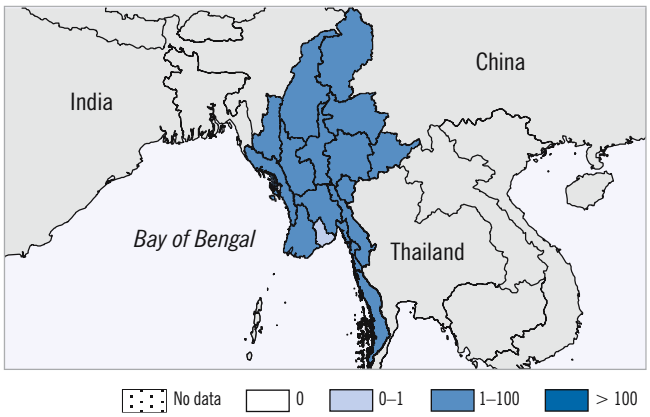
Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	25 583	53
Low transmission (0–1/1000)	8 791	18
Malaria-free (0 cases)	14 006	29
Rural population	33 253	69

Vector and parasite profile

Major *Anopheles* species: *dirus*, *jeyporiensis*, *maculatus*, *minimus*, *philippinensis*, *sundaicus*

Plasmodium species: *falciparum*, *vivax*

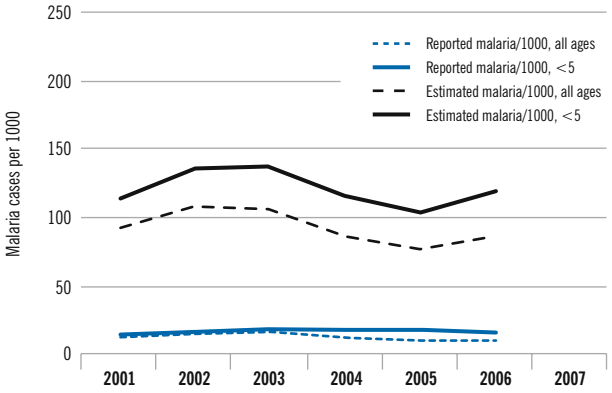
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	18 848 000	2 823 000	39 076 000	390	58	808
	< 5 years	2 214 000	332 000	4 590 000	534	80	1 107
Malaria cases	All ages	4 209 000	867 000	8 529 000	87	18	176
	< 5 years	494 000	102 000	1 002 000	119	25	242
Malaria deaths	All ages	9 100	2 400	17 000	0.19	0.05	0.35
	< 5 years	2 300	590	4 400	0.56	0.14	1.1
Malaria case-fatality rate (%)	All ages	0.22			—	—	—
	< 5 years	0.47			—	—	—

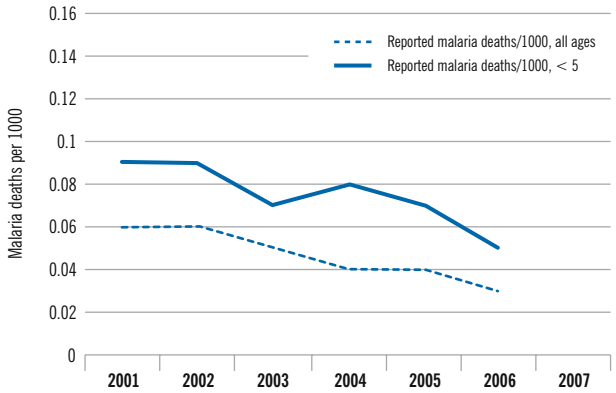
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006
Reported malaria cases, all ages	574 352	721 739	716 806	602 883	506 041	475 297
Reported malaria cases, < 5 years	58 450	71 716	72 946	72 403	74 046	64 392
All-cause outpatient consultations, all ages	5 182 738	5 243 515	5 250 160	5 195 966	5 406 736	5 222 385
All-cause outpatient consultations, < 5 years	1 079 481	645 782	667 332	698 782	734 521	691 546

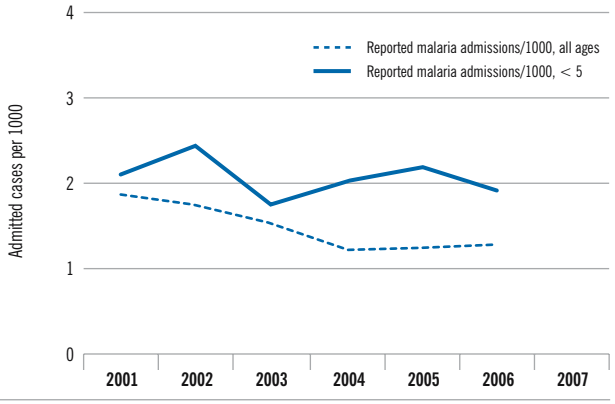
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006
Reported malaria deaths, all ages	2 814	2 634	2 476	1 982	1 707	1 647
Reported malaria deaths, < 5 years	398	383	320	326	286	207
All-cause deaths, all ages	15 382	14 583	14 269	13 183	13 560	12 473
All-cause deaths, < 5 years	1 791	2 546	1 969	1 995	1 734	1 638

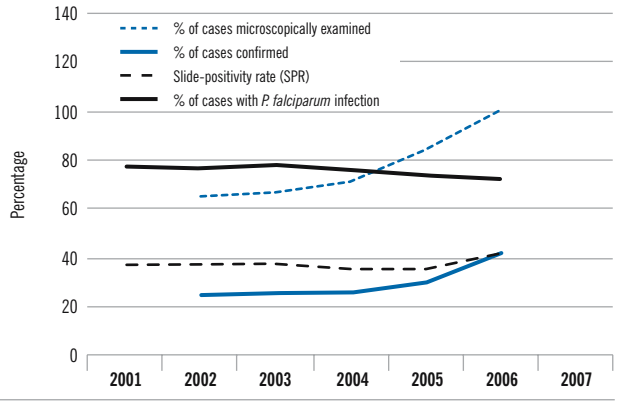
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	87 111	82 193	72 824	58 641	59 405	62 813	
Reported malaria admissions (< 5)	9 301	10 610	7 470	8 615	9 147	7 974	
All-cause admissions, all ages	591 546	612 823	602 178	600 939	650 417	643 594	
All-cause admissions, < 5 years	61 296	70 639	63 738	76 002	81 201	80 138	

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined	463 194	467 871	481 201	432 581	424 652	478 066	
Positive	170 502	173 096	177 530	152 070	151 508	200 679	
P. falciparum	130 029	133 187	138 187	114 523	111 357	144 585	

II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution – Free	Yes	—	Distribution – Antenatal care	No	—
	Targeting – All age groups	Yes	—	Distribution – EPI routine and campaign	No	—
	Targeting – Children under 5 years and pregnant women	No	—			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	Yes	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	No	—	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	Yes	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	No	—
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	No	—	IPT implemented countrywide	No	—
Case management	ACT is free or highly subsidized in public sectors	Yes	—	Free malaria diagnosis and first-line treatment of malaria	Yes	—
	Oral artemisinin monotherapies banned	Yes	—	Home management of malaria	No	—
	Parasitological confirmation for all age groups	Yes	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	Yes	—
				RDTs in areas without microscopy	Yes	—

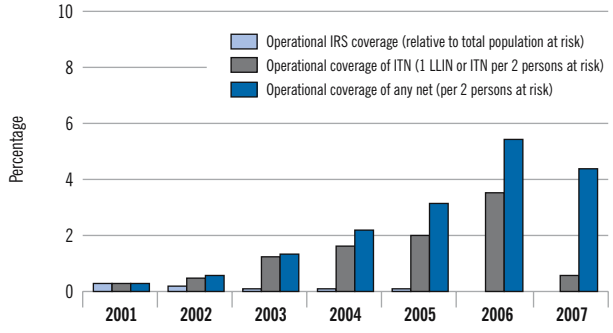
Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	CQ	2002
First-line treatment of *P. falciparum* (confirmed)	AS+MQ; AL; DHA+PIP	2002
Treatment failure of *P. falciparum*	QN+T or D	2002
Treatment of severe malaria	QN/AS	2002
Treatment of *P. vivax*	CQ+PQ(14d)	—

III. IMPLEMENTING MALARIA CONTROL

Coverage of ITN: survey data

No data

Coverage of IRS and ITN: programme data

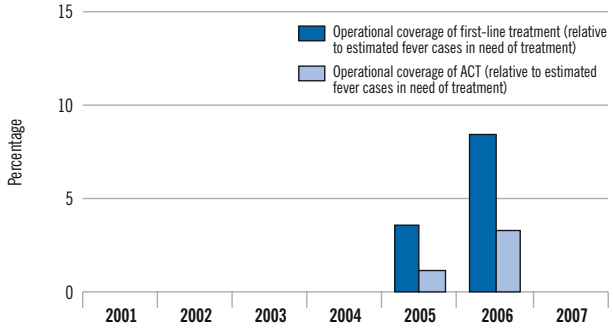


	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS	20 238	12 141	7 848	4 165	4 733	2 951	
No. of ITNs and/or LLINs	46 903	47 329	137 636	181 072	222 886	538 436	

Access by febrile children to effective treatment: survey data

No data

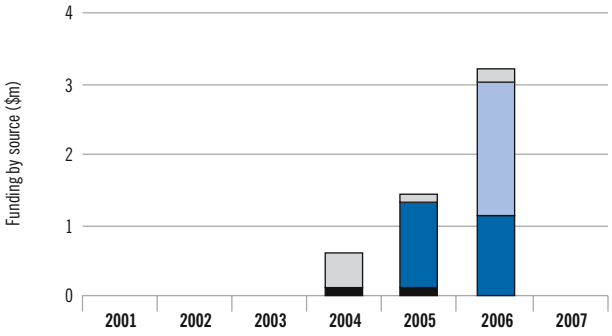
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received					433 135	1 000 710	
No. of ACT treatment courses received					143 385	392 085	

IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others							
Bilaterals				500 000	122 942	200 000	
European Union							
GFATM						1 900 000	
World Bank							
UN agencies					1 204 528	1 120 000	
Gov. malaria expenditure				105 859	129 219		

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	NMCP	Surveillance data	Insecticide-treated nets (ITN)	No surveys
Operational coverage of ITNs, IRS and access to medicines	NMCP	Programme report	Treatment	No surveys
Financial data	NMCP	Programme report	Use of health services	MICS 2000

Niger

Malaria transmission is more intensive in the south, occurring seasonally between January and April. Desert areas in the north are malaria-free. Almost all cases are caused by *P. falciparum* but most cases are unconfirmed. Reported cases and deaths fluctuated over the period 2001–2006, but there were no systematic trends. IRS is not national policy. In 2005, the NMCP distributed nearly 2.7 million ITNs. DHS 2006 reported that 69% of households owned a mosquito net and 43% an ITN, but only 7% of children under 5 years slept under an ITN. Despite the adoption of ACTs in 2005, a 2006 survey recorded no children treated with ACT. Only one third of children with fever were given antimalarial medicine. The NMCP has provided little information about funding, but reported a major award from the Global Fund in 2004.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

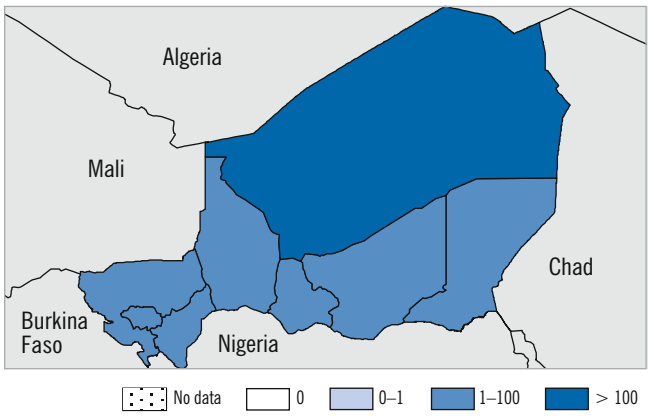
Population (000)	2006	%
All age groups	13 737	
< 5 years	2 713	20
≥ 5 years	11 024	80

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	13 737	100
Low transmission (0–1/1000)	0	0
Malaria-free (0 cases)	0	0
Rural population	11 405	83

Vector and parasite profile

Major *Anopheles* species: *arabiensis*, *coustani*, *funestus*, *gambiae*, *moucheti*, *nili*, *pharoensis*
Plasmodium species: *falciparum*, *vivax*

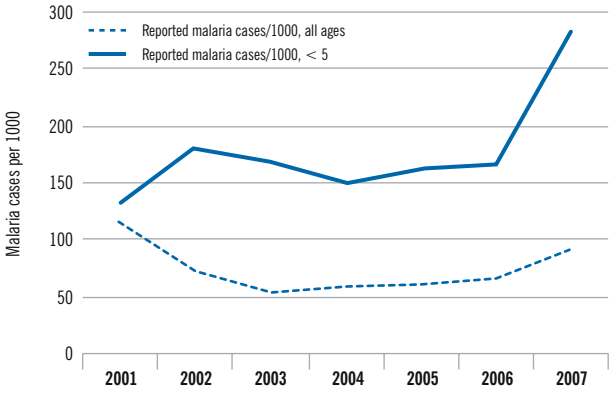
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	10 259 000	5 360 000	15 551 000	747	390	1 132
	< 5 years	6 394 000	1 121 000	12 275 000	2 357	413	4 524
Malaria cases	All ages	5 760 000	3 010 000	8 731 000	419	219	636
	< 5 years	3 590 000	629 000	6 892 000	1 323	232	2 540
Malaria deaths	All ages	32 000	15 000	53 000	2.3	1.1	3.9
	< 5 years	30 000	14 000	51 000	11	5.2	18
Malaria case-fatality rate (%)	All ages	0.56			—	—	—
	< 5 years	0.84			—	—	—

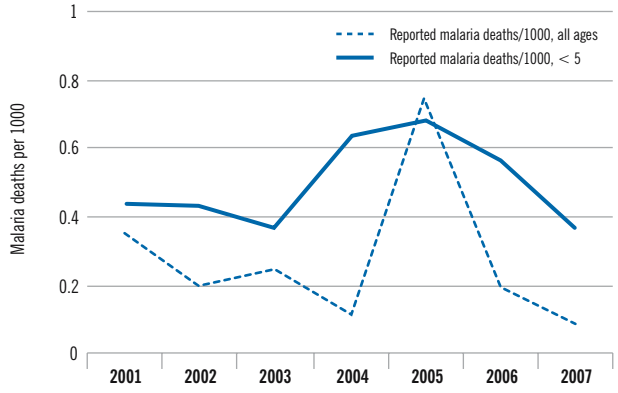
Trends in malaria morbidity and mortality

Reported malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	1 340 142	888 345	681 783	760 718	817 707	886 531	1 308 234
Reported malaria cases, < 5 years	304 032	431 710	414 284	385 674	424 691	449 044	790 448
All-cause outpatient consultations, all ages	4 989 176	4 827 380	3 996 584	1 663 367	2 595 771	3 458 631	5 119 076
All-cause outpatient consultations, < 5 years	2 137 498	2 080 927	1 847 222	731 299	833 437	1 627 033	1 957 624

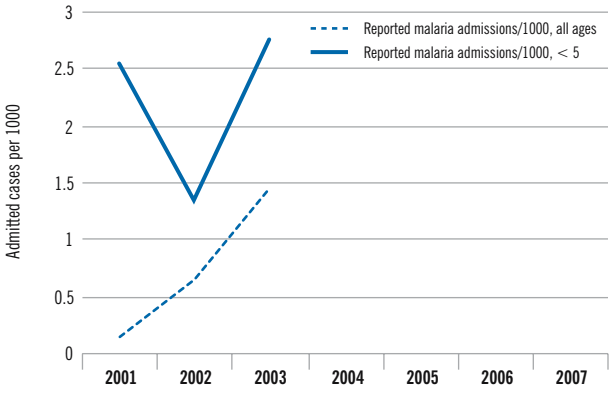
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	4 018	2 433	3 135	1 382	9 958	2 570	1 349
Reported malaria deaths, < 5 years	1 019	1 024	907	1 607	1 793	1 531	1 042
All-cause deaths, all ages	9 275	7 034	4 659	3 085		4 729	3 313
All-cause deaths, < 5 years	3 042	2 468	2 274	1 919	2 187	2 712	1 901

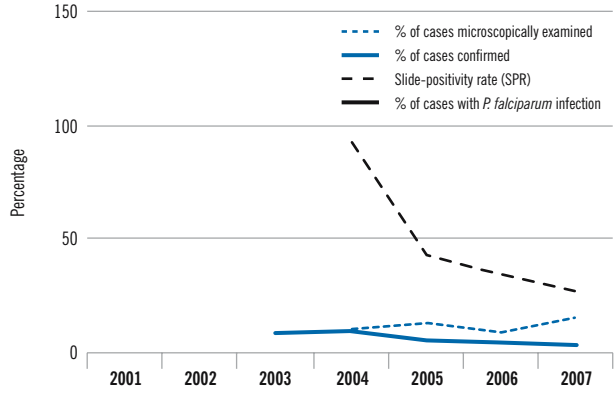
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	1 665	7 773	17 938				
Reported malaria admissions (< 5)	5 888	3 179	6 818				
All-cause admissions, all ages	15 979	40 850	75 973				
All-cause admissions, < 5 years	20 711	10 016	22 880				

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined				81 814	107 092	87 103	204 226
Positive			56 460	76 030	46 170		55 141
P. falciparum							

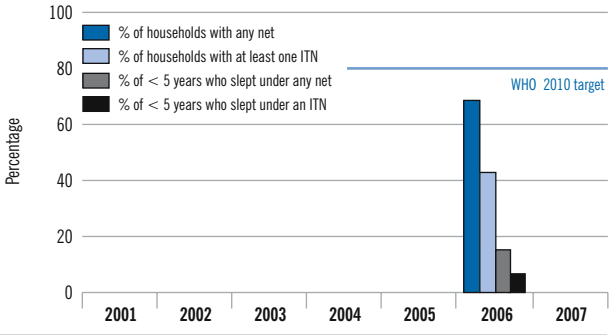
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	No	—	Distribution – Antenatal care	Yes	2005
	Targeting – All age groups	No	—	Distribution – EPI routine and campaign	Yes	2005
	Targeting – Children under 5 years and pregnant women	Yes	1998			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	Yes	1998	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	No	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	No	—
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2005	IPT implemented countrywide	Yes	2005
Case management	ACT is free or highly subsidized in public sectors	Yes	2005	Free malaria diagnosis and first-line treatment of malaria	No	—
	Oral artemisinin monotherapies banned	No	—	Home management of malaria	Yes	1998
	Parasitological confirmation for all age groups	Yes	1998	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	Yes	1998
				RDTs in areas without microscopy	Yes	2005

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AL	2005
First-line treatment of *P. falciparum* (confirmed)	AL	2005
Treatment failure of *P. falciparum*	QN(7d)	2005
Treatment of severe malaria	QN(7d)	2005
Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

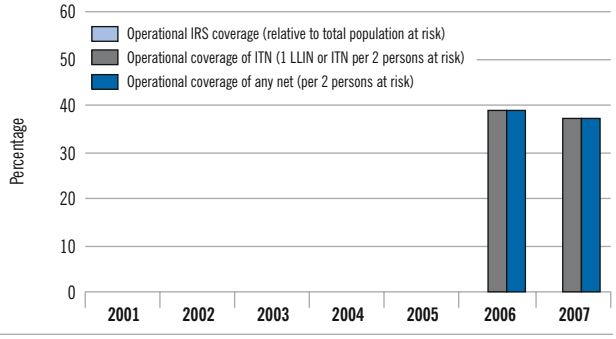
Coverage of ITN: survey data



	2006
% of pregnant women who slept under any net	13
% of pregnant women who slept under an ITN	7

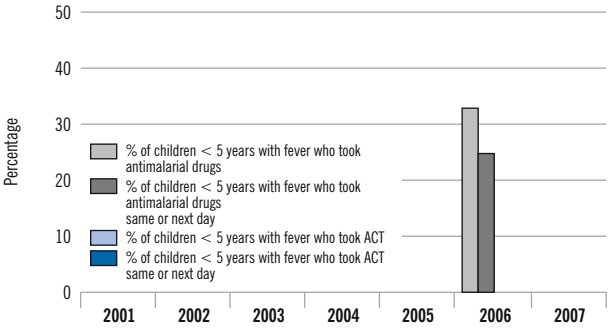
Source: DHS 2006.

Coverage of IRS and ITN: programme data



	2006
No. of households protected by IRS	
No. of ITNs and/or LLINs	2 665 000

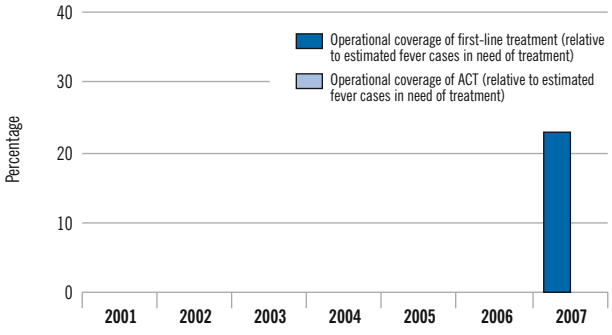
Access by febrile children to effective treatment: survey data



	2006
% of children < 5 years with fever	27
% of febrile children < 5 years who sought treatment in health facility	46

Source: DHS 2006.

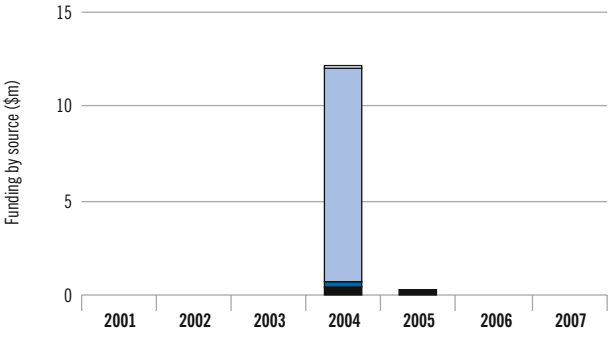
Access to effective treatment: programme data



	2007
No. of first-line treatment courses received	3 442 130
No. of ACT treatment courses received	

IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2004	2005
Others	210 852	
Bilaterals		
European Union	0	
GFATM	11 257 988	
World Bank	0	
UN agencies	313 775	
Gov. malaria expenditure	444 231	342 346

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	MOH/PNLP/SNIS	Surveillance data	Insecticide-treated nets (ITN)	MICS 2000, DHS 2006
Operational coverage of ITNs, IRS and access to medicines	MOH/PNLP/SNIS	Programme report	Treatment	MICS 2000, DHS 2006
Financial data	MOH/PNLP/SNIS	Programme report	Use of health services	DHS 2006

Nigeria

Nigeria accounts for a quarter of all malaria cases in the WHO African Region. Transmission in the south occurs all-year round, and is more seasonal in the north. Almost all cases are caused by *P. falciparum* but most are unconfirmed. There is no evidence of a systematic decline in malaria burden; the upward trend in numbers of cases and deaths is probably due to improvements in reporting. IRS is not national policy. The NMCP delivered about 17 million ITN during 2005–2007 (6.6 million LLIN), enough to cover only 23% of the population at risk. The programme delivered 4.5 million courses of ACT in 2006 and 9 million in 2007, far below total requirements. Funding for malaria control was reported to have increased from US$ 17 million in 2005 to US$ 60 million in 2007, provided by the government, the Global Fund and the World Bank. This is unlikely to be sufficient to reach national targets for prevention and cure.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

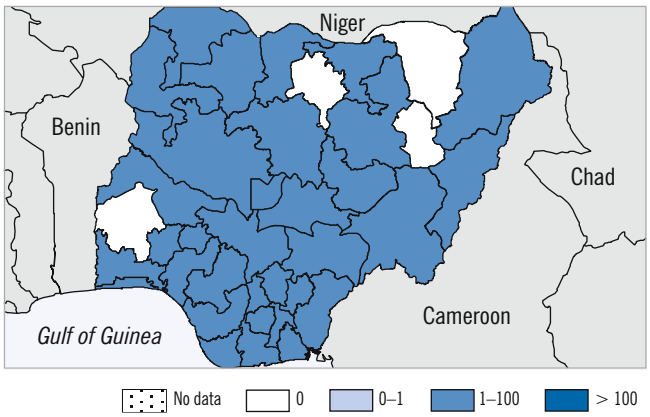
Population (000)	2006	%
All age groups	144 720	
< 5 years	24 503	17
≥ 5 years	120 217	83

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	144 720	100
Low transmission (0–1/1000)	0	9
Malaria-free (0 cases)	0	0
Rural population	73 833	51

Vector and parasite profile

Major *Anopheles* species: *arabiensis*, *brochieri*, *coustani*, *flavicosta, funestus*, *gambiae*, *hancocki*, *hargreavesi*, *melas*, *moucheti*, *nili, paludis*, *pharoensis*
Plasmodium species: *falciparum*, *vivax*

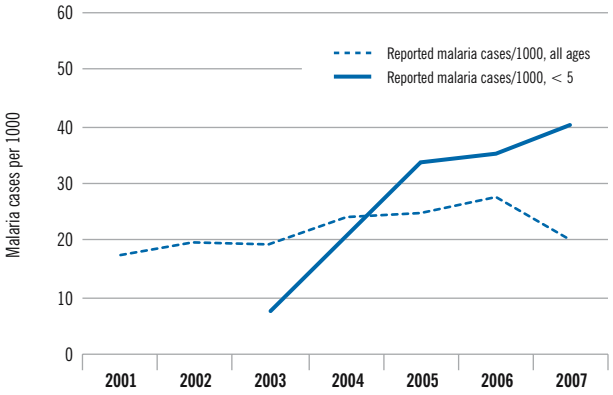
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	155 556 000	95 978 000	217 205 000	1 075	663	1 501
	< 5 years	92 231 000	15 447 000	178 057 000	3 764	630	7 267
Malaria cases	All ages	57 506 000	35 481 000	80 297 000	397	245	555
	< 5 years	34 096 000	5 710 000	65 825 000	1 392	233	2 686
Malaria deaths	All ages	225 000	116 000	354 000	1.6	0.80	2.4
	< 5 years	219 000	110 000	337 000	8.8	4.5	13
Malaria case-fatality rate (%)	All ages	0.39			—	—	—
	< 5 years	0.63			—	—	—

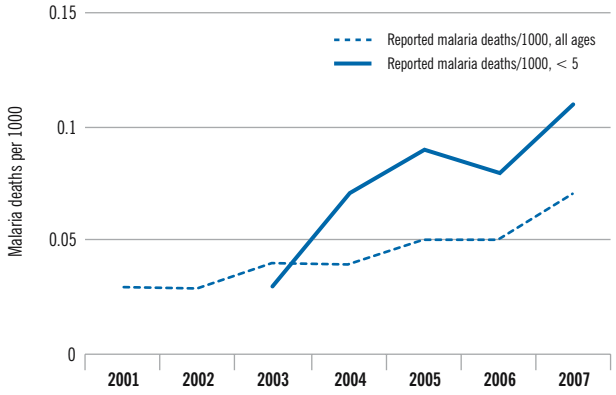
Trends in malaria morbidity and mortality

Reported malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	2 253 519	2 605 381	2 608 479	3 310 229	3 532 108	3 982 372	2 969 950
Reported malaria cases, < 5 years			171 812	507 173	814 274	865 374	1 004 392
All-cause outpatient consultations, all ages	3 882 376	4 488 796	4 237 566	4 970 109	5 302 576	5 633 088	
All-cause outpatient consultations, < 5 years							

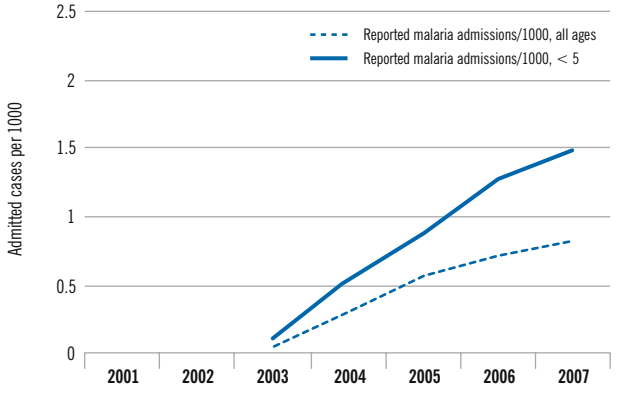
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	4 317	4 092	5 343	6 032	6 494	6 586	10 289
Reported malaria deaths, < 5 years			721	1 714	2 096	2 001	2 695
All-cause deaths, all ages				7 632	13 504	8 747	12 013
All-cause deaths, < 5 years			1 501	3 649	5 581	3 612	4 495

I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)			5 935	41 913	80 825	102 303	121 696
Reported malaria admissions (< 5)			2 358	12 814	21 455	31 151	36 647
All-cause admissions, all ages			96 074	342 748	614 272	675 044	747 193
All-cause admissions, < 5 years			32 101	102 152	186 861	212 596	211 559

Slide examination, case confirmation, *Plasmodium* spp

No data

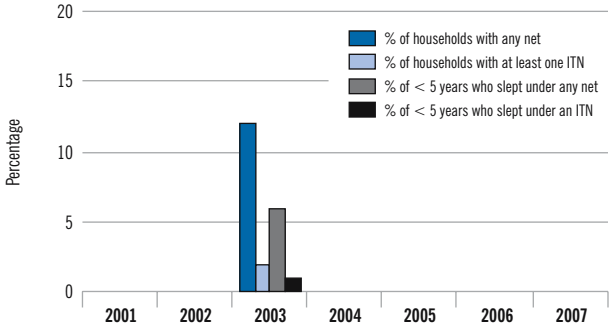
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	2001	Distribution – Antenatal care	Yes	2001
	Targeting – All age groups	No	—	Distribution – EPI routine and campaign	Yes	2006
	Targeting – Children under 5 years and pregnant women	Yes	2001			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	No	—	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	No	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	2007
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2001	IPT implemented countrywide	Yes	2001
Case management	ACT is free or highly subsidized in public sectors	Yes	2006	Free malaria diagnosis and first-line treatment of malaria	Yes	—
	Oral artemisinin monotherapies banned	Yes	2006	Home management of malaria	Yes	2005
	Parasitological confirmation for all age groups	Yes	2006	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	Yes	2006
				RDTs in areas without microscopy	Yes	2006

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AL	2004
First-line treatment of *P. falciparum* (confirmed)	AL	2004
Treatment failure of *P. falciparum*	QN(7d)	2004
Treatment of severe malaria	QN(7d)	2004
Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

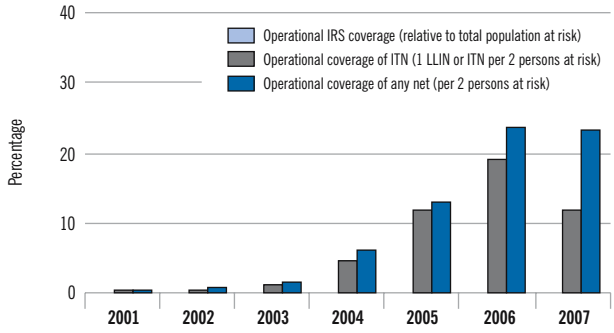
Coverage of ITN: survey data



	2001	2002	2003	2004	2005	2006	2007
% of pregnant women who slept under any net			5				
% of pregnant women who slept under an ITN			1				

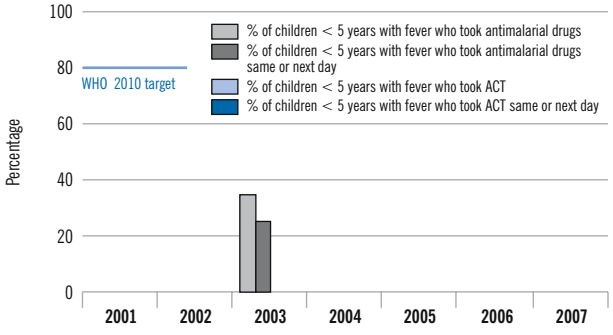
Source: DHS 2003.

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS						900	4 500
No. of ITNs and/or LLINs	200 000	218 900	696 482	3 279 000	5 086 934	8 853 589	3 225 594

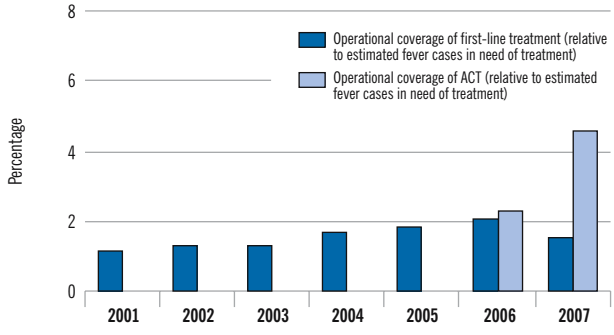
Access by febrile children to effective treatment: survey data



	2001	2002	2003	2004	2005	2006	2007
% of children < 5 years with fever			31				
% of febrile children < 5 years who sought treatment in health facility			31				

Source: DHS 2003.

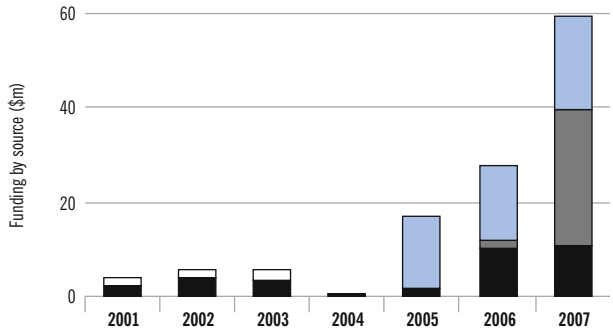
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received	2 253 519	2 605 381	2 608 479	3 310 229	3 532 108	3 982 372	2 969 950
No. of ACT treatment courses received						4 530 108	8 986 485

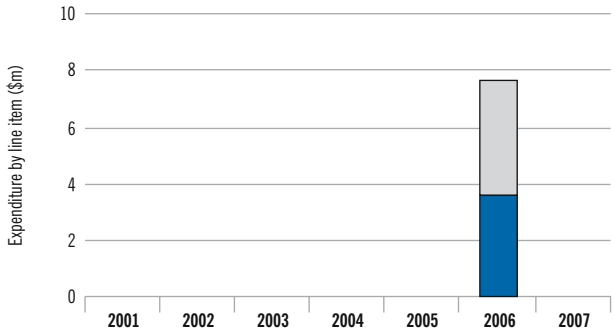
IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others	2 020 000	1 850 000	2 330 000				
Bilaterals							
European Union							
GFATM					15 000 000	16 000 000	20 000 000
World Bank						2 000 000	28 700 000
UN agencies						8	
Gov. malaria expenditure	2 020 000	4 000 000	3 530 000	390 625	1 953 125	10 000 000	11 000 000

Breakdown of expenditure by intervention



	2006
Others	
Treatment	4 038 461
Diagnosis	
IRS	
ITN	3 461 538

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	Epid Division,FMOH	Surveillance data	Insecticide-Treated Nets (ITN)	DHS 2003
Operational coverage of ITNs, IRS and access to medicines	Epid Division,FMOH	Programme report	Treatment	DHS 2003
Financial data	Epid Division,FMOH	Programme report	Use of health services	DHS 2003

Pakistan

Following the resurgence of malaria after the eradication programme of the 1970s, malaria has been a persistent problem in Pakistan. There were an estimated 1.5 million malaria episodes in 2006, accounting for one quarter of all cases in the WHO Eastern Mediterranean Region. Most cases occur between July and November. Almost all are confirmed as malaria, and about 30% are due to *P. falciparum*. Routinely-collected data suggest that incidence was roughly stable between 2001 and 2007. Deaths are reported sporadically. IRS has been used selectively and covered about 300 000 households in 2006. The NMCP delivered 240 000 LLINs in 2006, far fewer than needed to protect the population at risk. Information about the provision of antimalarial medicines has not been provided by the NMCP. Government funding for malaria control has been approximately US$ 1 million annually since 2002, boosted by Global Fund grants in 2004 and 2005.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

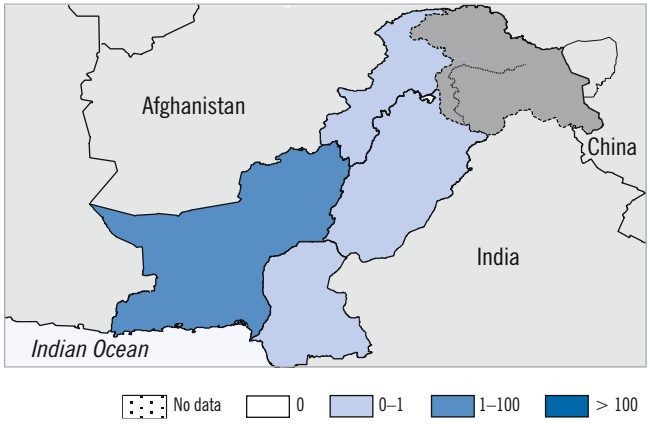
Population (000)	2006	%
All age groups	160 943	
< 5 years	19 012	12
≥ 5 years	141 931	88

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	11 422	7
Low transmission (0–1/1000)	149 521	93
Malaria-free (0 cases)	0	0
Rural population	104 222	65

Vector and parasite profile

Major *Anopheles* species: *culicifacies*, *stephensi*
Plasmodium species: *falciparum*, *vivax*

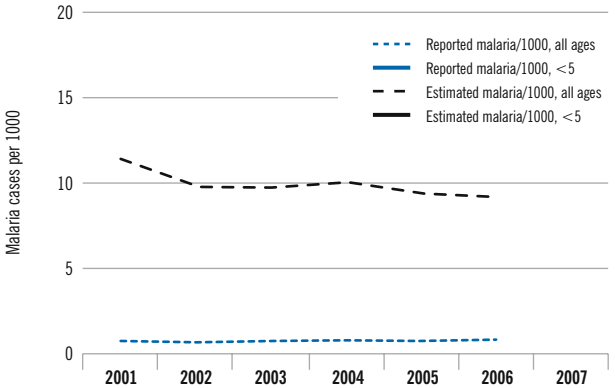
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	61 212 000	43 177 000	86 832 000	380	268	540
	5 years	26 357 000	18 591 000	37 388 000	1 386	978	1 967
Malaria cases	All ages	1 499 000	1 145 000	2 012 000	9.0	7.0	13
	< 5 years	645 000	493 000	866 000	34	26	46
Malaria deaths	All ages	1 400	850	2 000	0.01	0.01	0.01
	< 5 years	660	410	970	0.04	0.02	0.05
Malaria case-fatality rate (%)	All ages	0.09			—	—	—
	< 5 years	0.10			—	—	—

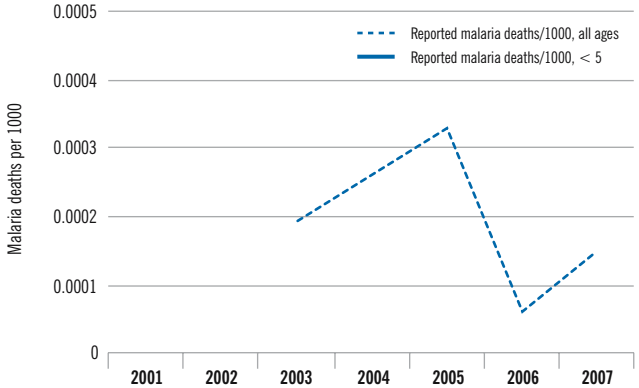
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	125 292	107 666	125 152	126 719	127 826	124 910	128 570
Reported malaria cases, < 5 years							
All-cause outpatientv consultations, all ages							
All-cause outpatient consultations, < 5 years							

Reported malaria deaths, per 1000



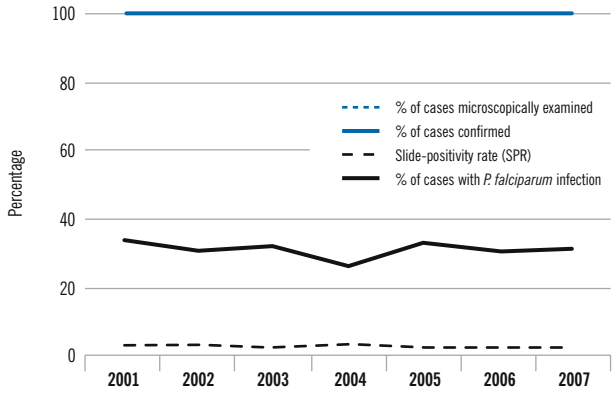
	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages			29		52	9	24
Reported malaria deaths, < 5 years							
All-cause deaths, all ages							
All-cause deaths, < 5 years							

I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000

No data

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined	3 572 425	3 399 524	4 577 037	4 243 108	4 776 274	4 490 577	4 905 561
Positive	125 292	107 666	125 152	126 719	127 826	124 910	128 570
P. falciparum	41 771	32 591	39 944	32 761	42 056	37 837	39 856

II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	—	Distribution – Antenatal care	No	—
	Targeting – All age groups	Yes	2007	Distribution – EPI routine and campaign	No	—
	Targeting – Children under 5 years and pregnant women	No	—			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	Yes	2005	IRS is the primary vector-control intervention	Yes	1998
				IRS is used for prevention and control of epidemics	Yes	1998
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	2005
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	No	—	IPT implemented countrywide	No	—
Case management	ACT is free or highly subsidized in public sectors	Yes	2007	Free malaria diagnosis and first-line treatment of malaria	Yes	1998
	Oral artemisinin monotherapies banned	Yes	2007	Home management of malaria	Yes	1998
	Parasitological confirmation for all age groups	No	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	Yes	1998
				RDTs in areas without microscopy	Yes	2007

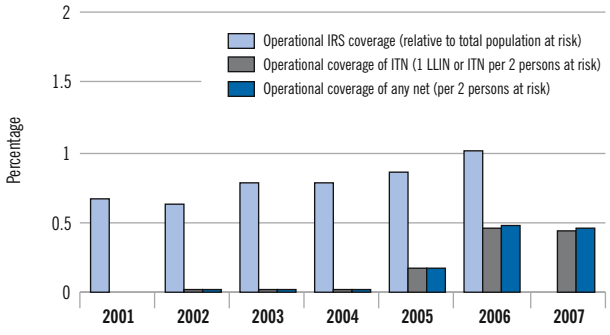
	Antimalarial medicines	Type of medicine	Year adopted
	First-line treatment of *P. falciparum* (unconfirmed)	AS+SP	—
	First-line treatment of *P. falciparum* (confirmed)	AS+SP	—
	Treatment failure of *P. falciparum*	QN	—
	Treatment of severe malaria	QN/AM	—
	Treatment of *P. vivax*	CQ+PQ(5d)	—

III. IMPLEMENTING MALARIA CONTROL

Coverage of ITN: survey data

No data

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS	195 576	191 400	242 340	241 524	271 572	327 360	
No. of ITNs and/or LLINs		20 000		2 000	140 000	240 000	

Access by febrile children to effective treatment: survey data

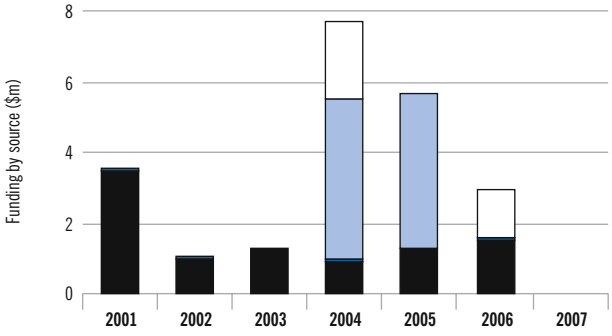
No data

Access to effective treatment: programme data

No data

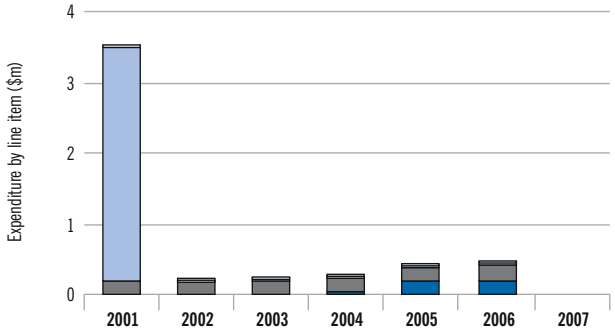
IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others				2230000		1420000	
Bilaterals							
European Union							
GFATM				4500000	4407000		
World Bank							
UN agencies	100000	76841		84450		67000	
Gov. malaria expenditure	3450500	965000	1256432	900200	1300050	1500500	

Breakdown of expenditure by intervention



	2001	2002	2003	2004	2005	2006	2007
Others							
Treatment	23400	21200	13750	12000	16800	16650	
Diagnosis	3300000	25000	10900	13500	18000	22000	
IRS	200000	177000	208500	190000	207451	250067	
ITN				57000	191000	175099	

V. SOURCES OF INFORMATION

Programme data		Survey and other data	
Reported cases	Surveillance data	Insecticide-treated nets (ITN)	No surveys
Operational coverage of ITNs, IRS and access to medicines	Programme report	Treatment	No surveys
Financial data	Programme report	Use of health services	DHS 1990

Papua New Guinea

Papua New Guinea had an estimated 1.5 million cases and almost three thousand deaths in 2006. Malaria is highly endemic and comparatively stable in coastal areas; it is less stable in the Highlands region, which is prone to epidemics with many fatalities. 70–80% of infections are due to *P. falciparum*. Malaria is among the leading causes of hospital admission, and among the most important causes of death in children. There was no evidence of a systematic decline in cases and deaths over the period 2001–2006 but data from districts where ITN were distributed show a marked drop in reported malaria cases.First-line drugs have been widely available but parasite resistance to the drugs was high. Prior to 2003, investment in malaria control was limited. With support from the Global Fund from 2004, ITN have been delivered to about 24% of the population.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

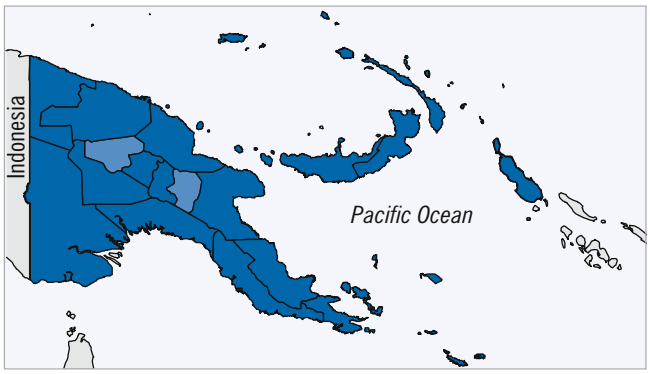
Population (000)	2006	%
All age groups	6 202	
< 5 years	898	14
≥ 5 years	5 304	86

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	5 849	94
Low transmission (0–1/1000)	352	6
Malaria-free (0 cases)	0	0
Rural population	5 367	87

Vector and parasite profile

Major *Anopheles* species: *farauti*, *koliensis*, *punctulatus*, *subpictus*
Plasmodium species: *falciparum*, *vivax*

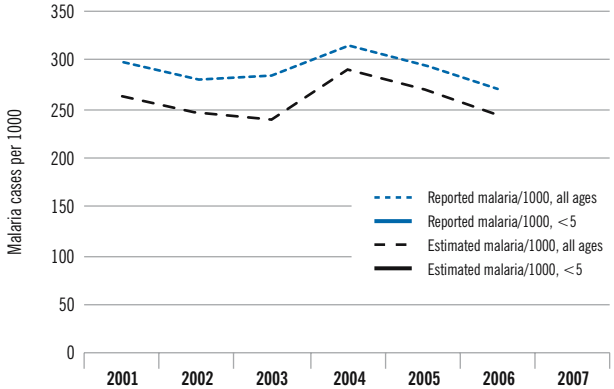
Stratification of burden (reported cases/1000)



Estimated burden of malaria	Age group	Estimated cases and deaths (2006) Numbers	Lower	Upper	Estimated cases and deaths per 1000 (2006) Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	5 157 000	2 036 000	9 407 000	832	328	1 517
	< 5 years				—	—	—
Malaria cases	All ages	1 508 000	628 000	2 540 000	243	101	410
	< 5 years				—	—	—
Malaria deaths	All ages	2 800	1 200	4 800	0.45	0.19	0.77
	< 5 years	1 200	510	2 100	1.3	0.57	2.3
Malaria case-fatality rate (%)	All ages	0.19			—	—	—
	< 5 years				—	—	—

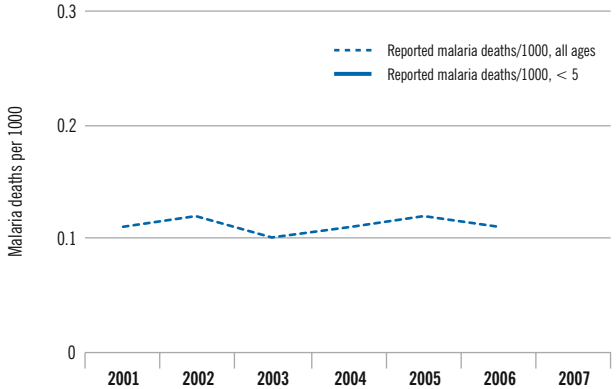
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	1 643 075	1 587 580	1 650 662	1 868 413	1 788 318	1 676 681	
Reported malaria cases, < 5 years							
All-cause outpatient consultations, all ages	5 592 434	5 351 135	5 448 841	5 855 904	5 659 581	5 469 413	
All-cause outpatient consultations, < 5 years							

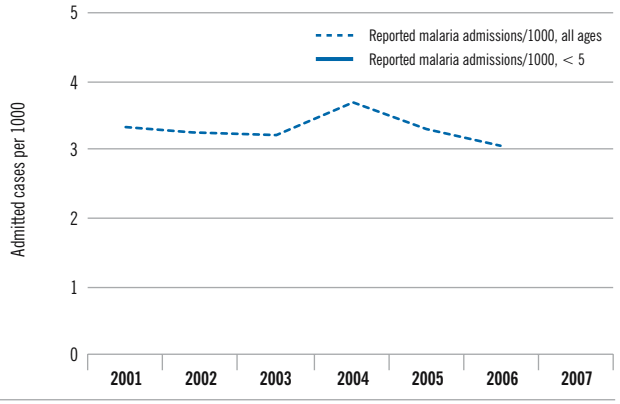
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	619	678	559	644	731	668	
Reported malaria deaths, < 5 years							
All-cause deaths, all ages	7 103	7 925	7 314	8 113	7 207	7 649	
All-cause deaths, < 5 years							

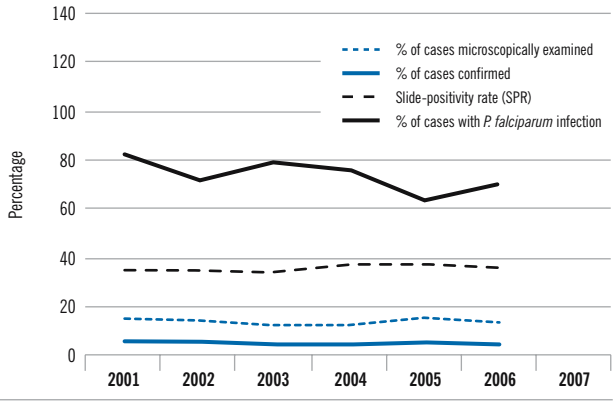
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	18 255	18 398	18 602	21 701	19 821	19 030	
Reported malaria admissions (< 5)							
All-cause admissions, all ages	349 362	251 788	230 258	252 613	232 282	240 848	
All-cause admissions, < 5 years							

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined	254 266	228 665	207 901	222 904	267 123	223 464	
Positive	89 819	80 903	70 226	83 799	98 762	81 303	
P. falciparum	74 117	58 188	55 362	62 918	62 806	56 917	

II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution – Free	Yes	2004	Distribution – Antenatal care	No	—
	Targeting – All age groups	Yes	2000	Distribution – EPI routine and campaign	No	—
	Targeting – Children under 5 years and pregnant women	No	—			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	Yes	2000	DDT is used alternately with other insecticides in the same area	Yes	2000
	Insecticide-resistance management implemented	No	—	IRS is the primary vector-control intervention	Yes	2000
				IRS is used for prevention and control of epidemics	Yes	2000
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	2000
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	No	—	IPT implemented countrywide	No	—
Case management	ACT is free or highly subsidized in public sectors	Yes	2004	Free malaria diagnosis and first-line treatment of malaria	No	—
	Oral artemisinin monotherapies banned	Yes	2000	Home management of malaria	No	—
	Parasitological confirmation for all age groups	No	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	Yes	2000
				RDTs in areas without microscopy	Yes	2005

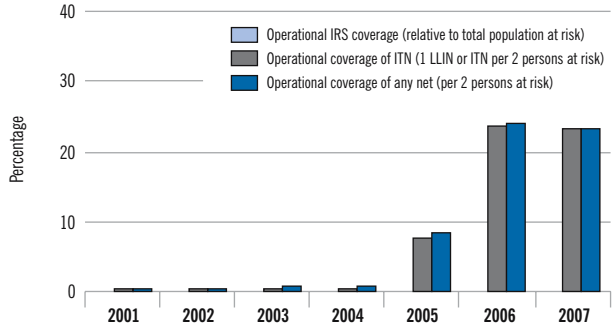
Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AL	2008
First-line treatment of *P. falciparum* (confirmed)	AL	2008
Treatment failure of *P. falciparum*	QN(7d)	2008
Treatment of severe malaria	AS/AM+AL	2008
Treatment of *P. vivax*	CQ+PQ(14d)	—

III. IMPLEMENTING MALARIA CONTROL

Coverage of ITN: survey data

No data

Coverage of IRS and ITN: programme data

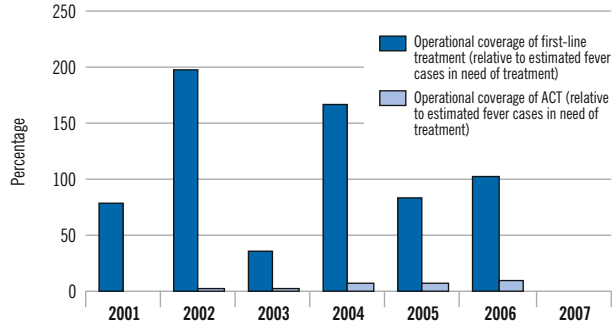


	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS						2 000	
No. of ITNs and/or LLINs	6 606	8 708	9 154	8 418	228 421	461 231	53 500

Access by febrile children to effective treatment: survey data

No data

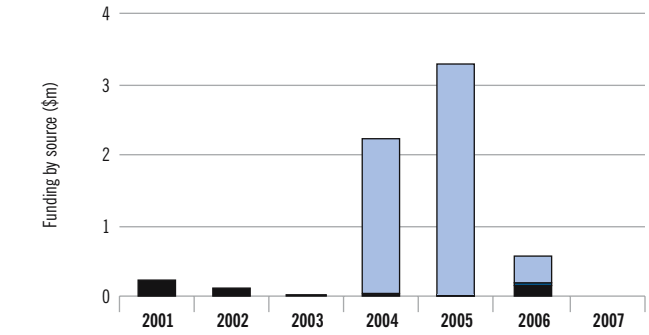
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received	3 719 444	9 407 778	1 729 167	7 958 122	3 896 627	4 822 368	
No. of ACT treatment courses received		89 545	62 620	362 071	321 296	395 185	

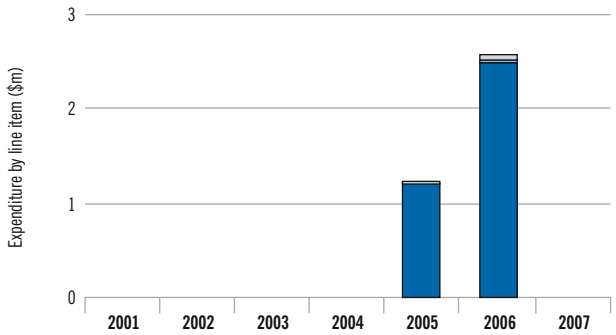
IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others							
Bilaterals							
European Union							
GFATM				2185723	3256526	372986	
World Bank							
UN agencies						45203	
Gov. malaria expenditure	217511	107478	5945	54581	19060	139300	

Breakdown of expenditure by intervention



	2001	2002	2003	2004	2005	2006	2007
Others							
Treatment					8294	47102	
Diagnosis					0	16300	
IRS							
ITN					1207165	2504153	

V. SOURCES OF INFORMATION

Programme data		Survey and other data		
Reported cases	NHIS	Surveillance data	Insecticide-treated nets (ITN)	No surveys
Operational coverage of ITNs, IRS and access to medicines	NHIS	Programme report	Treatment	No surveys
Financial data	NHIS	Programme report	Use of health services	DHS 1996

Senegal

Senegal accounts for an estimated 1% of all cases in the WHO African Region. Malaria is endemic throughout the country and transmission occurs seasonally from June to November. Almost all cases are *P. falciparum*, but most are unconfirmed. Survey data show that the percentage of households with any net or an ITN had increased to 57% and 36%, respectively, by 2006. Over 270 000 households were sprayed in 2007 protecting nearly 700 000 people at risk. The NMP delivered about one million courses of ACT in 2006 and 2007. There is no evidence, from routine surveillance, that malaria cases and deaths are falling. Funding has increased from about US$ 6 million in 2001 to over US$ 15 million in 2006, financed by the government, the Global Fund and other agencies.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

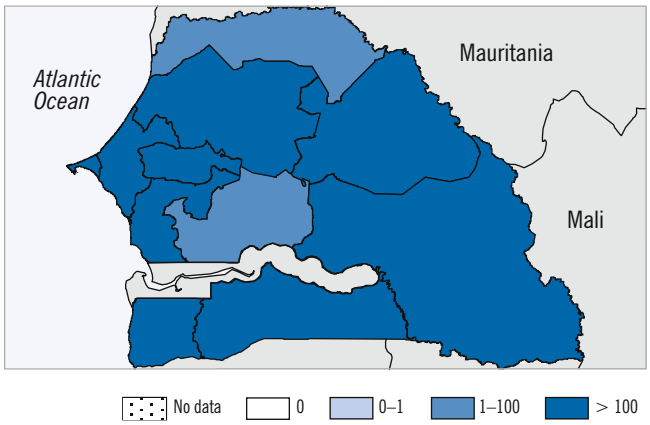
Population (000)	2006	%
All age groups	12 072	
< 5 years	1 913	16
≥ 5 years	10 159	84

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	11 570	96
Low transmission (0–1/1000)	503	4
Malaria-free (0 cases)	0	0
Rural population	7 029	58

Vector and parasite profile

Major *Anopheles* species: *arabiensis*, *brochieri*, *coustani*, *flavicosta*, *funestus*, *gambiae*, *hancocki*, *melas*, *nili*, *pharoensis*
Plasmodium species: *falciparum*, *vivax*

Stratification of burden (reported cases/1000)

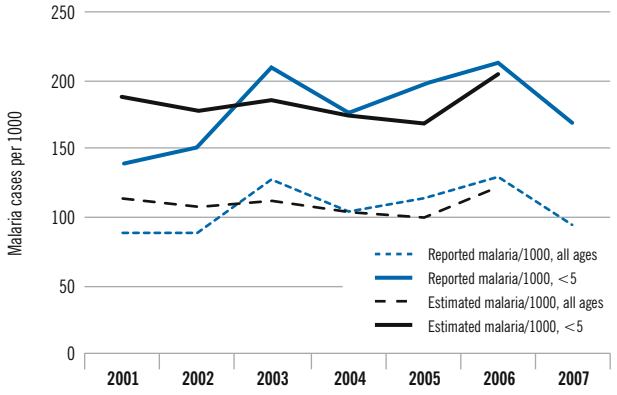


Estimated burden of malaria

		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	4 472 000	1 455 000	8 765 000	370	121	726
	5 years	1 202 000	391 000	2 356 000	628	204	1 232
Malaria cases	All ages	1 456 000	508 000	2 719 000	121	42	225
	< 5 years	391 000	136 000	731 000	204	71	382
Malaria deaths	All ages	9 600	3 600	17 000	0.80	0.30	1.4
	< 5 years	8 700	3 200	16 000	4.5	1.7	8.4
Malaria case-fatality rate (%)	All ages	0.66			—	—	—
	< 5 years	2.2			—	—	—

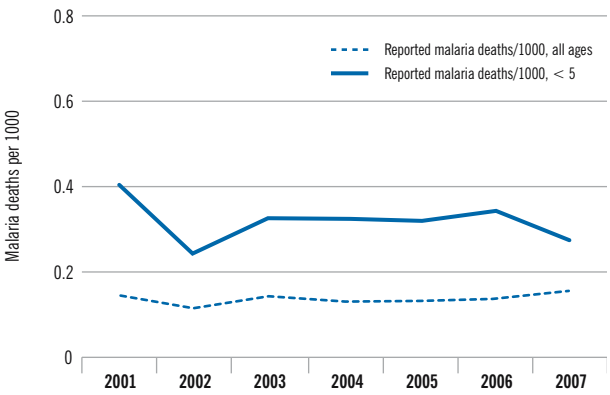
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	931 682	960 478	1 414 383	1 195 402	1 346 158	1 555 310	1 170 234
Reported malaria cases, < 5 years	239 508	267 341	379 339	324 620	370 061	408 588	327 867
All-cause outpatientv consultations, all ages	2 608 245	2 878 312	3 671 650	3 744 390	4 064 305	4 632 716	5 260 160
All-cause outpatient consultations, < 5 years	712 816	813 345	968 408	985 149	1 059 420	1 191 498	1 380 054

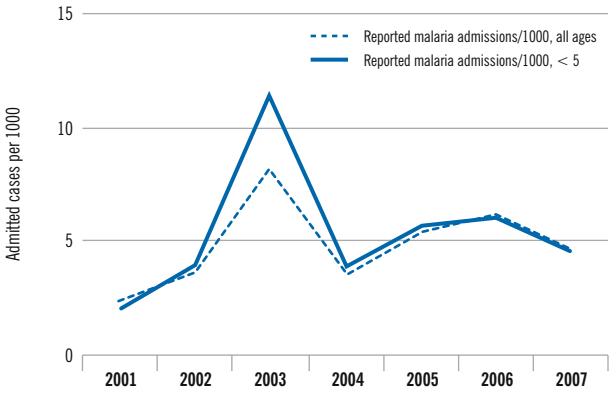
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	1 515	1 226	1 602	1 524	1 587	1 678	1 935
Reported malaria deaths, < 5 years	705	435	590	600	604	656	534
All-cause deaths, all ages	5 097	4 678	6 040	6 172	7 316	9 077	10 650
All-cause deaths, < 5 years	1 775	1 318	1 556	1 606	1 806	2 361	2 487

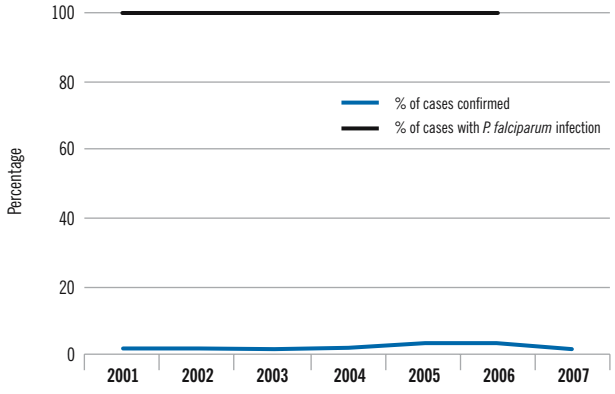
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	24 444	39 315	92 356	40 993	63 133	74 669	57 638
Reported malaria admissions (< 5)	3 474	7 074	20 763	7 060	10 524	11 662	8 815
All-cause admissions, all ages	59 059	105 462	170 000	107 214	175 107	214 449	195 083
All-cause admissions, < 5 years	10 281	22 840	37 477	20 301	30 624	34 660	28 357

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined							
Positive	14 261	15 261	28 272	23 171	38 746	49 366	22 638
P. falciparum	14 261	15 261	28 272	23 171	38 746	49 366	

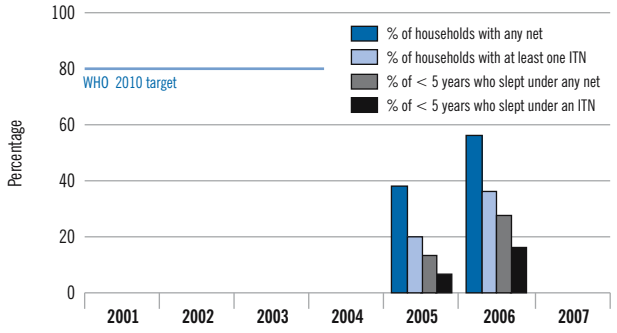
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution – Free	Yes	1998	Distribution – Antenatal care	Yes	2005
	Targeting – All age groups	Yes	1998	Distribution – EPI routine and campaign	No	—
	Targeting – Children under 5 years and pregnant women	Yes	1998			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	Yes	2000	IRS is the primary vector-control intervention	Yes	2007
				IRS is used for prevention and control of epidemics	No	—
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	2007
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2004	IPT implemented countrywide	Yes	—
Case management	ACT is free or highly subsidized in public sectors	No	—	Free malaria diagnosis and first-line treatment of malaria	No	—
	Oral artemisinin monotherapies banned	Yes	2003	Home management of malaria	Yes	1998
	Parasitological confirmation for all age groups	Yes	1998	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	No	—
				RDTs in areas without microscopy	Yes	2007

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AS+AQ	2005
First-line treatment of *P. falciparum* (confirmed)	AS+AQ	2005
Treatment failure of *P. falciparum*	—	2005
Treatment of severe malaria	QN(7d)	2005
Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

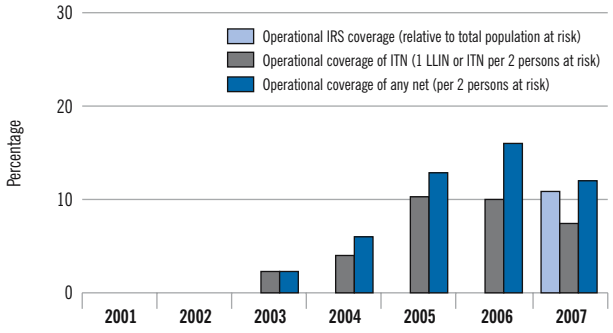
Coverage of ITN: survey data



	2001	2002	2003	2004	2005	2006	2007
% of pregnant women who slept under any net					14		
% of pregnant women who slept under an ITN					9	17	

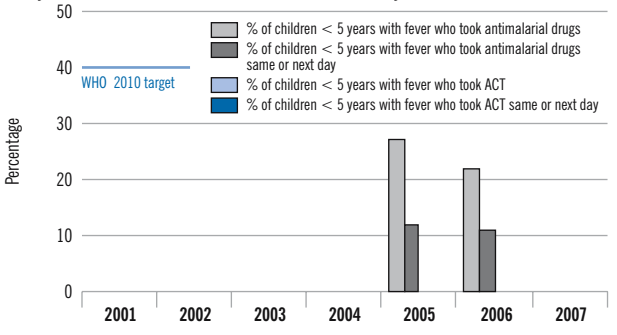
Source: DHS 2005, MIS 2006.

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS							272 401
No. of ITNs and/or LLINs			125 409	223 731	402 706	342 328	

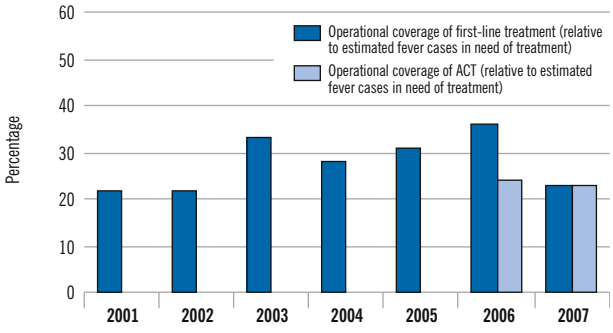
Access by febrile children to effective treatment: survey data



	2001	2002	2003	2004	2005	2006	2007
% of children < 5 years with fever					31		
% of febrile children < 5 years who sought treatment in health facility					46		

Source: DHS 2003, MIS 2006.

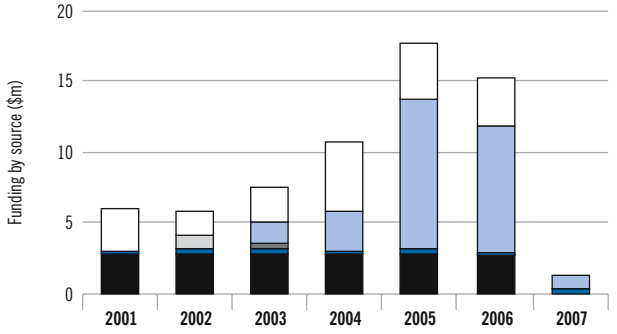
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received	931 682	960 478	1 414 383	1 195 402	1 346 158	1 555 310	990 141
No. of ACT treatment courses received						1 036 872	990 141

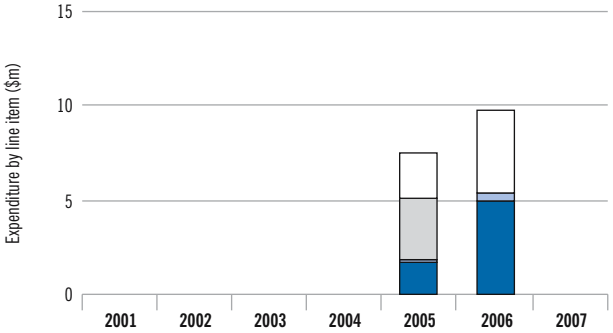
IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others	2 980 300	1 566 940	2 411 500	4 949 358	3 997 426	340 3767	
Bilaterals		1 000 000					
European Union							
GFATM	0	0	1 428 571	2 857 143	10 634 063	8 958 051	1 067 834
World Bank							
UN agencies	212 005	444 315	389 208	221 900	426 718	139 532	257 078
Gov. malaria expenditure	2 705 267	2 705 267	2 705 267	2 705 267	2 705 267	2 705 267	

Breakdown of expenditure by intervention



	2005	2006
Others	2 488 318	4 841 952
Treatment	3 273 462	0
Diagnosis	85 000	389 000
IRS	0	0
ITN	1 730 690	4 960 676

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	PNLP/Base RBM-M&E	Surveillance data	Insecticide-treated nets (ITN)	MICS 2000, DHS 2005, MIS 2006
Operational coverage of ITNs, IRS and access to medicines	Idem, PNLP	Programme report	Treatment	MICS 2000, DHS 2005, MIS 2006
Financial data	PNLP	Programme report	Use of health services	DHS 2005

Sudan

Sudan had about 2.5 million malaria cases in 2006, 62% of the burden in the WHO Eastern Mediterranean Region. Transmission occurs all year round in the south, and is more seasonal in the northern states. Over 12 million internally-displaced people are at greatest risk. The reported numbers of cases and deaths were falling between 2001 and 2006, but it is not known whether this reflects a real decline in malaria burden. Khartoum and Gezira launched a Malaria Free Initiative in 2002. IRS is carried out annually but locally, protecting about 3.2 million people in 2007. The NMCP distributed 3 million ITN during 2005–2007 (2 146 088 LLIN). About 4.38 million ACT were delivered in 2006 covering 90% of estimated treatment needs. Funding exceeded US$ 22 million in 2006, provided by government, UN agencies, the Global Fund and bilateral donors.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

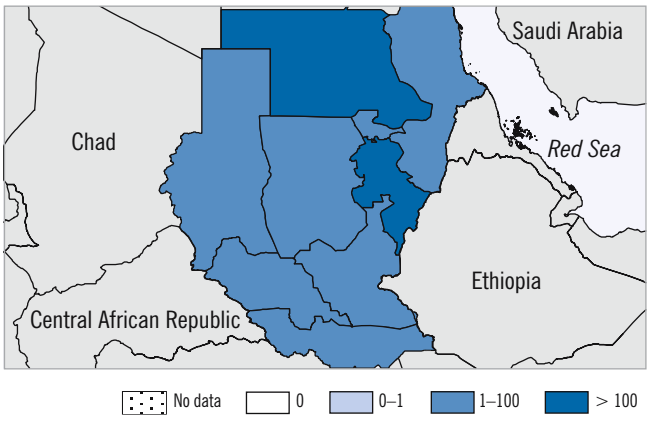
Population (000)	2006	%
All age groups	37 707	483
< 5 years	5 483	251
≥ 5 years	32 224	85

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	6 224	17
Low transmission (0–1/1000)	31 483	83
Malaria-free (0 cases)	0	0
Rural population	21 991	58

Vector and parasite profile

Major *Anopheles* species: *arabiensis*
Plasmodium species: *falciparum*, *vivax*

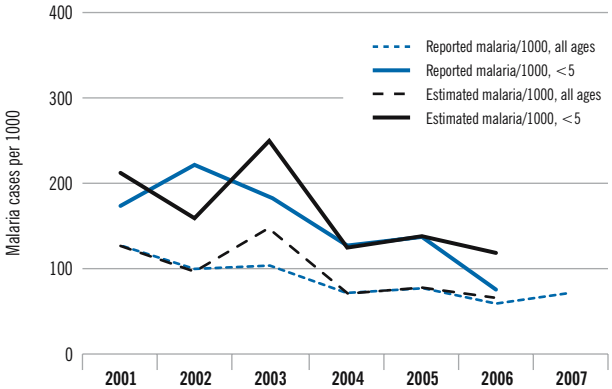
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	30 398 000	15 959 000	48 992 000	806	423	1 299
	< 5 years	7 820 000	4 106 000	12 603 000	1 426	749	2 298
Malaria cases	All ages	5 023 000	3 214 000	7 394 000	133	85	196
	< 5 years	1 292 000	827 000	1 902 000	236	151	347
Malaria deaths	All ages	32 000	18 000	50 000	0.85	0.48	1.3
	< 5 years	25 000	14 000	39 000	4.6	2.6	7.1
Malaria case-fatality rate (%)	All ages	0.6			—	—	—
	< 5 years	1.9			—	—	—

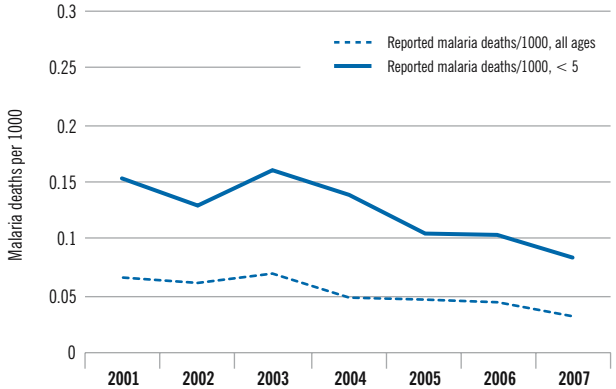
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	4 223 414	3 516 456	3 730 993	2 599 669	2 853 275	2 233 987	2 778 207
Reported malaria cases, < 5 years	927 397	1 202 822	994 205	693 476	745 606	418 441	
All-cause outpatient consultations, all ages	21 153 285	22 134 854	21 901 943	20 047 965	18 726 292	9 222 076	12 987 071
All-cause outpatient consultations, < 5 years	5 700 642	5 363 441	5 166 429	4 796 950	4 544 870	1 854 955	

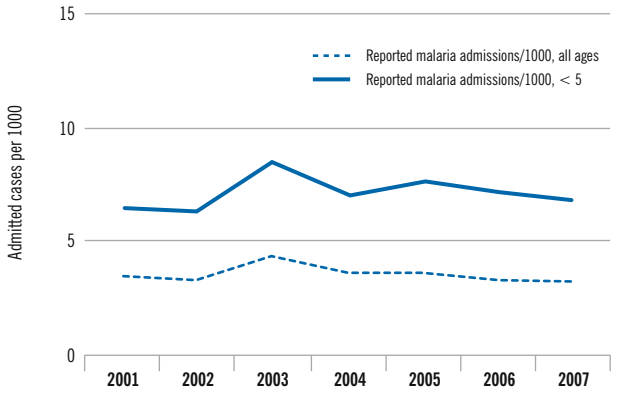
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	2 252	2 125	2 479	1 814	1 703	1 686	1 281
Reported malaria deaths, < 5 years	816	700	863	749	570	565	466
All-cause deaths, all ages	14 207	15 057	19 267	17 771	19 654	19 669	21 506
All-cause deaths, < 5 years	4 855	5 267	7 031	6 654	6 116	6 447	6 754

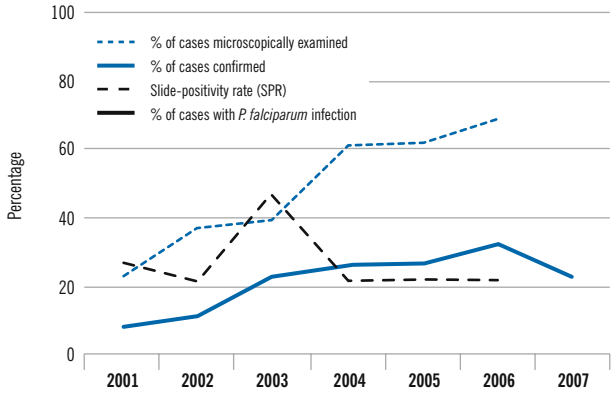
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	119 911	113 056	152 686	130 585	132 617	125 550	127 586
Reported malaria admissions (< 5)	34 750	34 216	45 736	38 495	41 725	39 615	37 751
All-cause admissions, all ages	466 460	494 358	724 630	724 695	811 645	852 037	933 619
All-cause admissions, < 5 years	115 143	136 117	194 919	192 577	206 343	225 578	257 897

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined	1 176 744	1 859 235	1 815 681	3 014 744	3 416 404	3 301 676	
Positive	323 402	393 606	850 953	668 484	761 034	721 233	651 091
P. falciparum							

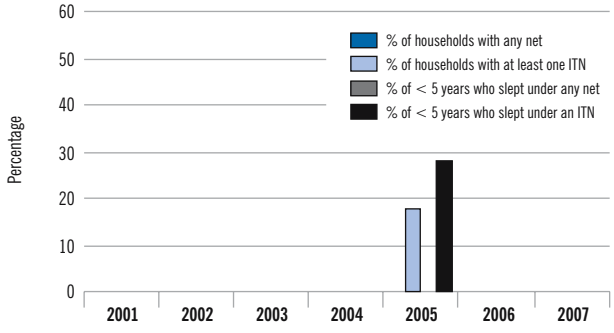
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution – Free	Yes	2001	Distribution – Antenatal care	Yes	—
	Targeting – All age groups	Yes	2006	Distribution – EPI routine and campaign	Yes	2008
	Targeting – Children under 5 years and pregnant women	Yes	2001			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	Yes	1999	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	Yes	1998
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	2003
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2005	IPT implemented countrywide	Yes	2005
Case management	ACT is free or highly subsidized in public sectors	Yes	2005	Free malaria diagnosis and first-line treatment of malaria	Yes	2005
	Oral artemisinin monotherapies banned	Yes	2004	Home management of malaria	Yes	2005
	Parasitological confirmation for all age groups	Yes	2000	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	Yes	2004
				RDTs in areas without microscopy	Yes	2004

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AS+SP, AS+AQ	2004
First-line treatment of *P. falciparum* (confirmed)	AS+SP, AS+AQ	2004
Treatment failure of *P. falciparum*	AL, QN	2004
Treatment of severe malaria	QN/AM/AS+SP	2004
Treatment of *P. vivax*	CQ+PQ(14d)	—

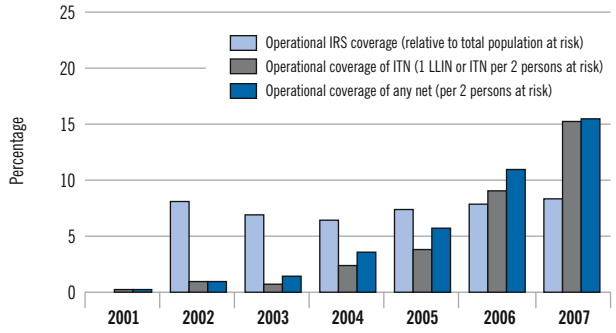
III. IMPLEMENTING MALARIA CONTROL

Coverage of ITN: survey data



	2001	2002	2003	2004	2005	2006	2007
% of pregnant women who slept under any net							
% of pregnant women who slept under an ITN							

Coverage of IRS and ITN: programme data

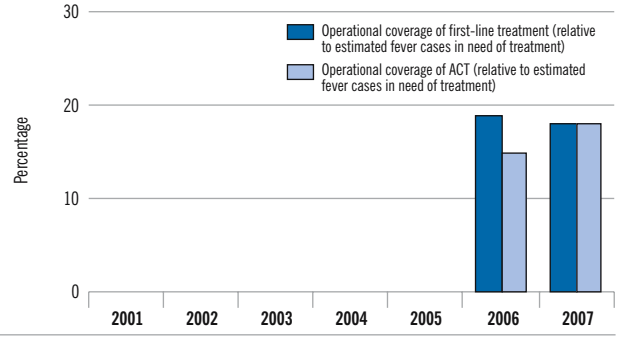


	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS		565 605	494 795	465 454	555 311	595 486	649 937
No. of ITNs and/or LLINs	135 000	160 600	76 500	414 000	579 064	1 063 287	1 345 000

Access by febrile children to effective treatment: survey data

No data

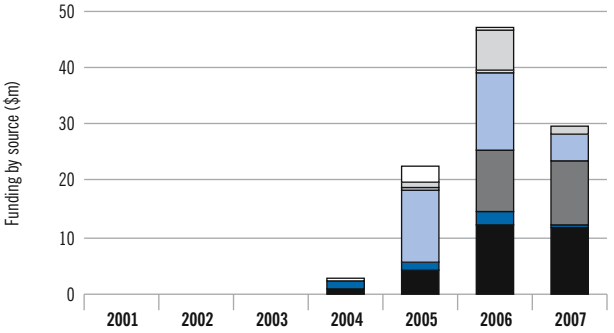
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received						2 888 943	2 677 199
No. of ACT treatment courses received						2 283 167	2 690 000

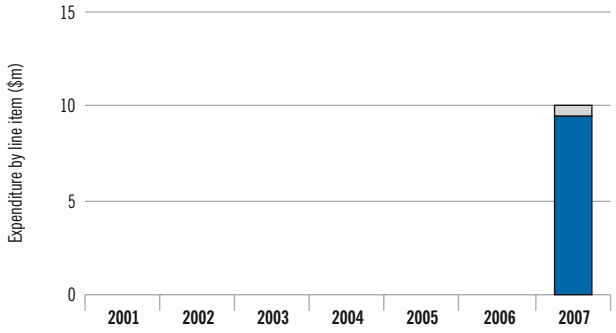
IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others				607 692	2 938 309	315 722	
Bilaterals				0	765 000	7 399 410	1 468 893
European Union				0	732 830	39 900	
GFATM				0	12 903 414	13 692 691	4 903 414
World Bank				0	0	11 000 000	11 000 000
UN agencies				1 219 231	1 074 662	2 369 200	500 000
Gov. malaria expenditure				861 538	4 278 554	12 185 187	11 800 000

Breakdown of expenditure by intervention



	2001	2002	2003	2004	2005	2006	2007
Others							
Treatment							500 000
Diagnosis							
IRS							
ITN							9 500 000

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	NMCP	Surveillance data	Insecticide-treated nets (ITN)	MICS 2000
Operational coverage of ITNs, IRS and access to medicines	NMCP	Programme report	Treatment	MICS 2000
Financial data	NMCP	Programme report	Use of health services	MICS 2006

Tajikistan

A successful malaria eradication campaign was carried out in 1957. Case numbers increased again after 1994 following the disruption of health services, armed conflict, population movement across the border with Afghanistan, and the launch of various development projects. Incidence peaked in 1997 and, while cases have since declined, there is a persistent risk of malaria everywhere below 2500 metres. There is transmission of both *P. falciparum* and *P. vivax*, but the latter is dominant. The recent resumption of *P. falciparum* transmission in the Khatlon region is a major concern. IRS in selected localities is the principal method of mosquito control, with limited ITN/LLIN distribution. All malaria cases are treated with a full dose of chloroquine and primaquine. Malaria control is funded mainly by the government and the Global Fund.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

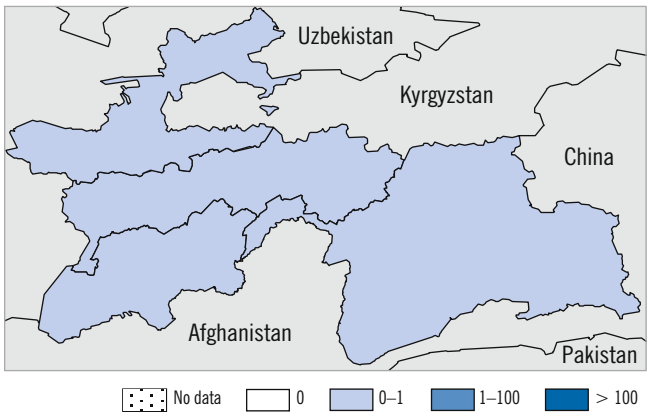
Population (000)	2006	%
All age groups	6 640	
< 5 years	858	13
≥ 5 years	5 782	87

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	190	3
Low transmission (0–1/1000)	4 863	73
Malaria-free (0 cases)	1 587	24
Rural population	5 011	75

Vector and parasite profile

Major *Anopheles* species: *hyrcanus*, *maculipennis*, *martinius*, *superpictus*
Plasmodium species: *falciparum*, *vivax*

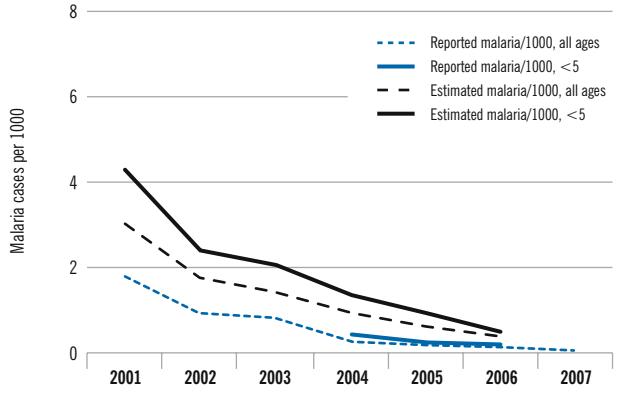
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	310 000	247 000	413 000	47	37	62
	< 5 years	61 000	48 000	81 000	71	56	94
Malaria cases	All ages	2 400	1 900	3 200	0.36	0.29	0.48
	< 5 years	460	370	620	0.54	0.43	0.72
Malaria deaths	All ages	0	0	0	0	0	0
	< 5 years	0	0	0	0	0	0
Malaria case-fatality rate (%)	All ages	0			—	—	—
	< 5 years	0	0	0	—	—	—

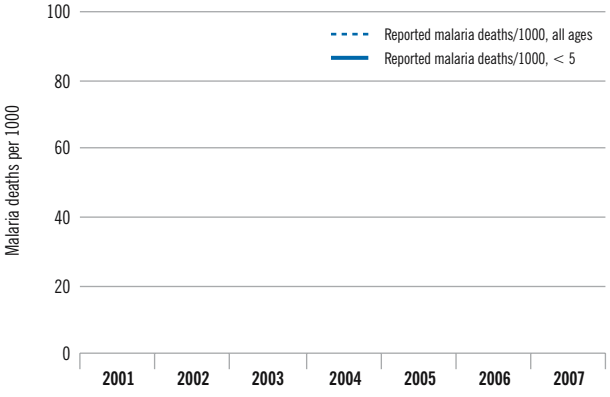
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	11 387	6 160	5 428	1 804	1 398	776	635
Reported malaria cases, < 5 years				392	231	159	
All-cause outpatient consultations, all ages							19 420 525
All-cause outpatient consultations, < 5 years							

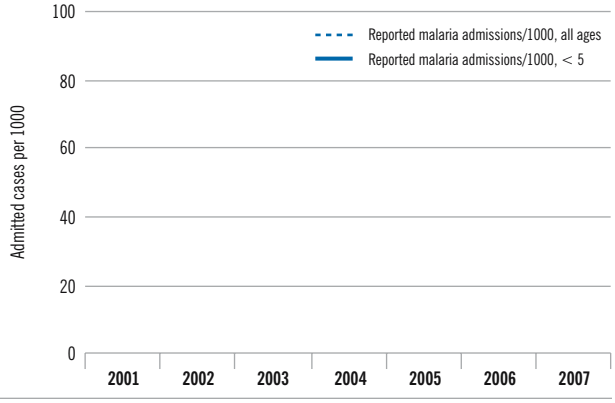
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	0	0	0	0	0	0	0
Reported malaria deaths, < 5 years	0	0	0	0	0	0	0
All-cause deaths, all ages							
All-cause deaths, < 5 years							

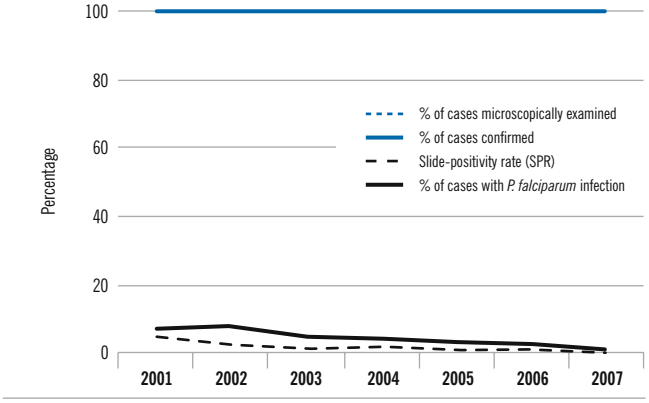
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	0	0	0	0	0	0	
Reported malaria admissions (< 5)	0	0	0	0	0	0	
All-cause admissions, all ages	11 387	6 160	5 428	151	911	568	
All-cause admissions, < 5 years					231	90	

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined	248 565	244 632	296 123	272 743	216 197	175 894	159 232
Positive	11 387	6 160	5 428	3 588	2 309	1 344	635
P. falciparum	826	509	252	151	81	28	7

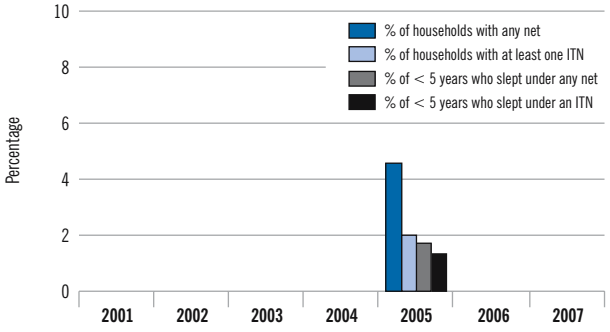
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution – Free	Yes	1997	Distribution – Antenatal care	No	—
	Targeting – All age groups	Yes	1997	Distribution – EPI routine and campaign	No	—
	Targeting – Children under 5 years and pregnant women	Yes	1997			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	Yes	2000	IRS is the primary vector-control intervention	Yes	1997
				IRS is used for prevention and control of epidemics	Yes	1997
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	1997
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	No	—	IPT implemented countrywide	No	—
Case management	ACT is free or highly subsidized in public sectors	Yes	2004	Free malaria diagnosis and first-line treatment of malaria	Yes	1997
	Oral artemisinin monotherapies banned	Yes	—	Home management of malaria	Yes	2004
	Parasitological confirmation for all age groups	Yes	1997	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	No	—
				RDTs in areas without microscopy	No	—

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	—	2004
First-line treatment of *P. falciparum* (confirmed)	AS+SP/AL	2004
Treatment failure of *P. falciparum*	QN(7d)	2004
Treatment of severe malaria	QN(7d)	2004
Treatment of *P. vivax*	CQ+PQ(14d)	—

III. IMPLEMENTING MALARIA CONTROL

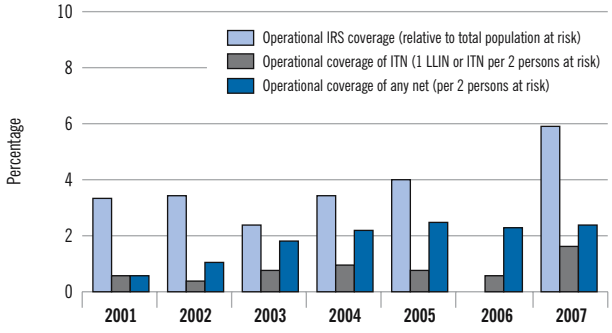
Coverage of ITN: survey data



	2001	2002	2003	2004	2005	2006	2007
% of pregnant women who slept under any net							
% of pregnant women who slept under an ITN							

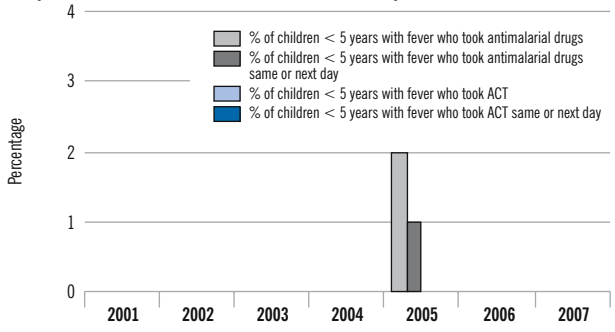
Source: MICS 2005.

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS	31 640	33 000	22 910	34 093	40 235		60 475
No. of ITNs and/or LLINs	14 188	10 625	19 986	22 952	19 993	15 150	26 438

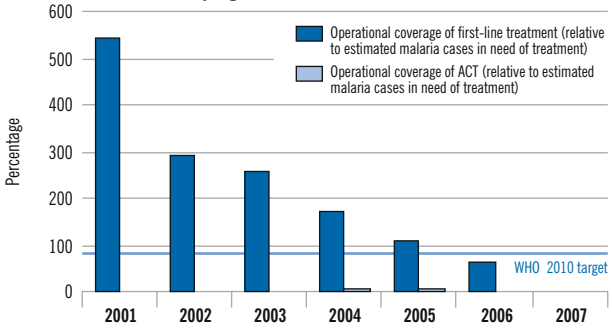
Access by febrile children to effective treatment: survey data



	2001	2002	2003	2004	2005	2006	2007
% of children < 5 years with fever							
% of febrile children < 5 years who sought treatment in health facility							

Source: MICS 2005.

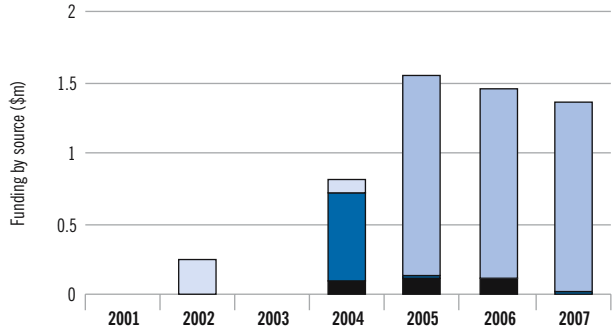
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received	11 387	6 160	5 428	3 588	2 309	1 344	
No. of ACT treatment courses received				151	81	28	

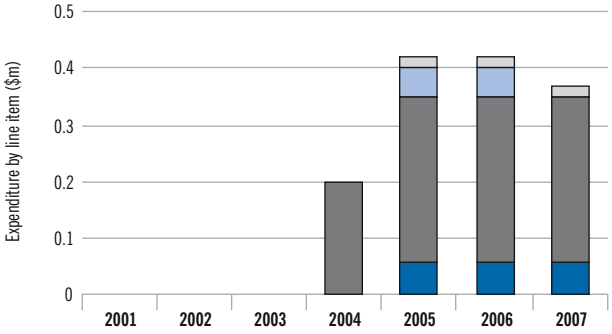
IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others							
Bilaterals							
European Union		250 000		100 000			
GFATM	0	0	0	0	1 425 218	1 346 783	1 346 783
World Bank	0	0	0	0	0	0	
UN agencies				612 000	20 000		20 000
Gov. malaria expenditure				102 726	108 039	110 885	

Breakdown of expenditure by intervention



	2001	2002	2003	2004	2005	2006	2007
Others							
Treatment					19 950	19 950	19 950
Diagnosis					53 000	52 000	
IRS				200 000	293 000	293 000	293 000
ITN					55 000	55 000	55 000

V. SOURCES OF INFORMATION

Programme data		Survey and other data	
Reported cases	MOH	Surveillance data	Insecticide-treated nets (ITN)	MICS 2005
Operational coverage of ITNs, IRS and access to medicines	MOH	Programme report	Treatment	MICS 2005
Financial data	MOH	Programme report	Use of health services	MICS 2005

Turkey

By 1968 malaria was largely under control, but case numbers increased sharply between 1971 and 1977. Prior to the 1970s, *P. falciparum* was the dominant parasite; however, following control activities most transmission is *P. vivax*. *P. falciparum* infections are acquired outside Turkey. Malaria is endemic in the south-east. In 2006, transmission was reported in 7 provinces, but 84% of cases came from Diyarbakir and Sanliurfa. Cases reported elsewhere in Turkey originated from these 7 provinces. IRS is the principal method of mosquito control, but coverage of households at risk is low in relation to the 6 million people at risk. Drugs to treat *P. vivax* infections are widely available. The number of reported cases fell steeply between 2003 and 2006, but it is not known how much of the decline is due to prevention and treatment. Malaria control is funded exclusively by the government.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

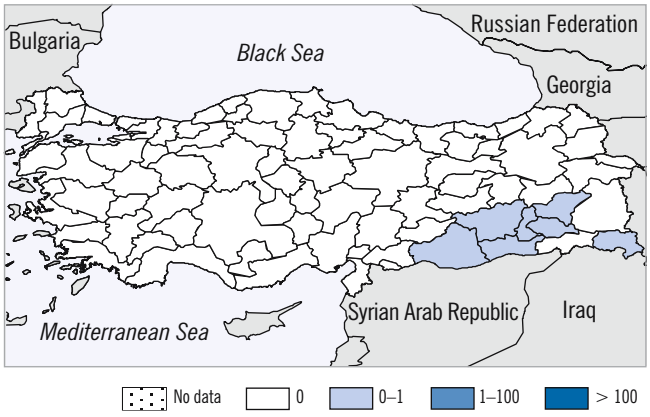
Population (000)	2006	%
All age groups	73 922	
< 5 years	6 630	9
≥ 5 years	67 292	91

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	0	0
Low transmission (0–1/1000)	6 160	8
Malaria-free (0 cases)	67 762	92
Rural population	23 827	32

Vector and parasite profile

Major *Anopheles* species: *sacharovi*
Plasmodium species: *vivax*

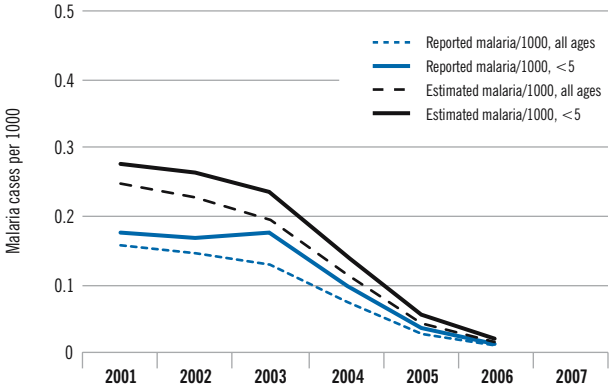
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	1 439 000	1 296 000	1 563 000	19	18	21
	< 5 years	167 000	150 000	181 000	25	23	27
Malaria cases	All ages	1 200	1 100	1 300	0.02	0.02	0.02
	< 5 years	140	130	150	0.02	0.02	0.02
Malaria deaths	All ages	0	0	0	0	0	0
	< 5 years	0	0	0	0	0	0
Malaria case-fatality rate (%)	All ages	0	0	0	—	—	—
	< 5 years	0	0	0	—	—	—

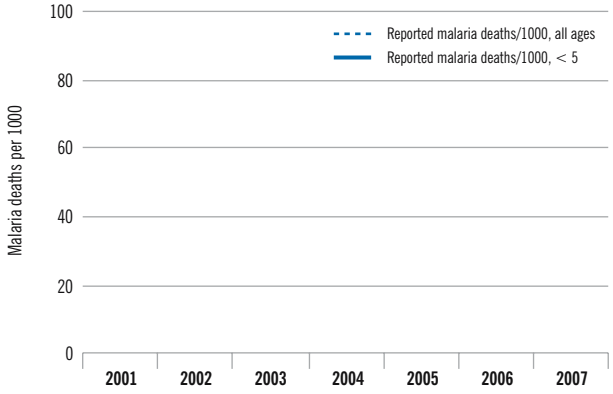
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	10 801	10 212	9 209	5 289	2 052	767	
Reported malaria cases, < 5 years	1 243	1 165	1 185	665	224	79	
All-cause outpatient consultations, all ages	178 411 123	180 162 242	196 238 494	227 338 423	292 782 714	338 641 581	
All-cause outpatient consultations, < 5 years							

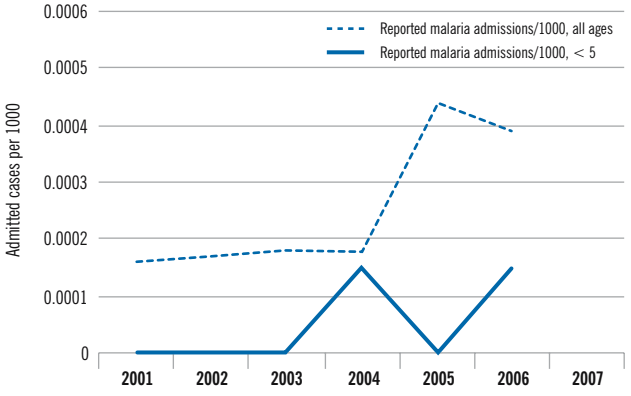
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	0	0	0	0	0	0	0
Reported malaria deaths, < 5 years	0	0	0	0	0	0	0
All-cause deaths, all ages							
All-cause deaths, < 5 years							

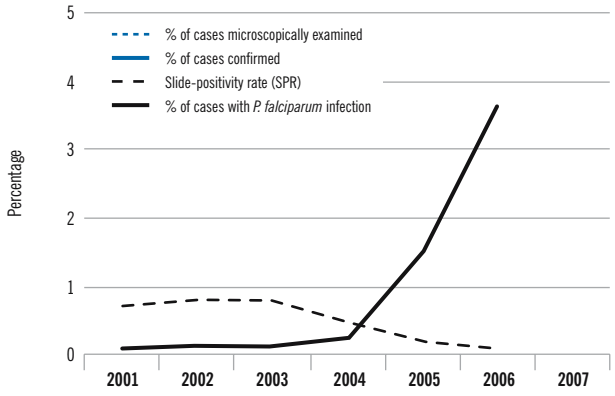
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	11	12	13	13	32	29	
Reported malaria admissions (< 5)	0	0	0	1	0	1	
All-cause admissions, all ages	5 290 024	5 508 263	5 736 517	6 440 800	7 011 514	7 764 651	
All-cause admissions, < 5 years							

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined	1 550 521	1 320 010	1 187 814	1 158 673	1 042 509	934 839	
Positive	10 812	10 224	9 222	5 302	2 084	796	
P. falciparum	11	12	12	13	32	29	

II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	No	—	Distribution – Antenatal care	No	—
	Targeting – All age groups	No	—	Distribution – EPI routine and campaign	No	—
	Targeting – Children under 5 years and pregnant women	No	—			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	Yes	2000	IRS is the primary vector-control intervention	Yes	2000
				IRS is used for prevention and control of epidemics	Yes	2000
				Where IRS is conducted, other options are also implemented, e.g. ITN	No	—
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	No	—	IPT implemented countrywide	No	—
Case management	ACT is free or highly subsidized in public sectors	No	—	Free malaria diagnosis and first-line treatment of malaria	Yes	2000
	Oral artemisinin monotherapies banned	No	—	Home management of malaria	No	—
	Parasitological confirmation for all age groups	Yes	2000	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	No	—
				RDTs in areas without microscopy	No	—

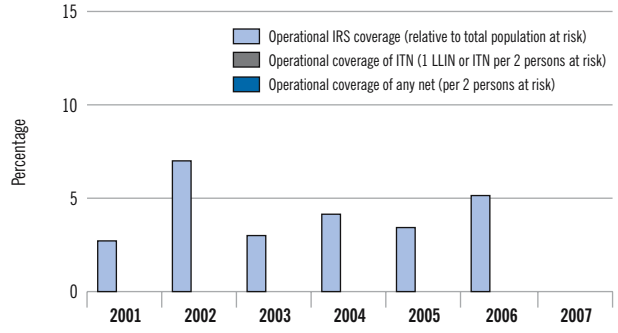
Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	—	—
First-line treatment of *P. falciparum* (confirmed)	—	—
Treatment failure of *P. falciparum*	—	—
Treatment of severe malaria	—	—
Treatment of *P. vivax*	CQ+PQ(14d)	—

III. IMPLEMENTING MALARIA CONTROL

Coverage of ITN: survey data

Not applicable

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS	31 600	82 400	35 304	50 184	41 370	62 669	
No. of ITNs and/or LLINs							

Access by febrile children to effective treatment: survey data

Not applicable

	2001	2002	2003	2004	2005	2006	2007
% of children < 5 years with fever			40				
% of febrile children < 5 years who sought treatment in health facility			43				

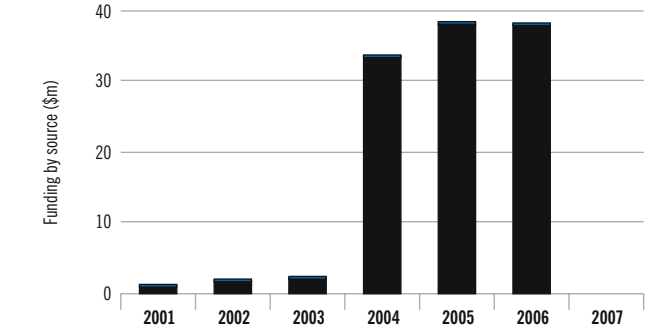
Access to effective treatment: programme data

Not applicable

	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received	986 852	1 208 158	1 197 132	419 938	854 004	1 139 577	
No. of ACT treatment courses received							

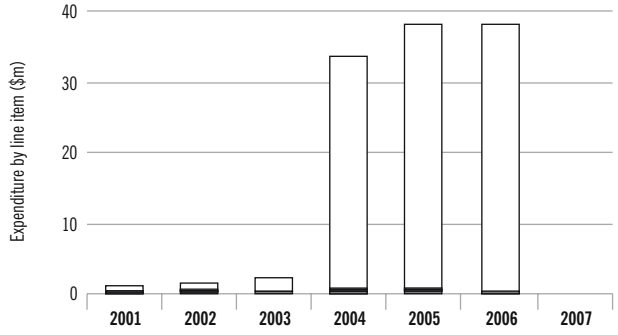
IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others							
Bilaterals							
European Union							
GFATM							
World Bank							
UN agencies	10 000	10 000	10 000	10 000	10 000	15 000	
Gov. malaria expenditure	1 060 931	1 648 831	2 338 800	33 642 069	38 220 474	38 072 421	

Breakdown of expenditure by intervention



	2001	2002	2003	2004	2005	2006	2007
Others	932 338	1 291 441	1 864 827	33 403 393	37 876 240	37 892 128	
Treatment	0	76 108	0	5 040	45 015	0	
Diagnosis	11 121	52 958	0	8 838	57 446	0	
IRS	117 472	228 324	473 973	224 798	241 773	180 293	
ITN							

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	MoH/MCP	Surveillance data	Insecticide-treated nets (ITN)	No surveys
Operational coverage of ITNs, IRS and access to medicines	MoH/MCP	Programme report	Treatment	No surveys
Financial data	MoH/MCP	Programme report	Use of health services	DHS 2003

Uganda

Uganda had an estimated 10.6 million malaria cases in 2006. Transmission occurs all year round in most parts of the country. Case reports were presented only in round numbers from 2001 to 2005, and do not provide a basis for evaluating incidence trends although programme reports show a fall in cases and deaths between 2005 and 2006. IRS began on a limited scale in 2006, protecting 500 000 people at risk. 1.9 million LLIN were distributed in 2005 and 2006. A 2006 survey showed that 34% of households owned a mosquito net, but only 10% of children slept under an ITN. Although 15 million ACT courses were reportedly delivered in 2006, survey data indicate that only 3% of febrile children received ACT. Funding for malaria control exceeded US$ 75 million in 2006, supported by government, the Global Fund, UN agencies and other external donors.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

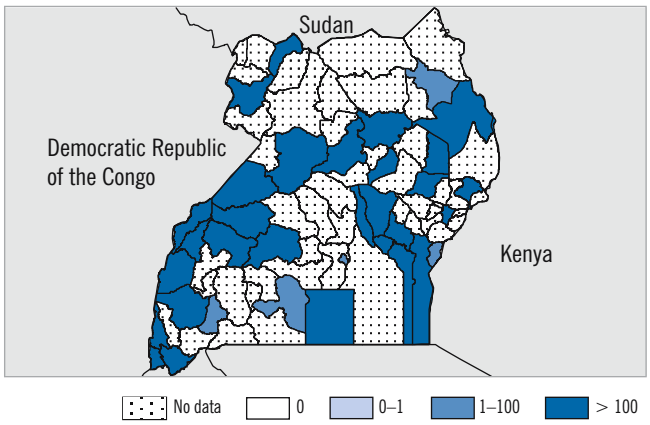
Population (000)	2006	%
All age groups	29 899	
< 5 years	5 840	20
≥ 5 years	24 058	80

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	28 238	94
Low transmission (0–1/1000)	1 661	6
Malaria-free (0 cases)	0	0
Rural population	26 098	87

Vector and parasite profile

Major *Anopheles* species: *arabiensis*, *brochieri*, *bwambae*, *coustani*, *funestus*, *gambiae*, *hancocki*, *hargreavesi*, *nili*, *paludis*, *pharoensis*, *quadriannulatus*
Plasmodium species: *falciparum*, *vivax*

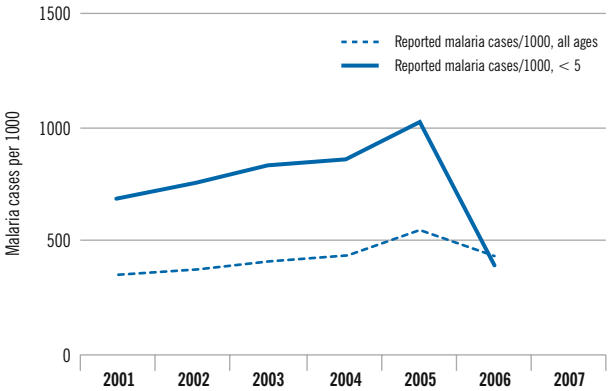
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	28 044 000	14 631 000	42 534 000	938	489	1 423
	< 5 years	16 765 000	3 138 000	32 011 000	2 871	537	5 481
Malaria cases	All ages	10 627 000	5 544 000	16 118 000	355	185	539
	< 5 years	6 353 000	1 189 000	12 130 000	1 088	204	2 077
Malaria deaths	All ages	43 000	21 000	72 000	1.4	0.70	2.4
	< 5 years	39 000	19 000	65 000	6.7	3.3	11
Malaria case-fatality rate (%)	All ages	0.40			—	—	—
	< 5 years	0.61			—	—	—

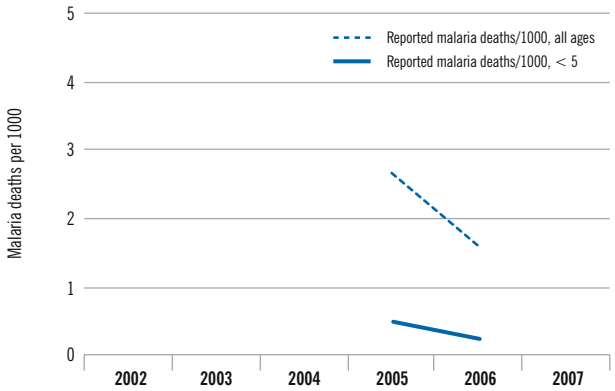
Trends in malaria morbidity and mortality

Reported malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	9 000 000	9 800 000	11 000 000	12 000 000	16 000 000	12 792 759	
Reported malaria cases, < 5 years	3 500 000	3 900 000	4 400 000	4 700 000	5 800 000	2 349 615	
All-cause outpatient consultations, all ages							
All-cause outpatient consultations, < 5 years							

Reported malaria deaths, per 1000



	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages				77 000	47 000	
Reported malaria deaths, < 5 years				2 631	1 332	
All-cause deaths, all ages						
All-cause deaths, < 5 years						

I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000

Not applicable

Slide examination, case confirmation, *Plasmodium* spp

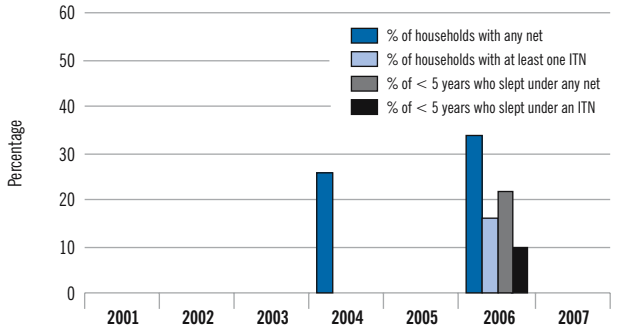
Not applicable

II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	2002	Distribution – Antenatal care	Yes	2004
	Targeting – All age groups	No	—	Distribution – EPI routine and campaign	Yes	2004
	Targeting – Children under 5 years and pregnant women	Yes	2002			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	Yes	—
	Insecticide-resistance management implemented	Yes	—	IRS is the primary vector-control intervention	Yes	2006
				IRS is used for prevention and control of epidemics	Yes	2001
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	2002
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2000	IPT implemented countrywide	Yes	2005
Case management	ACT is free or highly subsidized in public sectors	Yes	2006	Free malaria diagnosis and first-line treatment of malaria	Yes	—
	Oral artemisinin monotherapies banned	Yes	2007	Home management of malaria	Yes	2004
	Parasitological confirmation for all age groups	Yes	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	Yes	—
				RDTs in areas without microscopy	Yes	—
	Antimalarial medicines	**Type of medicine**	**Year adopted**			
	First-line treatment of *P. falciparum* (unconfirmed)	AL	2004			
	First-line treatment of *P. falciparum* (confirmed)	AL	2004			
	Treatment failure of *P. falciparum*	QN(7d)	2004			
	Treatment of severe malaria	QN(7d)	2004			
	Treatment of *P. vivax*	—	—			

III. IMPLEMENTING MALARIA CONTROL

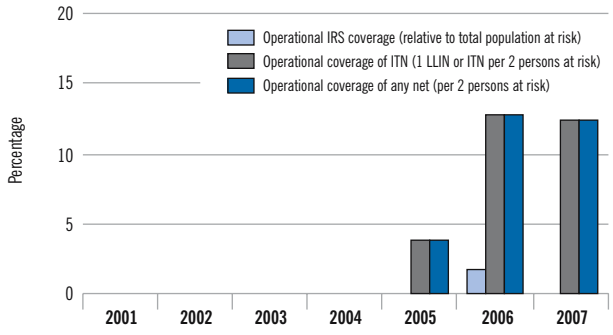
Coverage of ITN: survey data



	2006
% of pregnant women who slept under any net	24
% of pregnant women who slept under an ITN	10

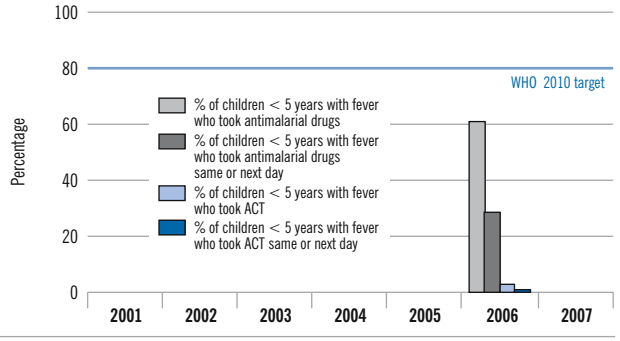
Source: AIS 2004–05, DHS 2006.

Coverage of IRS and ITN: programme data



	2005	2006
No. of households protected by IRS		104 000
No. of ITNs and/or LLINs	540 682	1 365 919

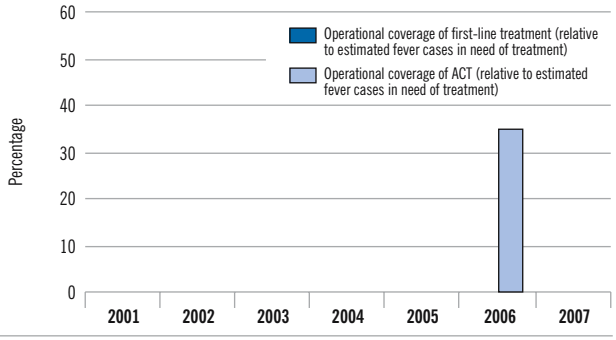
Access by febrile children to effective treatment: survey data



	2006
% of children < 5 years with fever	42
% of febrile children < 5 years who sought treatment in health facility	69

Source: DHS 2006.

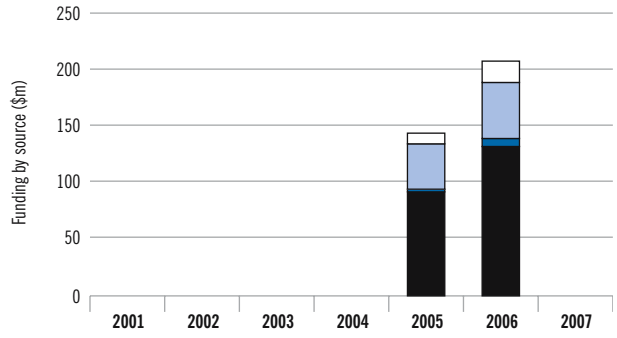
Access to effective treatment: programme data



	2006
No. of first-line treatment courses received	
No. of ACT treatment courses received	15 000 000

IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2005	2006
Others	9 500 000	19 000 000
Bilaterals		
European Union		
GFATM	40 899 062	47 854 144
World Bank		
UN agencies	2 000 000	7 000 000
Gov. malaria expenditure	91 084 448	131 823 468

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data		Survey and other data		
Reported cases	HMIS	Surveillance data	Insecticide-treated nets (ITN)	DHS 2000–01, AIS 2004–05, DHS 2006
Operational coverage of ITNs, IRS and access to medicines	NMCP, PMI (IRS)	Programme report	Treatment	DHS 2006
Financial data	HMIS	Programme report	Use of health services	DHS 2006

United Republic of Tanzania

The United Republic of Tanzania had an estimated 11.5 million malaria cases in 2006. Transmission occurs all year round, with seasonal peaks. The majority of cases are caused by *P. falciparum* but most are unconfirmed. 10–12 million cases and 15 000–20 000 deaths were reported annually between 2003 and 2006. While nationwide trends are unclear, the numbers of cases and deaths have been significantly reduced in Zanzibar, linked to the provision of LLINs and ACT. On the mainland, the NMCP distributed more than 2 million ITNs annually in 2005, 2006 and 2007, and IRS began in 2007. The NMCP delivered 23 million ACT courses in 2007 (and 230 000 in Zanzibar in 2006), which should be sufficient to treat all fever cases. No information on funding since 2005 has been provided by the programme, but it is known that expenditure on malaria control has increased markedly with external donor support.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

Population (000)	2006	%
All age groups	39 459	
< 5 years	6 953	18
≥ 5 years	32 506	82

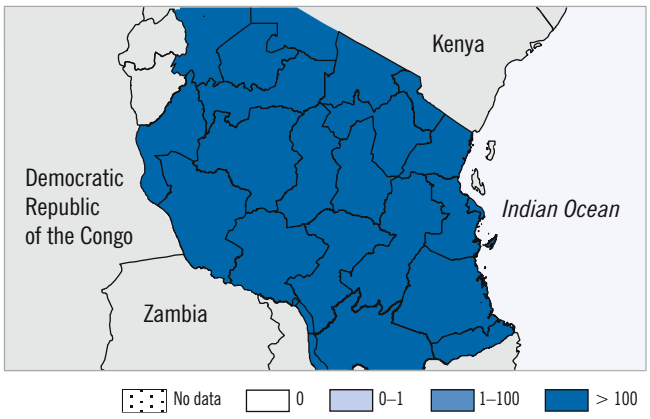
Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	29 594	75
Low transmission (0–1/1000)	9 865	25
Malaria-free (0 cases)	0	0
Rural population	29 747	75

Vector and parasite profile

Major *Anopheles* species: *arabiensis*, *coustani*, *funestus*, *gambiae*, *merus*, *nili*, *paludis*, *pharoensis*

Plasmodium species: *falciparum*, *vivax*

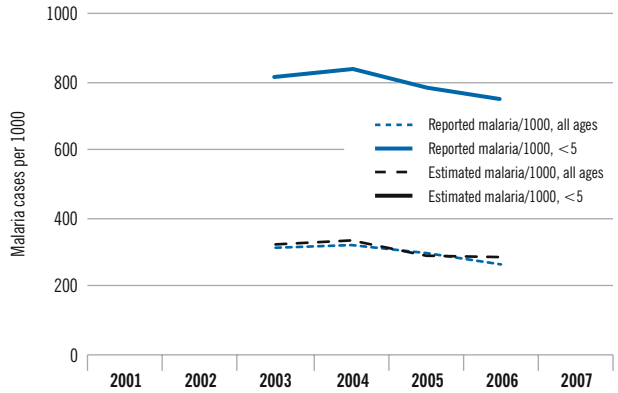
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	26 393 000	15 549 000	38 066 000	669	394	965
	< 5 years	12 508 000	7 369 000	18 040 000	1 799	1 060	2 595
Malaria cases	All ages	11 540 000	6 931 000	16 220 000	292	176	411
	< 5 years	5 469 000	3 285 000	7 687 000	787	472	1 106
Malaria deaths	All ages	39 000	21 000	61 000	0.99	0.53	1.5
	< 5 years	31 000	17 000	49 000	4.5	2.4	7.0
Malaria case-fatality rate (%)	All ages	0.34			—	—	—
	< 5 years	0.57			—	—	—

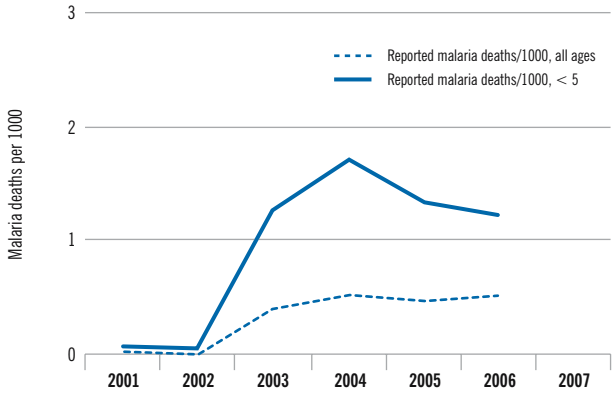
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages			11 379 411	11 898 627	11 441 681	10 566 201	
Reported malaria cases, < 5 years			5 223 215	5 589 250	5 318 558	5 228 905	
All-cause outpatient consultations, all ages			28 056 128	29 482 683	26 881 101	24 194 975	
All-cause outpatient consultations, < 5 years			12 087 476	13 040 335	11 341 630	11 753 392	

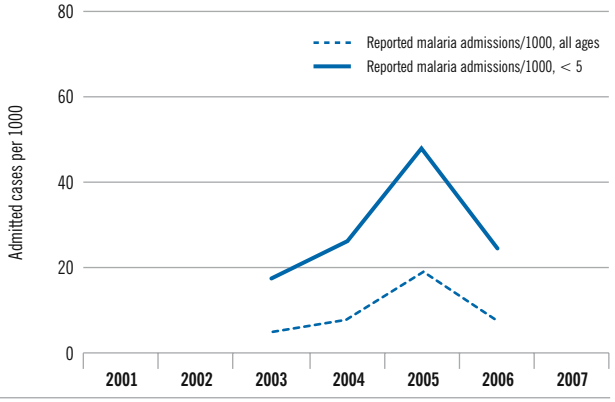
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	838	441	14 943	19 547	18 075	20 782	
Reported malaria deaths, < 5 years	443	238	8 170	11 408	9 057	8 453	
All-cause deaths, all ages			45 296	60 174	71 074	55 733	
All-cause deaths, < 5 years			21 634	30 924	30 462	21 211	

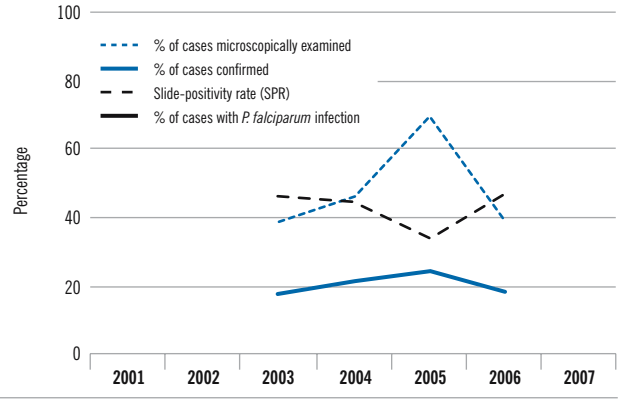
I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)			186 949	292 991	730 509	287 577	
Reported malaria admissions (< 5)			112 540	173 991	329 672	168 721	
All-cause admissions, all ages			1 442 748	2 217 838	2 830 224	2 562 019	
All-cause admissions, < 5 years			723 320	1 193 230	1 213 770	1 217 515	

Slide examination, case confirmation, *Plasmodium* spp



	2001	2002	2003	2004	2005	2006	2007
Examined			4 296 588	5 528 934	7 993 977	4 136 387	
Positive			1 960 909	2 490 446	2 756 421	1 926 711	
P. falciparum							

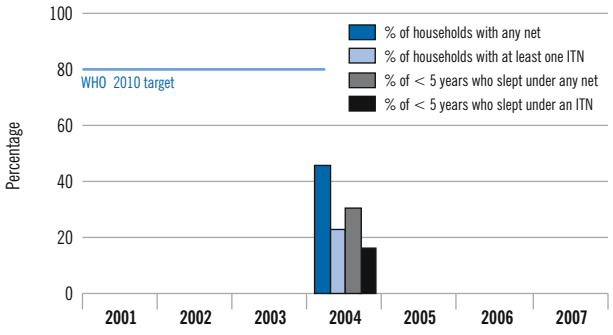
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	No	—	Distribution – Antenatal care	Yes	2004
	Targeting – All age groups	No	—	Distribution – EPI routine and campaign	Yes	2005
	Targeting – Children under 5 years and pregnant women	Yes	2004			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	No	—	DDT is used alternately with other insecticides in the same area	No	—
	Insecticide-resistance management implemented	No	—	IRS is the primary vector-control intervention	No	—
				IRS is used for prevention and control of epidemics	Yes	2007
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	2007
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2001	IPT implemented countrywide	Yes	2001
Case management	ACT is free or highly subsidized in public sectors	Yes	1998	Free malaria diagnosis and first-line treatment of malaria	No	—
	Oral artemisinin monotherapies banned	No	—	Home management of malaria	No	—
	Parasitological confirmation for all age groups	No	—	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	Yes	2001
				RDTs in areas without microscopy	No	—

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AL/AS+AQ	2004
First-line treatment of *P. falciparum* (confirmed)	AL/AS+AQ	2004
Treatment failure of *P. falciparum*	QN(7d)/AL	2004
Treatment of severe malaria	QN(7d)	2004
Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

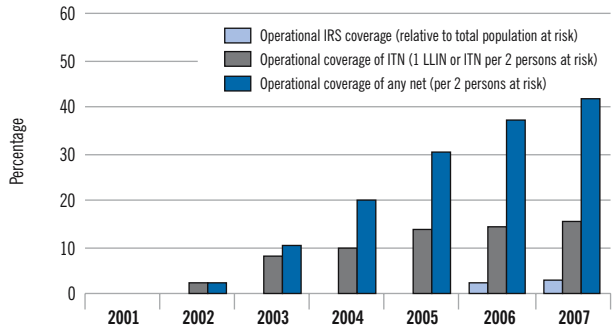
Coverage of ITN: survey data



	2001	2002	2003	2004	2005	2006	2007
% of pregnant women who slept under any net							
% of pregnant women who slept under an ITN				16			

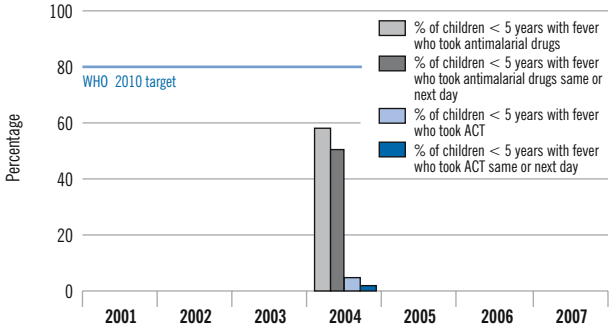
Source: DHS 2004–2005.

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS						203 699	231 669
No. of ITNs and/or LLINs		467 668	1 466 181	1 790 647	2 634 414	2 874 043	2 967 148

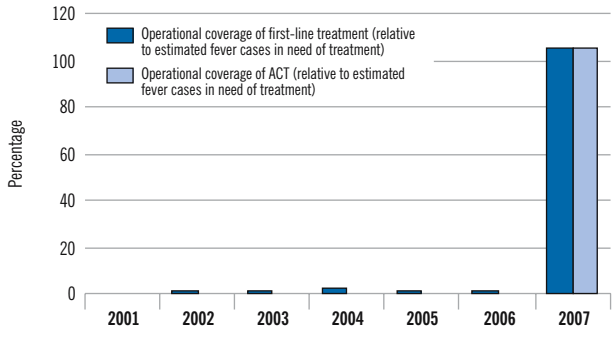
Access by febrile children to effective treatment: survey data



	2001	2002	2003	2004	2005	2006	2007
% of children < 5 years with fever				25			
% of febrile children < 5 years who sought treatment in health facility				55			

Source: DHS 2004–2005.

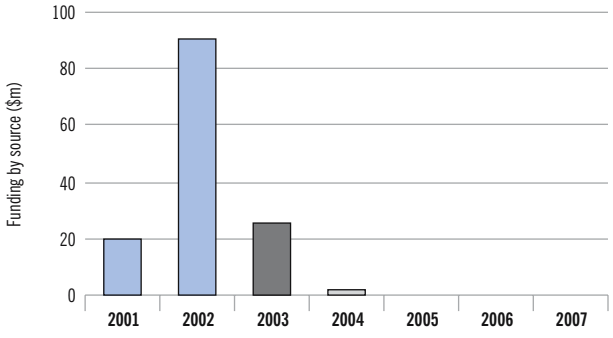
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of first-line treatment courses received		28 726	220 725	476 712	363 585	227 047	23 455 260
No. of ACT treatment courses received							23 455 260

IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others							
Bilaterals				1 800 000			
European Union							
GFATM	19 800 000	90 400 000					
World Bank			25 000 000				
UN agencies							
Gov. malaria expenditure							

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	NMCP, ZMCP	Surveillance data	Insecticide-treated nets (ITN)	DHS 1999, DHS 2004–05
Operational coverage of ITNs, IRS and access to medicines	NMCP, ZMCP	Programme report	Treatment	DHS 1999, DHS 2004–05
Financial data	NMCP, ZMCP	Programme report	Use of health services	DHS 2004

Zambia

Malaria transmission is seasonal, occurring mainly from November to May. The majority of cases are caused by *P. falciparum* but little confirmation is done. In 2007, reported in-patient malaria cases and deaths in children < 5 years were lower by 33% and 24%, respectively, than the average of 2001–2003 (prior to interventions). IRS is not the primary preventive strategy, but 2.4 million people at risk were protected in 2006. The NMCP distributed 1.7 million LLINs in 2005 and 2006. A 2006 survey found that 44% of all households owned an ITN; ITN use in children was 24%. 58% of children with fever received an antimalarial drug in 2006; only 13% received ACT, though access to ACT is increasing. Except government expenditures, little financial information was provided although the programme is increasingly funded by the Global Fund, the World Bank, bilateral organizations and others.

I. EPIDEMIOLOGICAL PROFILE

Population, endemicity and malaria burden

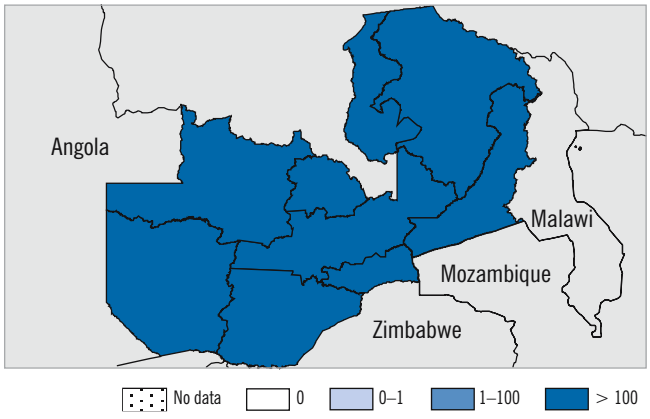
Population (000)	2006	%
All age groups	11 696	
< 5 years	2 012	17
≥ 5 years	9 684	83

Population by malaria endemicity (000)	2006	%
High transmission ≥ 1/1000	11 696	100
Low transmission (0–1/1000)	0	0
Malaria-free (0 cases)	0	0
Rural population	7 591	65

Vector and parasite profile

Major *Anopheles* species: *arabiensis*, *funestus*, *gambiae*, *nili*, *pharoensis*, *quadriannulatus*
Plasmodium species: *falciparum*, *vivax*

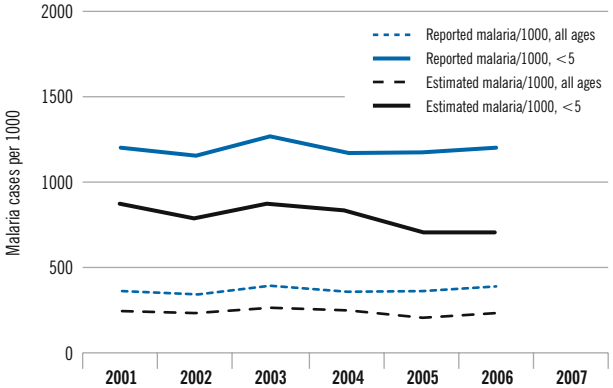
Stratification of burden (reported cases/1000)



Estimated burden of malaria		Estimated cases and deaths (2006)			Estimated cases and deaths per 1000 (2006)		
	Age group	Numbers	Lower	Upper	Per 1000	Lower	Upper
Fever suspected of being malaria	All ages	10 209 000	2 951 000	20 240 000	873	252	1 730
	< 5 years	5 818 000	1 681 000	11 533 000	2 892	835	5 732
Malaria cases	All ages	3 655 000	1 126 000	6 833 000	312	96	584
	< 5 years	2 083 000	641 000	3 894 000	1 035	319	1 935
Malaria deaths	All ages	14 000	4 800	26 000	1.2	0.41	2.2
	< 5 years	12 000	4 200	23 000	6.0	2.1	11
Malaria case-fatality rate (%)	All ages	0.38			—	—	—
	< 5 years	0.58			—	—	—

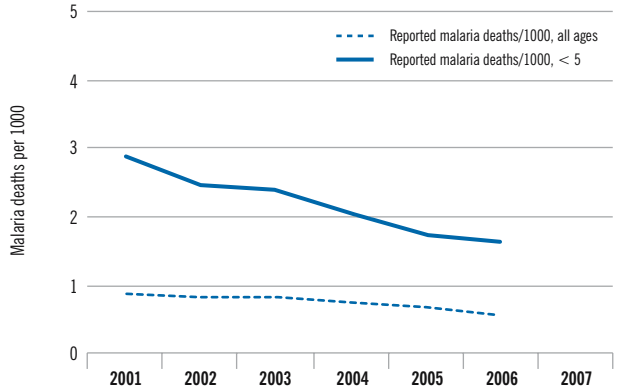
Trends in malaria morbidity and mortality

Reported and estimated malaria cases, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria cases, all ages	3 838 402	3 760 335	4 346 172	4 078 234	4 121 356	4 731 338	
Reported malaria cases, < 5 years	2 295 738	2 230 107	2 480 157	2 324 580	2 360 307	2 434 135	
All-cause outpatient consultations, all ages	10 133 545	10 347 966	11 970 827	11 252 589	11 567 755	13 283 617	
All-cause outpatient consultations, < 5 years	5 334 699	5 299 233	5 972 557	5 534 795	5 680 460	5 872 543	

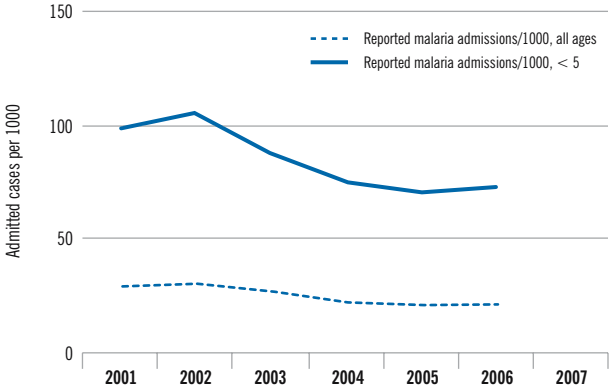
Reported malaria deaths, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria deaths, all ages	9 369	9 021	9 178	8 289	7 737	6 484	
Reported malaria deaths, < 5 years	5 498	4 717	4 653	4 008	3 470	3 342	3 783
All-cause deaths, all ages	35 358	39 482	39 117	38 466	38 740	35 541	
All-cause deaths, < 5 years	16 680	16 377	15 459	13 569	12 796	12 469	13 842

I. EPIDEMIOLOGICAL PROFILE *(continued)*

Reported malaria admissions, per 1000



	2001	2002	2003	2004	2005	2006	2007
Reported malaria admissions (all ages)	308 662	340 834	296 602	251 434	240 952	247 120	212 049
Reported malaria admissions (< 5)	184 917	203 625	171 408	147 663	140 329	146 524	125 188
All-cause admissions, all ages	757 255	893 262	766 078	685 130	722 712	718 149	666 705
All-cause admissions, < 5 years	379 811	424 748	348 864	289 082	300 804	307 443	

Slide examination, case confirmation, *Plasmodium* spp

No data

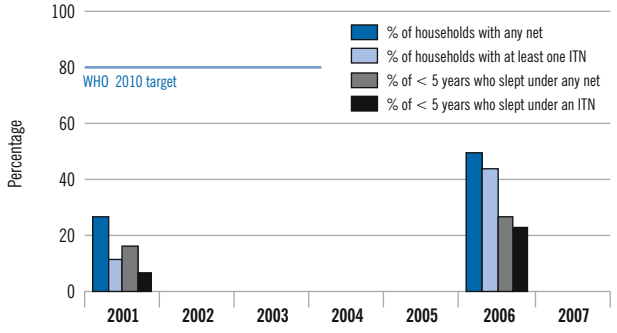
II. INTERVENTION POLICIES AND TARGETS

Intervention	WHO-recommended policies/strategies			Optional policies/strategies		
	Policy/strategy	Yes/ No	Year adopted	Policy/strategy	Yes/ No	Year adopted
Insecticide-treated nets (ITN)	Distribution of LLINS – Free	Yes	2005	Distribution – Antenatal care	Yes	2001
	Targeting – All age groups	Yes	1998	Distribution – EPI routine and campaign	Yes	2003
	Targeting – Children under 5 years and pregnant women	Yes	2001			
Indoor residual spraying (IRS)	DDT is used for IRS (public health) only	Yes	2001	DDT is used alternately with other insecticides in the same area	Yes	2001
	Insecticide-resistance management implemented	Yes	2000	IRS is the primary vector-control intervention	Yes	2001
				IRS is used for prevention and control of epidemics	Yes	2001
				Where IRS is conducted, other options are also implemented, e.g. ITN	Yes	2001
Intermittent preventive treatment (IPT)	IPT used to prevent malaria during pregnancy	Yes	2001	IPT implemented countrywide	Yes	2003
Case management	ACT is free or highly subsidized in public sectors	Yes	2003	Free malaria diagnosis and first-line treatment of malaria	Yes	1998
	Oral artemisinin monotherapies banned	Yes	2003	Home management of malaria	Yes	2006
	Parasitological confirmation for all age groups	Yes	2001	Prereferral treatment at health-facility level with quinine im or artesunate suppositories	Yes	1998
				RDTs in areas without microscopy	Yes	2005

Antimalarial medicines	Type of medicine	Year adopted
First-line treatment of *P. falciparum* (unconfirmed)	AL	2002
First-line treatment of *P. falciparum* (confirmed)	ALI	2002
Treatment failure of *P. falciparum*	QN(7d)	2002
Treatment of severe malaria	QN(7d)	2002
Treatment of *P. vivax*	—	—

III. IMPLEMENTING MALARIA CONTROL

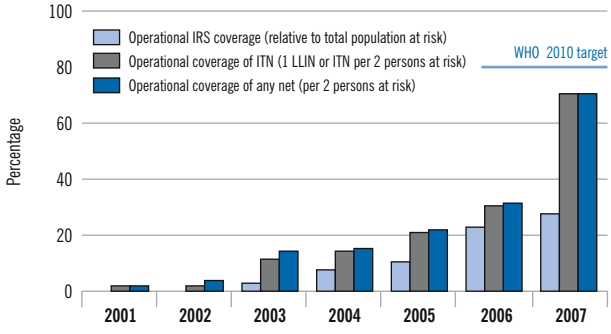
Coverage of ITN: survey data



	2001	2002	2003	2004	2005	2006	2007
% of pregnant women who slept under any net	17						
% of pregnant women who slept under an ITN	9					24	

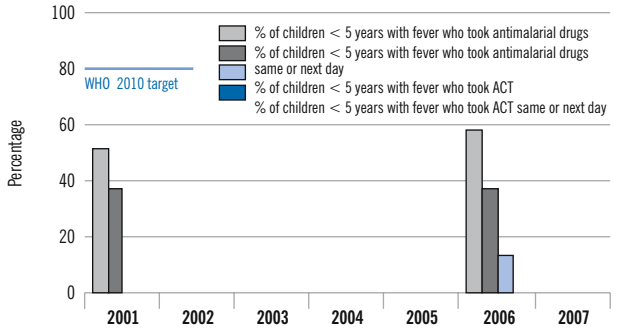
Source: DHS 2001–2002, MIS 2006.

Coverage of IRS and ITN: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of households protected by IRS			69 774	175 192	236 759	537 877	657 695
No. of ITNs and/or LLINs	115 891	112 020	557 071	176 082	516 999	1 162 578	2 458 183

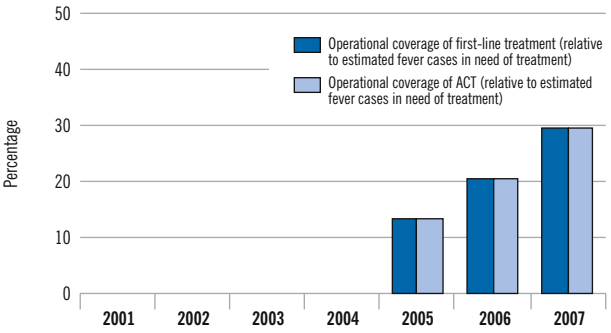
Access by febrile children to effective treatment: survey data



	2001	2002	2003	2004	2005	2006	2007
% of children < 5 years with fever	44						
% of febrile children < 5 years who sought treatment in health facility	61						

Source: DHS 2001–2002, MIS 2006.

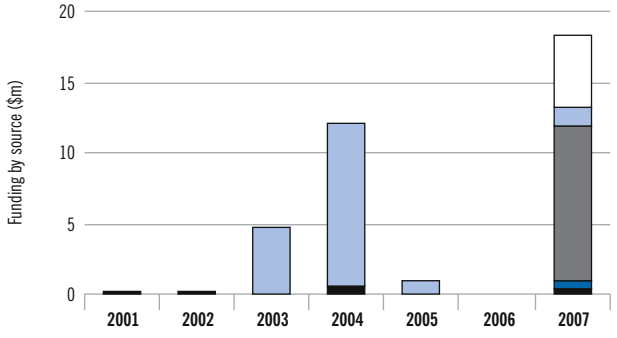
Access to effective treatment: programme data



	2001	2002	2003	2004	2005	2006	2007
No. of 1st-line treatment courses received				1 184 698	1 379 955	2 111 348	3 036 982
No. of ACT treatment courses received				1 184 698	1 379 955	2 111 348	3 036 982

IV. FINANCING MALARIA CONTROL

Governmental and external financing



	2001	2002	2003	2004	2005	2006	2007
Others							5 000 000
Bilaterals							
European Union							
GFATM			4 653 400	11 440 135	946 665		1 400 000
World Bank							11 000 000
UN agencies							450 000
Gov. malaria expenditure	160 000	302 860		588 571			460 380

Breakdown of expenditure by intervention

No data

V. SOURCES OF INFORMATION

Programme data			Survey and other data	
Reported cases	HMIS	Surveillance data	Insecticide-treated nets (ITN)	MICS 1999, DHS 2001–02, MIS 2006
Operational coverage of ITNs, IRS and access to medicines	NMCP	Programme report	Treatment	MICS 1999, DHS 2001–02, MIS 2006
Financial data	HMIS	Programme report	Use of health services	DHS 2001

ANNEX 1

Estimating the numbers of malaria cases and deaths by country in 2006

The working definition of a case of malaria is considered to be "fever with parasites" which normally defines all those that require antimalarial treatment (*1*).[1] Estimates of the number of malaria cases and fever suspected of being malaria have been made by one of two methods:

1. By adjusting the reported malaria cases for reporting completeness, the extent of health service utilization and the likelihood that cases are parasite-positive; where data permit, this is generally the preferred method and it was used for countries outside the African Region and selected African countries*.
2. From an empirical relationship between measures of malaria transmission risk and case incidence; this procedure was used for countries in the African Region where a convincing estimate from reported cases could not be made.

Estimates of the number of malaria deaths were also made by one of two methods:

1. By multiplying the estimated number of *P. falciparum* malaria cases by a fixed case fatality rate for each country. This method was used in countries where malaria accounts for a relatively small proportion of all deaths, and where reasonably robust estimates of case incidence could be made. This method was used primarily for countries outside the African Region.
2. From an empirical relationship between measures of malaria transmission risk and malaria-specific mortality rates. This procedure was used primarily for countries in the African Region where estimates of case incidence could not be made from routinely reported cases.

1. Estimates of cases by adjusting the malaria cases reported by countries

The principal source of data was outpatients attending health facilities as recorded in the health management information system (HMIS) of a ministry of health, or by disease surveillance systems. National malaria control programmes (NMCP) were asked to report on: (i) the number of probable or unconfirmed cases recorded – these are cases that were treated as malaria but not tested or confirmed;[2] (ii) the number of cases confirmed by slide examination or RDT; and (iii) the number of slide or RDT examinations undertaken. The relationship between these numbers is summarized in **Fig. 1** (*2*).[3]

The following steps were used to estimate the number of malaria cases in a country:

1. The total number of parasite-positive cases that attended health facilities covered by the HMIS of a ministry of health was estimated; this is given by the confirmed malaria cases plus the unconfirmed cases multiplied by the slide positivity rate.
2. The revised estimate of confirmed cases was adjusted to take account of missing HMIS reports; by dividing by the health-facility reporting completeness fraction.
3. The estimated number of confirmed cases attending health facilities in the HMIS was then adjusted to take into account the propensity of fever cases to use health facilities not covered by the HMIS (e.g. those going to the private sector), or not to seek treatment at all.

Upper and lower limits for the estimated number of cases, *M*, arising in any given year in a country are given by:

$$M_{upper} = \frac{C + (s \times U)}{r} \times \frac{1}{u}$$

$$M_{lower} = \frac{C + (s \times U)}{r} \times \frac{1 - n}{u}$$

Where:

C = Reported number of confirmed malaria cases in a year.

U = Reported number of probable or unconfirmed cases in a year – cases suspected of being malaria but not tested or confirmed.

s = The proportion of slides examined that are positive for malaria parasites, often known as the slide positivity rate (SPR). In countries that are unable to undertake microscopic examination of all suspected cases, s was derived from a selection of facilities, or treatment outlets, that undertake case confirmation. The proportion of cases found to be positive, s, was applied to cases that were not tested.

r = Completeness of health-facility reports. Typically this is the number of outpatient health-facility reports received divided by the number of facility reports expected. The expected number of reports is given by the number of health facilities multiplied by the number of reports expected to be submitted by each health facility in a year, which is 12 for a monthly reporting system. The quantity r has been reported by countries as lying within three possible ranges (less than 50%, 50–80% and > 80%). In order to calculate an average reporting rate, it has been assumed that the reporting rate has a triangular distribution in the outer ranges and a uniform distribution in the middle with expected values in these ranges of 33%, 65% and 87% respectively.

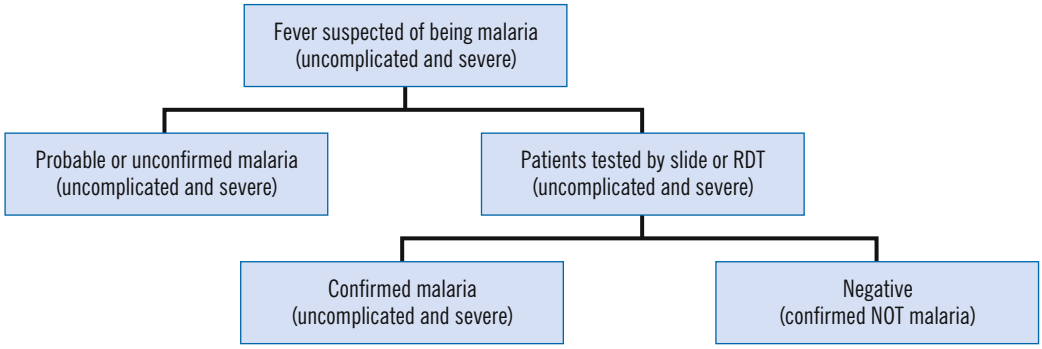
* Cibulskis RE et al. Estimating trends in the burden of malaria. *American Journal of Tropical Medicine and Hygiene,* 2007, 77(suppl 6): 133-137.

[1] There are, however, widely recognized exceptions to this notion. In much of sub-Saharan Africa, antimalarial treatment may be recommended for all fever cases without parasite confirmation, particularly for children under 5 years. In these circumstances it is also useful to estimate the number of fever cases. In other situations, parasites may be detected in individuals that do not have fever. No special provision has been made for such asymptomatic malaria cases even though they would normally be eligible for treatment, since they rarely receive treatment.

[2] *WHO expert committee on malaria: twentieth report*. Geneva, World Health Organization, 1998.

[3] Adapted from (*2*).

Fig. 1 Relationship between suspected, unconfirmed and confirmed malaria



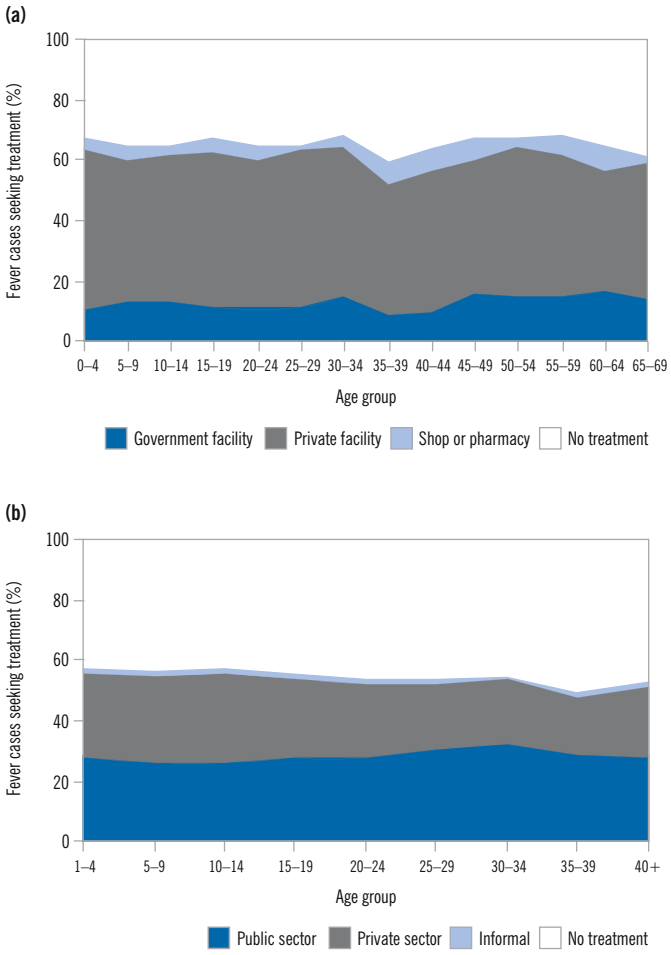
u = The proportion of the population with fever (or suspected malaria) that uses health facilities that are covered by the health-facility reporting system. This was derived from household survey information on whether or not children under 5 years, with fever in the previous two weeks, sought treatment and where. The household survey used for most countries was a DHS or MICS that only considers fever in children under 5. Fever treatment rates for older age groups are assumed to be the same as those for children under 5. Household surveys undertaken in Indonesia (Susenas) and India (NSSO) suggest that this assumption is reasonable (see **Fig. 2**).

Several of the MICS3 surveys were not available for analysis at the time of publication of this report, but otherwise the DHS, MICS or other survey closest to 2006 was chosen. In general, there has been little change in the proportion of fever cases seeking treatment over time (see **Fig. 3**), hence it is a reasonable approximation to the proportion of fever cases seeking treatment in 2006, unless there is specific knowledge that treatment-seeking behaviour has changed.

If there was more than one survey for a country, the following choices were made:

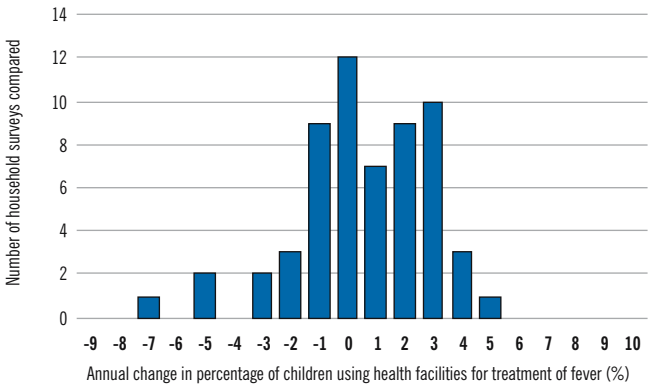
1. if both a DHS and a MICS were available for the period 2001–2006, the DHS was selected in preference to the MICS, even if the DHS was undertaken earlier, since sample sizes were larger and *u* can be calculated more directly;
2. if a MICS was available for the years 2001–2006 and a DHS only for 2000 or earlier, the MICS was selected because it was more recent;

Fig. 2 Variation in utilization of health facilities for treatment of fever by age[a]



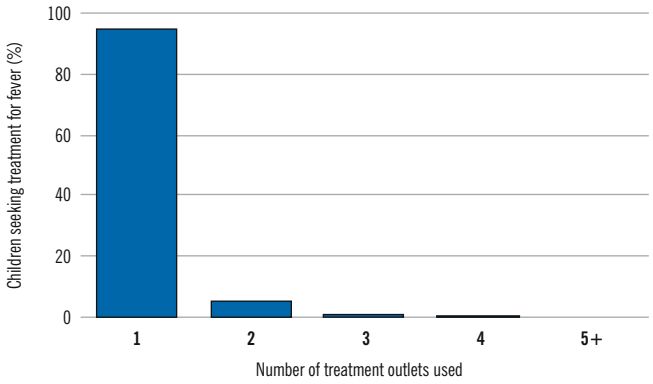
[a] Analyses of household surveys undertaken (a) in India (NSSO, 2004) and (b) in Indonesia (Susenas, 2004) suggest that the percentage of children under 5 using health facilities for treatment of fever provides a good approximation to the percentage of older age groups using health facilities for treatment of fever.

Fig. 3 Variation over time in the percentage of fever cases seeking treatment at health facilities[a]



[a] Of 58 survey differences that could be compared over time using DHS and MICS data sets, the median annual change in the proportion of febrile children attending health facilities was 0.1% (inter-quartile range: 1.4%–2.0%).

Fig. 4 Percentage of fever cases using more than one outlet for treatment[a]



[a] In an analysis of 105 DHS surveys (with each survey weighted equally), the proportion of fever cases using more than one treatment outlet was only 5%.

3. if a MICS and a DHS were only available in 2000 or earlier, the DHS was selected. In total, relevant household survey data could be found for 69 countries.

For DHS surveys, the measure of *u* is the proportion of fever cases seeking treatment from hospitals, health centres and health posts run by the government and missions but excludes cases treated at private for-profit organizations and pharmacies or shops. It also excludes those cases not seeking any treatment. If more than one source of treatment was used, the source of treatment considered to be at the highest level or furthest along the referral chain was selected, with government facilities ranked higher than mission or private facilities as in the following order: government hospital, government health centre, government health post, other government facility, mission hospital, mission health centre, mission health post, private clinic or health centre, private doctor, private other, community health worker, pharmacy, shop, traditional, other. The ranking was intended to reflect the probability that a case attending multiple treatment outlets would be recorded in the HMIS of a ministry of health, but the precise classification used has little effect on the final results since the percentage of children using more than one outlet for treatment is only 5% (see **Fig. 4**).

In the majority of MICS surveys, there is a question that records the proportion of fever cases seeking treatment at health facilities but the type of health facility attended, and whether it is in the public or private sector or not, is not distinguished. Hence for MICS surveys, information on health-facility utilization for acute respiratory infection (ARI) was combined with fever treatment to estimate the proportion of fever cases attending public-sector facilities as below:

$$u = h_{fever} \times \frac{g_{ARI}}{h_{ARI}}$$

Where:

h_{fever} = The proportion of children with fever in the past two weeks who attended a health facility.

h_{ARI} = The proportion of children with both cough and rapid breathing in the past two weeks who attended a health facility.

g_{ARI} = The proportion of children with both cough and rapid breathing in the past two weeks who attended a government or mission health facility.

For countries with both a DHS and a MICS survey, there was no systematic deviation in the estimate of *u* made from either the DHS or the MICS (**Fig. 5**).

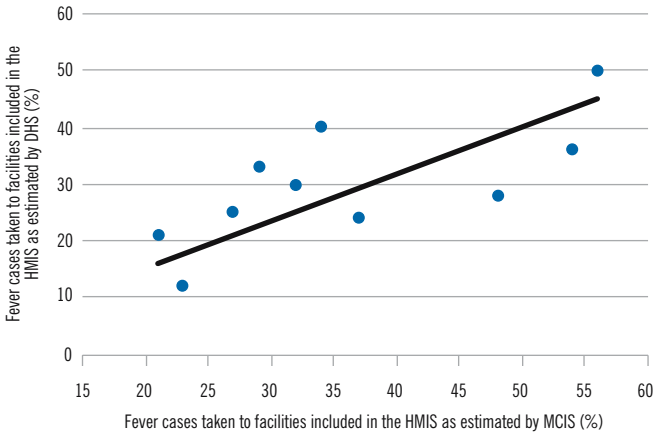
For Papua New Guinea and Myanmar the household surveys, a DHS and a MICS respectively, did not record health-facility utilization for fever. Hence information on health-facility utilization for ARI (cough and/or rapid breathing) was used to estimate *u* since it is observed for other countries that health-facility utilization rates for ARI serves as a reasonable approximation for health-facility utilization rates for fever (see **Fig. 6**).

For the Solomon Islands and Guinea-Bissau, confidence intervals of u could not be calculated because of insufficient information on the sampling procedures employed. Confidence intervals were therefore assumed to lie 7.5 percentage points either side of the point estimate of *u*, since 90% of measured confidence intervals were of this size or smaller in other countries.

n = The proportion of the population with fever (or suspected malaria) that does not seek treatment. This was derived from household survey information on whether or not treatment for fever was sought, as described above.

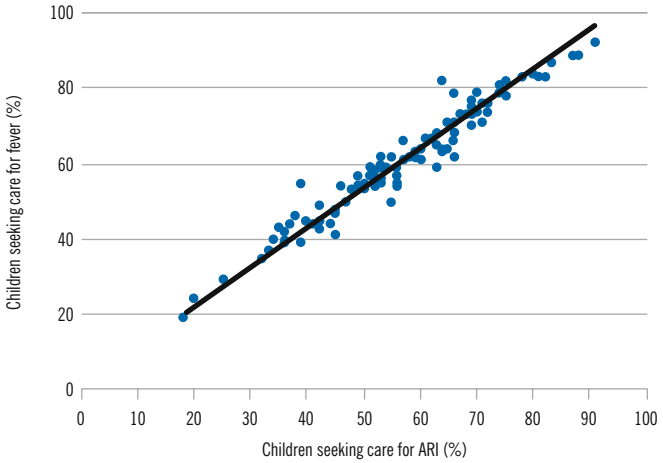
The difference between upper and lower limits on *M* reflects the extent to which it is believed that malaria cases are treated in the health system (both formal and informal). The upper limit produces an estimate of the number of

Fig. 5 Percentage of fever cases taken to health facilities[a]



[a] Comparison of estimates of *u* (the percentage of fever cases taken to a facility included in a country's HMIS) derived from MICS and DHS suggest no systematic deviation in estimates derived from different survey platforms.

Fig. 6 Percentage of fever cases seeking treatment for fever (at all outlets) plotted against the percentage of ARI cases seeking treatment[a]



[a] Analysis of 105 demographic and health surveys suggests that the percentage of children with ARI that seek treatment can provide a good approximation to the percentage of children with fever that seek treatment.

malaria cases if all fever cases were equally likely to be malaria whether they sought treatment or not, i.e. those that do not seek treatment have the same slide positivity rate, *s*, as those that do. The lower limit estimates the number of malaria cases if only those fever cases that seek treatment were malaria, i.e. the slide positivity rate, *s*, of fever cases not seeking treatment is zero. In practice the true value will probably lie between these points. It will lie close to the lower limit in areas where accessibility to services is good and all cases that need treatment actually seek it. It will lie closer to the upper limit in areas where accessibility of services is poor, and many malaria cases go untreated. It was only possible for a few countries to assume that all cases seek treatment; these were countries in Europe and some countries nearing malaria elimination (where most infections produce symptomatic cases and where access to services is good). In the absence of detailed information on the structure of health services in a country, it is expedient to derive a single point estimate, *I* from the arithmetic of average of I_{lower} and I_{upper}.

Estimating fever cases and the need for treatment. An estimate of the total number of fever cases suspected of being malaria, *F*, was made by dividing the estimated confirmed cases by the slide positivity rate. Thus the upper and lower limits of *F* are given by:

$$F_{upper} = \frac{M_{upper}}{s} = \frac{C + (s \times U)}{r \times s} \times \frac{1}{u}$$

$$F_{lower} = \frac{M_{lower}}{s} = \frac{C + (s \times U)}{r \times s} \times \frac{1-n}{u}$$

As for confirmed malaria cases, a single point estimate of the number of fever cases, *F*, can be obtained from the arithmetic of average of F_{lower} and F_{upper}. The number of treatment courses required, *T*, depends on the extent to which case confirmation is undertaken as below:

$$T = F \times e \times s + (F \times (1 - e))$$

Where:

T = The number of treatment courses required per year.

M = The estimated confirmed malaria cases per year.

F = The estimated fever cases per year.

e = The proportion of suspected cases tested.

If all cases are confirmed ($e = 1$), the number of treatment courses required is given by:

$$T = F \times s = M$$

Which is the estimate of confirmed malaria cases. If no cases are confirmed ($e = 0$), then:

$$T = F$$

Values of *C*, *U*, *s*, *r*, *n*, *u*, *M*, *F*, *e* and *T* are given for each country at www.who.int/topics/malaria/en. Note that e is estimated from patients attending facilities included in ministry of health reporting systems only.

Lack of data. The formulae used to estimate the number of malaria cases require six parameters. Four parameters are obtained from the national malaria control programmes (*U*, *C*, *r*, *s*) and two from household surveys (*n* and *u*). Some countries did not provide values for all parameters or a household survey may not have been available for analysis. In such cases, values for the parameters were imputed according to the scheme below:

U or *C*: If *U* or *C* was missing from 2006 the value of *U* and *C* from the most recent year was taken (this applied to Mexico and Peru only). If no values of *U* and *C* were available then no estimate of malaria cases was made.

r: If the reporting completeness, *r*, was not reported for a single year the most frequent value for the country between the years 2001 and 2006 was chosen or, exceptionally, a rate that was considered more consistent with the reported number of cases. If *r* was missing for all years, it was assumed to lie between 50% and 80% with a point estimate of 65%.

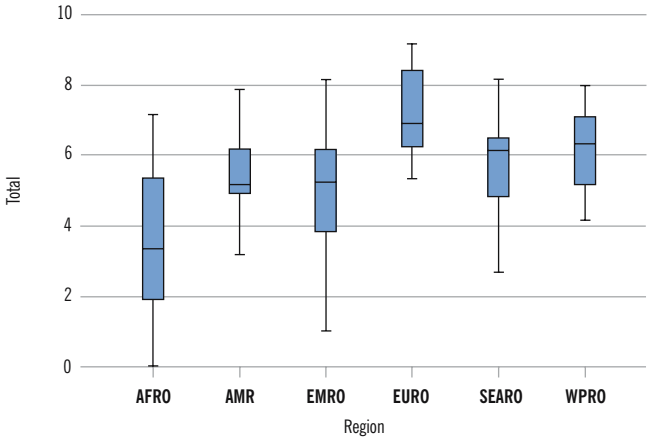
s: If the slide positivity rate, *s*, was missing for a year, then the country arithmetic average for available years between 2001 and 2006 was taken with each year being weighted equally. If *s* was missing for all years, the regional arithmetic average for the year 2006 was applied with each country weighted equally.

u, *n*: If *u* and *n* were missing, household surveys from other countries in the region were used to derive regional averages of *u* and *n* with each country weighted equally.

Uncertainty analysis. An attempt was made to quantify the uncertainty in each of the parameters and to use this information to construct a plausible range within which it is reasonably certain that the estimate of the number of fever and malaria cases lies. The underlying distribution assumed for each of the parameters is shown in **Table 1**. Pallisade @Risk software (version 5.0) was used to sample from the distributions assumed for each parameter and each country. Latin Hypercube sampling was performed 1000 times to yield a distribution for the estimated number of fever and malaria cases for a country, from which the mean value was taken together with 5% and 95% uncertainty limits for the mean.

Limitations. Not all aspects of the uncertainty were modelled. Moreover, the assumptions regarding the distribution of some parameters may not always apply. Particular concerns regarding different parameters are summarized in **Table 2**. Recognition of the limitations, along with information on how data are collected in a country, suggests steps that may be taken to improve estimates in particular countries. An index of the quality of data available in each country has been constructed taking into account the completeness of data in the HMIS of a ministry of health and the availability of household survey information. It ranges from zero (no data) to 10 (maximum score). Values for each country are are available from www.who.int/topics/malaria/en and summarized regionally in **Fig. 7**. Where data systems are good and household surveys recent, greater confidence may generally be placed in an estimate.

Fig. 7 Range of data quality scores achieved by countries within each WHO region[a]



[a] The data quality score takes into account the completeness of data in the HMIS of a ministry of health and the availability of household survey information. It ranges from zero (no data) to 10 (maximum score). The highest scores are obtained in the WHO region where the malaria burden is lowest and the lowest scores are obtained in the region where the burden is highest.

Table 1 Distributions assumed for parameters in uncertainty analysis

ASSUMED DISTRIBUTION IF PARAMETER DERIVED FROM REPORTED DATA

r For each reported value of reporting completeness, *r* was assumed to be distributed as follows:

REPORTED VALUE	DISTRIBUTION	MINIMUM	MOST LIKELY	MAXIMUM
80% +	Triangular	80%	80%	100%
50–80%	Uniform	50%		80%
< 50%	Triangular	0%	50%	50%

s The uncertainty analysis aimed to reflect the variation of *s* within a country, so that when *s* was applied to cases that were not microscopically examined the slide positivity rate could take on a range of values that could reasonably be expected to occur across the country. Specifically, the national slide positivity rate, *s*, was assumed to be distributed normally with a mean c and standard deviation of $0.311s^{0.5547}$. Values of *s* were then truncated so that values lie between 0 and 1. This relationship was obtained from a least squares regression of the mean value of *s* against the standard deviation of *s* for each country for which subnational values of *s* were available.

u and *n* *u* and *n* were assumed to be distributed normally with mean and standard deviation derived directly from analysis of household surveys, taking into account the specified sampling design.

ASSUMED DISTRIBUTION IF PARAMETER IMPUTED

r The reporting rate was assumed to have uniform distribution with a range between 50% and 80%.

s If a country did not report a slide positivity rate, values of *s* from other countries in the relevant WHO region were applied and assumed to occur with equal probability.

u and *n* If a relevant household survey was not available for a country, values of *u* and *n* from other countries in the relevant WHO region were applied and assumed to occur with equal probability.

Table 2 Potential problems and consequences of uncertainty in parameters used to estimate malaria cases

POTENTIAL PROBLEM	CONSEQUENCE
REPORTING COMPLETENESS	
Countries may not keep a complete and up-to-date list of all open health facilities, and reporting completeness may have been provided only for those facilities that are known to malaria control programmes.	Reporting completeness overestimated and malaria burden underestimated.
If health facility reports are aggregated at a district level then, in the absence of other information, when a district report is received it may be assumed that all health facilities in the district have reported. Similarly if reports are aggregated quarterly they may contain incomplete monthly information but be counted as complete. If accurate monitoring of the percentage of reports received is not kept, then reporting completeness may be overestimated.	Reporting completeness overestimated and malaria burden underestimated.
The analysis undertaken does not consider the type of institution failing to report. Failure of a hospital to report will generally have a greater influence on the reported number of malaria cases than a health post. In some countries malaria programmes have difficulty obtaining data from hospitals that use a separate reporting system. In other countries, missing reports may be mostly those from health posts and reporting completeness underestimated.	If hospitals are more likely to underreport, the reporting completeness will be overestimated. If health posts are more likely to underreport, reporting completeness will be underestimated.
UTILIZATION OF PUBLIC HEALTH FACILITIES	
DHS and MICS were used to estimate the proportion of malaria cases attending public health facilities, private health facilities, pharmacies or shops and those not seeking treatment at all. These proportions were derived from children under 5 who experienced fever in the two weeks before the survey. Care-seeking behaviour in children under 5 seemed to provide a reasonable approximation to care-seeking behaviour in other age groups in two countries where it could be checked, but may not apply elsewhere.	There is no comprehensive evidence to suggest that other age groups use health services more or less than children under 5 years in response to reported fever. Potential consequence unknown.
Care-seeking behaviour for self-reported fever may not necessarily reflect care-seeking behaviour for suspected or confirmed malaria.	There is no comprehensive evidence that fever differs significantly from true malaria. Potential consequence unknown.
Only 9 of the 69 household surveys analysed were conducted in 2006. 85% of surveys were from 2000 or later, with the median age of survey being 5 years. Utilization of health services may therefore be under- or overestimated	There is no evidence that the percentage of fever cases using government health services has either increased or decreased. Potential consequence unknown.
A single national estimate of the proportion of fever cases attending public health facilities was used. In some countries, the availability and accessibility of services may be greater in areas with less malaria. Conversely services may be less accessible in areas where there is more malaria.	Potential overestimation of the proportion of malaria cases attending public health facilities. Simultaneously the proportion of malaria cases using private health facilities may be overestimated. The combined effect of these tendencies is unknown.
The uncertainty analysis considered only sampling variation in the estimation of u and n. The potential effect of misclassification of treatment outlets as being covered by the HMIS or not was not explored.	Potential underestimation of the uncertainty regarding case estimates.
SLIDE POSITIVITY RATE	
Health facilities that undertake slide examination may only do so for selected patients, e.g. those admitted, or for adults.	If slide examination is reserved for more severe cases, the number of confirmed malaria cases may be overestimated. If slide examination is reserved for adults, the number of confirmed malaria cases may be underestimated. The combined effect of these tendencies is unknown.
A slide positivity rate derived from selected government facilities is applied to suspected malaria cases attending other facilities to estimate confirmed malaria cases. Health facilities not undertaking case confirmation may differ qualitatively from those undertaking slide examination (e.g. they may be in different parts of the country) and obtain a different SPR.	If facilities undertaking slide examination are located in more developed or urban areas, the true proportion of suspected cases that are confirmed may be underestimated. If slide examination is more likely to be undertaken in areas where malaria transmission is more intense, the proportion of all cases that are confirmed will be overestimated. The combined effect of these tendencies is unknown.
An SPR from public health facilities is applied to private facilities including shops and pharmacies, but the true rate may be different.	No evidence that slide positivity in the private sector differs from that in the public sector. Potential consequence unknown.
On average an SPR of half of that found in public health facilities is applied to fever cases not attending facilities; the range of SPR used being from 0 to s.	Knowledge of infection rates in fever cases that do not seek treatment is insufficient. Potential consequence unknown.

2. Estimates of malaria cases from an empirical relationship between measures of malaria transmission risk and case incidence

The procedure follows that of Snow et al. (*3*) and Korenromp et al. (*1*). The number of malaria cases was estimated in two steps: firstly, populations in each sub-Saharan country were classified as living at either high, low or no risk of malaria; secondly, high, low or zero case-incidence rates were applied to the number of people living in each endemicity class as derived from literature reviews. The case-incidence rates were subsequently adjusted to take into account the level of malaria intervention coverage (use of ITNs and IRS only). Such an approach was attempted only (i) for countries in the WHO African Region where it is assumed that transmission is relatively homogenous and a broad categorization of malaria risk into low-transmission and high transmission is possible; and (ii) for countries with profound deficiencies in malaria reporting.

Defining malaria risk. Malaria risk for countries in the African Region was defined according to climatic suitability, as per the Mapping Malaria Risk in Africa (MARA) project estimate for the year 2002.[1] Long-term climate data were used to define the probability of malaria transmission, in terms of a "climate suitability index", ranging from 0 (unsuitable) to 1 (very suitable), at a resolution of 5 × 5 km^2. Areas with a MARA index greater than 0.75 were considered to be at high transmission risk, and areas with a MARA index below 0.75 at low transmission risk (*5*). These two categories are thought to correspond broadly with parasite prevalence in childhood populations greater than or equal to 25%, and less than 25% respectively (*6*). The proportion of a country's 2002 population reported to be living at high, low and no risk (*7*) was applied to the 2006 country populations as projected by the UN Population Division (*8*).

Deriving case-incidence rates. "Basic malaria incidence rates" were derived for populations at high and low transmission risk from a review of longitudinal studies of populations not benefiting from malaria prevention (*3*). More than 20 studies were from high-intensity transmission areas (defined as parasite prevalence ≥ 25% or MARA climate suitability index ≥ 0.75), and four from low-intensity transmission areas (parasite prevalence < 25% and MARA climate suitability index between 0 and 0.75). The rates for southern African countries were derived from national surveillance data from Botswana, Namibia, South Africa, Swaziland and Zimbabwe, and were not thought to vary by age. The number of studies and median incidence rates with inter-quartile ranges (IQR) for each category of transmission risk are shown in **Table 3**.

Adjusting for urban–rural differences. Adjustments to basic incidence rates were made for urban settings following Korenromp et al. (*1*). Urban incidence rates for children under 5 were assumed to be half those of rural areas, as determined (approximately) from other community-based studies of urban–rural differences (*9*). Incidence rates for other age groups in high-transmission areas were considered to be the same as for rural areas. Incidence rates for urban low-transmission areas were considered to be the same as rural low-transmission areas, although Carneiro et al. (*9*) note one study in Kenya which estimated urban incidence rates to be 40% of those in rural areas for children under 5. Similarly, Korenromp et al. note that, outside Africa, urban incidence rates were approximately one third of those in rural areas. Hence the assumption that urban incidence rates in low-transmission areas are the same as rural incidence rates may lead to an overestimate of malaria incidence in urban low-transmission areas. However, the influence on individual country estimates is relatively minor as less than 25% of any country is considered to be urban and low-transmission, while for sub-Saharan Africa as a whole it is about 6.5%.

Adjusting for malaria preventive activities. Since the basic incidence estimates were for populations not subject to malaria preventive measures, they are adjusted downward for each country according to the expected impact of ITNs and IRS. Local impact was calculated based on an assumed fixed efficacy of 50% reduction in incident cases for both IRS and ITNs, at an ITN usage rate of 60% among children under 5, according to observations in randomized controlled trials (*10*). Local impact was then calculated by applying the 50% efficacy to the local ITN child usage rate derived from national household surveys as listed in Annex 6, assuming a linear decrease in efficacy with coverage lower than 60%. The last two steps, adjusting for urban–rural differences and impact of preventive activities, were not undertaken by Snow et al., but were followed by Korenromp et al. They result in a reduction in the number of cases estimated for the continent of 9% and 5% respectively, or 14% combined. The calculated impact of ITNs and IRS appears quite small and this is partly because some of the household surveys documenting ITN use were undertaken several years before 2006 and may not reflect current levels of use.

Uncertainty analysis. An attempt was made to quantify the uncertainty in the malaria incidence rate that could be applied to each category of malaria transmission. A truncated triangular distribution of basic incidence rates was assumed for each age group and category of transmission risk. The median and inter-quartile ranges of the triangular distributions were the same as those of the basic incidence rates shown in **Table 3**. The triangular distributions were truncated so that their lower limit did not fall below 1. In repeated simulations the truncated triangular distribution was found to provide a good approximation for the distribution of basic incidence rates inferred from individual studies. Its use was preferred to deriving a distribution of basic incidence rates from a separate literature review

[1] See www.mara.org.za. More recent work on defining populations at risk (*4*) does not provide such a detailed classification of risk with 97.5% of the population at risk within Africa being classified as stable and 2.5% unstable.

Table 3 Malaria case-incidence rates by transmission risk category (cases per person per year)

	HIGH TRANSMISSION			LOW TRANSMISSION			SOUTHERN AFRICA		
	n	*Median*	*IQR*	*n*	*Median*	*IQR*	*n*	*Median*	*IQR*
Under-5s	28	1.424	0.838 – 2.167	4	0.182	0.125 – 0.216	5	0.029	0.097 – 0.129
5–14y	19	0.587	0.383 – 0.977		0.182a	0.125 – 0.216		0.029	0.097 – 0.129
>=15y	7	0.107	0.074 – 0.138		0.091b	0.063 – 0.108		0.029	0.097 – 0.129
Urban									
Under-5s		0.712c	0.419 – 1.084		0.182d	0.125 – 0.216		0.029	0.097 – 0.129
5–14y		0.587d	0.383 – 0.977		0.182d	0.125 – 0.216		0.029	0.097 – 0.129
>=15y		0.107d	0.074 – 0.138		0.091d	0.063 – 0.108		0.029	0.097 – 0.129

[a] No observations available so assumed to be the same as that measured in children under 5 by Snow et al. (*3*).
[b] No observations available so assumed to be half the rate of children 5–14 years by Snow et al. (*3*).
[c] Estimated to be approximately half the rate of rural areas by Korenromp et al. (*1*) and Carneiro et al. (*9*).
[d] Considered to be the same as in rural area by Korenromp et al. (*1*).

in order to make the results more consistent with those of Snow et al.

Palisade @Risk software (version 5.0) was used to sample from the distributions assumed for each parameter. Latin Hypercube sampling was performed 1000 times for each country to yield a distribution for the estimated number of fever and malaria cases for a country, and for the African continent, from which the mean value was taken together with 5% and 95% uncertainty limits for the mean.

Limitations. The methods used to estimate malaria case incidence from malaria transmission risk provide only a very rough guide to the number of malaria cases in any country because:

1. The delimitation of only two risk categories (high and low) does not provide for a fine categorization of malaria risk; a particular risk category may contain a wide range of malaria incidence and death rates.

2. The model to determine the suitability of the climate model for malaria transmission was based on a 30-year average of climatic variables. There is known to be variation year by year in the suitability of climate for malaria transmission, and this annual variation was not taken into account in the uncertainty analysis, nor was the suitability of the climate for malaria transmission in 2006 specifically estimated.

3. The studies used to derive basic incidence rates were not designed to be representative of the levels of endemicity they purport to describe, are small in number, and show a wide variation in measured case incidence with few, if any, studies in urban areas and low-risk rural areas which required rates to be inferred.

4. The studies used to derive basic incidence rates within categories of endemicity, urbanicity and age group were mostly conducted during the 1990s and before, and do not necessarily reflect rates in 2006. Notably, the influence of artemisinin-based treatments on reducing transmission and case rates was not captured.

5. The adjustments made to take into account the effects of interventions on case incidence are based on a relatively small number of clinical trials, run for only two years after the introduction of ITNs, which tended to show higher levels of intervention coverage than observed in most countries. Moreover the assumption of efficacy varying linearly from lower to higher coverage levels was not based on empirical evidence.

3. Estimates of malaria deaths by applying a fixed case fatality rate to the estimated number of *P. falciparum* malaria cases for each country

This method was used for all countries outside the African Region and to countries in the African Region where estimates of case incidence were derived from routine reporting systems and where malaria comprises less than 5% of all deaths in children under 5 as described in the *Global burden of disease: 2004 update* (GBD 2004) (*11*) . The African countries were Botswana, Namibia, South Africa and Swaziland, each of which had less than 5% of all deaths of children under 5 years attributed to malaria in GBD 2004, and Eritrea where recent trends in case incidence suggest that malaria accounts for less than 5% of deaths. In such situations, estimates of case incidence were considered to provide a better guide to the levels of malaria mortality than attempts to estimate the fraction of deaths due to malaria when the fraction of malaria deaths is small.

An estimate of *P. falciparum* cases in each country was made by multiplying the total number of estimated cases by the percentage of cases that were reported to be *P. falciparum* by national malaria control programs for the World malaria report 2008. If the information on the percentage of malaria cases due to *P. falciparum* was missing for a country then it was taken from GBD 2004. A case fatality rate of 0.45% was applied to the estimated number of *P. falciparum* cases for countries in the African Region and a case fatality rate of 0.3% for *P. falciparum* cases in other regions. Case fatality rates from malaria in populations are not well documented. Mendis et al (12) estimated *P.falciparum* case fatality rates to lie within a range of 0.01 to 0.3% outside of Africa. Hence, the value used in the World malaria report 2008 corresponds to the upper limit of this range.

For most countries the resultant estimates of malaria specific mortality fitted into the permitted mortality envelops described in GBD 2004. However, for Papua

New Guinea, Solomon Islands and Vanuatu the estimated number of deaths were scaled downwards to ensure that the number of malaria deaths does not require an upward adjustment of all-cause mortality rates estimated for the country. The resultant *P. falciparum* case fatality rates for the three Pacific nations were 0.17%, 0.26%, 0.26% and 0.19% respectively. The number of malaria deaths in children under 5 was estimated by multiplying the estimated number of malaria deaths in all age groups by the percentage of deaths estimated to occur in children under 5 years for each country in GBD 2004.

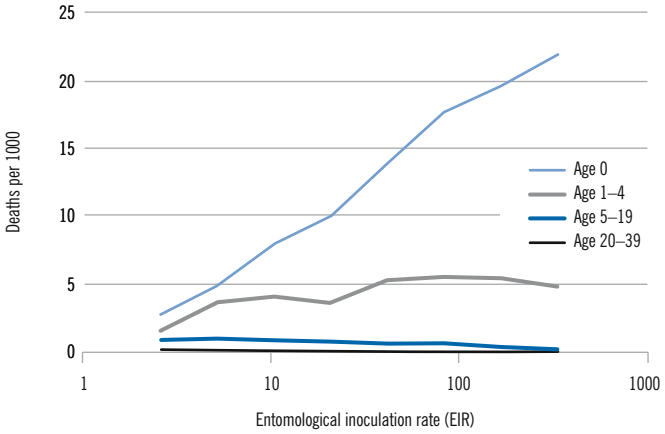
Uncertainty analysis. Uncertainty limits for the number of deaths were calculated by assuming a uniform distribution of case fatality rates ranging from 0.225% to 0.675% for African countries and 0.15% to 0.45% outside of Africa. The number of *P. falciparum* malaria cases for each country was assumed to have a uniform distribution with lower and upper limits given by the 5% and 95% uncertainty limits calculated in the estimation of total number of cases multiplied by the percentage of cases estimated to be *P. falciparum* in each country. Palisade @Risk software (version 5.0) was used to sample from the distributions assumed for each parameter. Latin Hypercube sampling was performed 1000 times for each country to yield a distribution for the estimated number of deaths for a country from which the mean value was taken together with 5% and 95% uncertainty limits for the mean.

Limitations. The methods used to estimate malaria mortality from malaria transmission risk suffer similar limitations as the procedure described to estimate malaria case incidence from routine case reports. In addition it should be noted that the case fatality rates assumed for different countries were assigned without regard to the availability and utilization of treatment for malaria, and in practice could vary from the rate used.

4. Estimates of malaria deaths from an empirical relationship between measures of malaria transmission risk and malaria-specific mortality rates.

For countries in which an estimate of malaria deaths could not be inferred from estimates of case incidence the number of malaria deaths were derived from the *Global burden of disease incremental revision for 2004* (from GBD 2004) (*11*). This includes all countries in the African Region except Botswana, Eritrea, Namibia, South Africa and Swaziland. For GBD2004 the malaria mortality estimates for children under 5 years in Africa were based on the work of Rowe et al. (*13*) which summarized studies that were able to estimate malaria-specific death rates in areas with high and low risk of malaria (those with a MARA transmission suitability index greater than or equal to 0.75, and those with a suitability index greater than 0 but less than 0.75). Malaria death rates were applied to the populations at risk in each country to obtain the number of deaths from malaria and the proportion of a country's expected childhood deaths due to malaria. The proportions of deaths due to malaria and other conditions were adjusted to fit post-neonatal child death envelopes for 2004, country by country, as described in Section B2 of GBD 2004. This results in a reduction of malaria deaths from those initially estimated by Rowe et al (13) of about 10%.

Fig. 8 Predicted direct malaria mortality rates by transmission intensity[a]



[a] Predictions of malaria-specific mortality rates from a model developed by Ross et al. (*14*) using as input the seasonal pattern of inoculations for Namawala, United Republic of Tanzania, scaled to different entomological inoculation rates (number of infectious bites per person per year).

Deaths above 5 years were inferred from a relationship between levels of malaria mortality in different age groups and the intensity of malaria transmission (*14*) (**Fig. 8**). The estimated malaria mortality rate in children under 5 years for a country was used to determine malaria transmission intensity and the corresponding malaria-specific mortality rates in older age groups. The malaria-specific mortality rates were compared with malaria incidence rates derived from a model similar to that developed by Korenromp et al. (*1*).[1] Implied case-fatality rates were calculated and adjustments made either to the number of cases or deaths in some countries to ensure plausible implied case-fatality rates. This mainly affected smaller countries and did not have a significant impact on regional totals.

Malaria-specific mortality fractions for 2004 were applied to the mortality envelopes implied by WHO life tables for 2006 and UN Population Division estimates for 2006, in order to obtain the number of malaria deaths by country for 2006. In practice the adjustments lead to small changes, but they were made in any case to base all estimates on a single year.

Limitations. The methods used to estimate malaria mortality from malaria transmission risk suffer similar limitations as the procedure described to estimate malaria case incidence from transmission risk. In addition it should be noted:

[1] The principal difference being that if the modelled estimate was more than 100 times the number of officially reported cases, the estimate would be replaced by the reported cases multiplied by 50 (rather than 100 in the original model) and that all case incidence estimates were reduced by 10% to allow for additional effects of control and development programmes. These adjustments resulted in a lower number of estimated cases for all countries, but particularly for larger countries outside Africa such as India.

1. The relationship between malaria mortality rates of children under 5 years and in other age groups versus malaria transmission was derived from a small number of studies and may not be generally applicable.
2. Malaria mortality rates were calibrated with malaria incidence rates derived from a model of incidence based on transmission risk, to ensure that case-fatality rates were plausible. Malaria mortality rates will be prone to error in countries where the model of incidence does not provide reliable estimates.

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ANNEX 2

Estimated and reported cases and deaths, 2006

Annex 2: Estimated and reported cases and deaths, 2006

			Estimates				Reported probable and confirmed				Reported laboratory-confirmed				
WHO region	Country/area	Population	Fever cases	Malaria cases	Malaria deaths	Method used	Outpatient malaria cases	Inpatient malaria cases	Malaria attributed deaths	Cases at community level	Mic. slides/ RDTs taken	Mic. slides/ RDTs positive	*P. falciparum*	*P. vivax*	Mixed infections
Africa	Algeria	33 351 136	-	0	0	MERG	-	-	-	-	-	-	-	-	-
	Angola	16 557 050	10 062 166	3 554 908	21 130	MERG	2 283 097	-	10 220	-	106 801	1 082 398	-	-	-
	Benin	8 759 653	9 437 986	3 238 973	12 770	MERG	861 847	-	1 392	-	-	-	-	-	-
	Botswana	1 858 162	63 519	6 722	30	HMIS	19 000	-	42	-	19 000	2 500	-	-	-
	Burkina Faso	14 358 500	23 015 003	6 226 667	25 625	MERG	2 060 867	306 392	8 083	-	122 047	44 265	-	-	-
	Burundi	8 173 070	7 132 386	2 270 872	7 662	HMIS	2 161 483	328 587	434	-	291 188	157 738	-	-	-
	Cameroon	18 174 696	14 704 590	5 091 300	21 146	MERG	634 507	75 904	930	-	-	-	-	-	-
	Cape Verde	518 566	-	-	1	MERG	7	54	7	0	8 729	61	61	0	0
	Central African Republic	4 264 804	5 429 435	1 574 295	4 268	MERG	114 403	29 667	865	-	-	-	-	-	-
	Chad	10 468 177	7 095 091	4 178 935	18 059	MERG	46 233	52 348	815	-	63 815	134 065	-	-	-
	Comoros	818 434	603 405	205 208	293	MERG	54 830	19 592	56	-	-	-	-	-	-
	Congo	3 689 299	3 891 236	1 331 668	4 566	MERG	157 757	-	253	-	-	-	-	-	-
	Côte d'Ivoire	18 914 476	21 571 969	7 028 990	19 557	MERG	1 253 408	2 527	-	-	-	-	-	-	-
	Democratic Republic of the Congo	60 643 888	75 987 396	23 619 960	96 113	MERG	5 008 956	139 789	24 347	0	0	-	-	-	-
	Equatorial Guinea	495 640	571 465	193 341	1 091	MERG	-	-	-	-	-	-	-	-	-
	Eritrea	4 692 115	166 163	18 964	75	HMIS	10 148	3 931	17	71 775	46 096	6 541	5 750	791	-
	Ethiopia	81 020 610	44 964 795	12 405 124	40 963	HMIS	3 759 960	38 427	1 357	-	1 103 120	509 804	297 766	212 038	23 122
	Gabon	1 310 818	1 139 924	386 506	1 255	MERG	118 104	-	79	-	-	-	-	-	-
	Gambia	1 663 032	1 192 196	469 382	1 759	MERG	266 188	-	-	-	-	-	-	-	-
	Ghana	23 008 442	20 341 716	7 282 377	25 075	MERG	3 511 452	122 928	2 832	-	-	472 255	-	-	-
	Guinea	9 181 338	11 226 052	3 766 478	15 081	MERG	834 835	-	-	-	0	12 416	-	-	-
	Guinea-Bissau	1 645 528	1 917 545	603 211	2 959	MERG	148 720	-	507	-	45 804	17 521	-	-	-
	Kenya	36 553 490	30 192 924	11 341 750	27 049	HMIS	7 958 704	-	-	-	-	-	-	-	-
	Liberia	3 578 922	2 541 351	1 459 884	6 128	MERG	1 105 272	-	877	-	1 045 405	761 095	761 095	-	-
	Madagascar	19 159 010	4 371 633	642 957	2 282	HMIS	1 012 639	8 820	590	-	35 278	2 822	-	-	-
	Malawi	13 570 714	13 343 182	4 527 651	12 950	MERG	4 204 468	141 710	7 132	-	-	-	-	-	-
	Mali	11 968 377	13 250 150	4 317 487	24 073	MERG	1 022 592	-	1 914	-	-	-	-	-	-
	Mauritania	3 043 638	19 946 349	559 484	2 588	MERG	188 025	10 736	67	-	31 013	1 061	-	-	-
	Mauritius	1 251 528	-	0	-	HMIS	-	-	-	-	-	-	-	-	-
	Mozambique	20 971 446	22 234 003	7 432 539	19 211	MERG	6 335 757	-	5 042	-	140 371	46 322	-	-	-
	Namibia	2 046 553	125 108	34 761	952	MERG	265 595	-	571	-	-	-	-	-	-
	Namibia	2 046 553	125 108	34 761	952	MERG	265 595	-	571	-	-	-	-	-	-
	Niger	13 736 722	10 258 770	5 759 935	31 501	MERG	886 531	-	2 570	-	99 670	3 956	44 612	-	1 056
	Nigeria	144 719 951	155 556 109	57 506 430	225 424	MERG	3 982 372	102 303	6 586	-	-	-	-	-	-
	Rwanda	9 464 240	11 542 587	3 251 156	5 626	HMIS	1 418 762	148 960	2 347	-	1 807 904	631 326	-	-	-
	Sao Tome and Principe	155 125	130 691	10 451	29	HMIS	7 293	1 873	26	-	58 672	5 146	-	-	-
	Senegal	12 072 475	4 471 534	1 456 336	9 613	HMIS	1 555 310	74 669	1 678	-	-	49 366	49 366	-	-
	Sierra Leone	5 742 694	8 735 966	2 272 651	8 857	MERG	160 666	6 865	70	0	16 973	4 932	3 945	0	0
	South Africa	48 282 459	117 653	32 530	146	HMIS	12 098	-	87	0	-	12 098	-	-	-
	Swaziland	1 133 613	11 938	198	1	HMIS	3 757	-	15	0	3 985	80	80	0	0
	Togo	6 410 428	6 858 772	2 085 590	7 261	MERG	566 450	21 337	819	-	-	-	-	-	-
	Uganda	29 898 598	28 043 855	10 626 930	43 490	MERG	12 792 759	-	47 000	1 500 000	-	-	95	-	2
	United Republic of Tanzania	39 458 708	26 393 441	11 539 867	38 730	HMIS	10 566 201	287 577	20 782	-	4 136 387	1 926 711	-	-	-
	Zambia	11 696 161	10 209 192	3 655 203	14 204	HMIS	4 731 338	247 120	6 484	-	-	-	-	-	-
	Zimbabwe	13 228 195	10 383 043	2 694 304	1 342	HMIS	1 535 877	-	-	-	-	-	-	-	-

Annex 2: Estimated and reported cases and deaths, 2006

			Estimates				Reported probable and confirmed				Reported laboratory-confirmed				
WHO region	**Country/area**	**Population**	**Fever cases**	**Malaria cases**	**Malaria deaths**	**Method used**	**Outpatient malaria cases**	**Inpatient malaria cases**	**Malaria attributed deaths**	**Cases at community level**	**Mic. slides/ RDTs taken**	**Mic. slides/ RDTs positive**	***P. falciparum***	***P. vivax***	**Mixed infections**
Americas	Argentina	39 134 296	15 226	501	0	HMIS	209	0	-	-	6 353	209	0	209	0
	Belize	281 645	102 907	2 698	0	HMIS	828	16	1	-	25 755	844	9	834	1
	Bolivia	9 353 848	991 239	73 796	19	HMIS	208 616	6	0	1 329	214 616	19 725	1 638	17 210	147
	Brazil	189 322 987	11 195 260	1 378 697	1 031	HMIS	549 184	9 470	97	-	3 504 379	549 184	136 837	403 122	8 990
	Colombia	45 558 453	1 892 062	408 352	444	HMIS	120 096	-	53	-	451 240	120 096	43 547	73 949	2 600
	Costa Rica	4 398 770	97 884	9 278	0	HMIS	2 903	-	-	-	24 498	2 903	32	2 667	204
	Dominican Republic	9 614 667	1 234 276	8 545	26	HMIS	3 525	-	10	-	446 839	3 525	3 519	6	0
	Ecuador	13 201 994	1 271 126	31 523	22	HMIS	9 863	-	-	-	318 132	9 863	-	8 267	1 596
	El Salvador	6 762 317	204 631	86	0	HMIS	44	0	0	16	113 754	48	1	48	0
	French Guiana	197 175	-	-	-		4 074	-	5	-	-	4 074	1 741	2 227	106
	Guatemala	13 028 572	982 588	140 541	11	HMIS	31 093	-	1	-	168 958	31 093	792	30 289	12
	Guyana	739 063	658 071	58 003	76	HMIS	20 997	67	20	-	202 688	21 064	9 258	10 560	1 246
	Haiti	9 445 945	612 742	164 590	741	HMIS	32 739	-	32	-	87 951	32 739	32 739	0	-
	Honduras	6 968 686	459 538	33 750	6	HMIS	11 561	0	0	-	122 783	11 561	734	10 793	34
	Jamaica	2 698 606	-	-	-		382	-	-	-	-	-	-	-	-
	Mexico	105 342 120	6 229 435	9 483	0	HMIS	-	-	-	-	-	-	-	-	-
	Nicaragua	5 532 366	1 015 069	5 821	2	HMIS	3 114	-	1	1 868	476 144	3 114	330	2 784	6
	Panama	3 287 538	848 081	5 315	1	HMIS	1 663	-	-	-	212 254	1 663	62	1 601	0
	Paraguay	6 015 701	266 897	1 972	0	HMIS	823	-	-	-	111 361	823	2	821	-
	Peru	27 588 575	4 582 193	221 808	128	HMIS	-	-	-	-	-	-	-	-	-
	Suriname	455 272	118 254	11 605	23	HMIS	3 631	-	1	-	29 596	3 631	2 350	829	452
	Venezuela (Bolivarian Republic of)	27 191 212	1 916 718	118 455	63	HMIS	37 062	-	-	-	479 708	37 062	6 576	30 111	352
Eastern Mediterranean	Afghanistan	26 087 653	3 998 464	585 933	126	HMIS	271 601	4 233	25	155 130	460 908	86 476	6 205	80 271	-
	Djibouti	818 509	229 349	38 673	114	HMIS	7 708	-	-	-	-	-	-	-	-
	Egypt	74 166 499	-	0	0	HMIS	29	-	0	-	-	-	-	-	-
	Iran (Islamic Republic of)	70 270 179	1 306 306	18 371	4	HMIS	15 909	-	1	-	1 131 261	15 909	1 199	14 710	-
	Iraq	28 505 846	1 120 092	28	0	HMIS	24	0	0	-	970 000	24	0	24	0
	Morocco	30 852 969	-	0	0	HMIS	83	-	2	-	-	-	-	-	-
	Oman	2 546 323	-	0	0	HMIS	443	-	-	-	-	-	-	-	-
	Pakistan	160 943 054	61 211 605	1 498 882	1 362	HMIS	124 910	-	9	-	4 490 577	124 910	37 837	86 986	74
	Saudi Arabia	24 174 941	927 031	1 473	0	HMIS	1 278	-	0	-	804 087	1 278	984	280	2
	Somalia	8 445 395	1 657 295	608 831	3 491	HMIS	49 256	63	58	-	-	16 430	16 430	-	-
	Sudan	37 707 483	30 397 719	5 022 809	31 975	HMIS	2 233 987	125 550	99	-	3 301 676	721 233	-	-	-
	Syrian Arab Republic	19 407 555	-	0	0	HMIS	34	-	2	-	-	-	-	-	-
	Yemen	23 331 665	5 729 308	287 584	845	HMIS	217 270	-	146	-	799 747	55 000	53 887	1 019	84
Europe	Armenia	3 009 548	305	0	0	HMIS	0	0	0	-	230	0	0	0	0
	Azerbaijan	8 406 027	697 030	200	0	HMIS	143	0	0	-	498 697	143	0	143	0
	Georgia	4 432 977	6 074	83	0	HMIS	60	0	0	-	4 400	60	1	59	0
	Kyrgyzstan	5 258 626	87 767	376	0	HMIS	320	0	0	-	74 729	320	1	319	0
	Russian Federation	143 221 293	-	0	-	HMIS	-	-	-	-	-	-	-	-	-
	Tajikistan	6 639 839	310 436	2 372	0	HMIS	776	0	-	-	175 894	1 344	28	1 316	0
	Turkey	73 921 766	1 438 727	1 225	0	HMIS	767	29	-	-	934 839	796	29	767	-
	Turkmenistan	4 899 455	78 658	0	0	HMIS	0	-	-	-	58 673	0	-	0	-
	Uzbekistan	26 980 509	1 276 226	105	0	HMIS	76	0	0	0	924 534	76	3	73	0

Annex 2: Estimated and reported cases and deaths, 2006

			Estimates				Reported probable and confirmed				Reported laboratory-confirmed				
WHO region	**Country/area**	**Population**	**Fever cases**	**Malaria cases**	**Malaria deaths**	**Method used**	**Outpatient malaria cases**	**Inpatient malaria cases**	**Malaria attributed deaths**	**Cases at community level**	**Mic. slides/ RDTs taken[1]**	**Mic. slides/ RDTs positive**	***P. falciparum***	***P. vivax***	**Mixed infections**
South-East Asia	Bangladesh	155 990 775	18 909 854	2 974 592	6 564	HMIS	362 042	-	-	-	5 000	51 498	35 487	12 761	-
	Bhutan	648 766	758 920	15 879	19	HMIS	1 991	1 031	6	-	66 365	1 868	761	963	144
	Democratic People's Republic of Korea	23 707 545	176 890	69 676	0	HMIS	9 353	-	-	9 353	12 983	6 913	0	6 913	-
	Democratic Republic of Timor-Leste	1 113 717	1 787 638	528 810	1 041	HMIS	191 399	1 285	68	-	88 835	33 524	22 004	11 295	187
	India	1 151 751 462	635 991 356	10 649 554	15 008	HMIS	1 785 109	-	1 708	-	106 606 703	1 785 109	838 555	946 554	3 475
	Indonesia	228 864 479	9 319 382	2 518 046	3 480	HMIS	1 327 431	-	494	-	1 246 324	347 597	160 147	177 006	-
	Myanmar	48 379 206	18 848 076	4 208 818	9 097	HMIS	475 297	62 813	1 647	-	478 066	200 679	144 585	49 982	2 429
	Nepal	27 641 363	1 070 986	30 985	26	HMIS	154 765	638	42	-	149 343	5 422	1 490	3 932	-
	Sri Lanka	19 207 440	5 918 326	3 250	0	HMIS	591	-	0	-	1 076 121	591	18	564	9
	Thailand	63 443 952	26 150 697	257 020	360	HMIS	30 293	2 726	113	-	2 280 070	30 293	14 124	15 991	144
Western Pacific	Cambodia	14 196 612	819 569	261 956	577	HMIS	89 109	4 392	396	43 437	197 050	78 696	69 925	7 551	680
	China	1 328 474 024	12 911 036	99 938	24	HMIS	116 260	-	38	-	3 995 227	35 383	2 808	32 345	230
	Lao People's Democratic Republic	5 759 404	365 297	21 809	63	HMIS	20 468	4 728	21	-	208 841	18 382	18 058	316	8
	Malaysia	26 113 733	4 380 337	14 600	15	HMIS	5 294	-	21	-	1 388 197	5 294	1 790	2 774	190
	Papua New Guinea	6 201 690	5 156 831	1 508 013	2 780	HMIS	1 676 681	19 030	668	-	228 655	84 051	56 917	22 744	4 167
	Philippines	86 263 714	980 452	124 152	222	HMIS	35 110	1 564	109	-	273 658	36 800	22 638	8 019	302
	Republic of Korea	48 050 440	41 921	6 474	0	HMIS	2 051	-	-	-	-	2 051	-	-	-
	Solomon Islands	484 021	494 002	105 684	143	HMIS	75 337	743	12	-	328 555	75 337	54 441	20 971	75
	Vanuatu	220 775	170 265	29 506	30	HMIS	21 184	7	6	-	40 625	8 055	3 522	4 405	121
	Viet Nam	86 205 867	9 753 023	70 324	167	HMIS	91 350	285	41	0	2 972 429	22 637	17 911	4 497	229

Note 1: Mic. slides/RDTs taken may be lower than Mic. slides/RDTs positive if a country did not report number of RDTs examined (taken) – **Note**: Mayotte is one of the 109 countries/areas with malarious areas but is not included in the annexes.

ANNEX 3

a. Reported malaria cases, 1990–2007

b. Reported malaria deaths, 1990–2007

Annex 3A: Reported malaria cases, 1990-2007

WHO region	Country/area	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Africa	Algeria	152	229	106	84	206	107	221	197	-	701	541	435	307	-	-	-	-	-
	Angola	243 673	1 143 701	782 988	722 981	667 376	156 603	-	893 232	1 169 028	1 471 993	1 635 884	1 249 767	1 862 662	3 246 258	2 489 170	2 329 316	2 283 097	-
	Benin	92 870	118 796	290 868	403 327	546 827	579 300	623 396	670 857	650 025	709 348	707 408	717 290	782 818	819 256	853 034	803 462	861 847	-
	Botswana	10 750	14 364	4 995	55 331	29 591	17 599	80 004	101 887	59 696	72 640	71 403	48 237	28 858	236 774	22 404	11 242	19 000	-
	Burkina Faso	496 513	448 917	420 186	502 275	472 355	501 020	582 658	672 752	721 480	867 866	1 032 886	352 587	1 188 870	1 443 184	1 546 644	1 615 695	2 060 867	2 487 633
	Burundi	92 870	568 938	773 539	828 429	831 481	932 794	974 226	670 857	687 301	1 936 584	3 057 239	3 365 640	2 649 039	2 259 694	1 749 892	2 361 734	2 161 483	-
	Cameroon	869 048	787 796	664 413	478 693	189 066	784 321	931 311	787 796	664 413	-	-	-	-	-	-	277 413	634 507	-
	Cape Verde	69	80	38	44	21	127	77	20	41	29	-	15	2	6	4	7	7	-
	Central African Republic	174 436	125 038	89 930	82 072	82 057	100 962	95 259	99 718	105 664	127 964	89 614	123 312	-	78 094	129 367	131 856	114 403	-
	Chad	212 554	246 410	229 444	234 869	278 225	293 564	278 048	343 186	395 205	392 815	369 263	386 197	43 933	45 195	31 929	41 237	46 233	-
	Comoros	-	-	-	12 012	13 860	15 707	15 509	-	3 844	9 793	-	3 718	-	-	43 918	29 554	54 830	-
	Congo	32 428	32 391	21 121	15 504	35 957	28 008	14 000	9 491	17 122	-	-	-	-	-	-	-	157 757	-
	Côte d'Ivoire	511 916	466 895	553 875	421 043	-	755 812	1 109 011	983 089	-	-	1 491 943	1 193 288	1 109 751	1 136 810	1 275 138	1 280 914	1 253 408	-
	Democratic Republic of the Congo	-	-	-	-	-	-	198 064	-	141 353	1 508 042	964 623	2 199 247	-	4 386 638	-	-	5 008 956	-
	Equatorial Guinea	25 552	22 598	25 100	17 867	14 827	12 530	-	-	-	-	-	-	-	-	-	-	-	-
	Eritrea	-	-	-	-	-	81 183	129 908	-	255 150	147 062	119 155	125 746	74 861	65 517	27 783	24 192	10 148	-
	Ethiopia	-	-	206 262	305 616	358 469	412 609	478 411	509 804	604 960	647 919	383 382	2 264 322	2 515 191	3 143 163	5 706 167	3 361 717	3 759 960	1 214 921
	Gabon	57 450	80 247	100 629	70 928	82 245	54 849	74 310	57 450	80 247	-	-	96 949	-	-	-	100 301	118 104	-
	Gambia	222 538	215 414	188 035	-	299 824	135 909	266 189	325 555	-	127 899	-	-	-	-	-	161 698	266 188	-
	Ghana	1 438 713	1 372 771	1 446 947	1 697 109	1 672 709	1 928 316	2 189 860	2 227 762	1 745 214	2 895 079	3 349 528	3 044 844	3 140 893	3 552 896	3 416 033	3 452 969	3 511 452	3 123 147
	Guinea	21 762	17 718	-	-	607 560	600 317	772 731	802 210	817 949	807 895	-	851 877	850 147	731 911	876 837	850 309	834 835	-
	Guinea-Bissau	81 835	64 123	56 073	158 748	-	197 386	6 457	10 632	2 113	197 454	246 316	246 316	202 379	194 976	162 344	185 493	148 720	-
	Kenya	-	-	-	-	6 103 447	4 343 190	3 777 022	-	80 718	122 792	74 194	3 262 931	3 319 399	5 090 639	7 545 541	9 181 224	7 958 704	-
	Liberia	-	-	-	-	-	-	239 998	826 151	777 754	-	-	-	-	-	-	116 681	1 105 272	-
	Madagascar	-	-	-	-	-	196 358	-	-	-	1 141 474	-	1 356 520	1 598 818	2 198 035	1 458 428	1 227 632	1 012 639	790 510
	Malawi	3 870 904	-	-	4 686 201	4 736 974	-	6 183 290	2 761 269	2 985 659	4 193 145	3 774 982	3 823 796	2 784 001	3 358 960	2 871 098	3 688 389	4 204 468	-
	Mali	248 904	282 256	280 562	295 737	263 100	95 357	29 818	384 907	12 234	530 197	546 634	612 896	723 077	809 428	1 969 214	962 706	1 022 592	-
	Mauritania	26 903	42 112	45 687	43 892	156 080	214 478	181 204	189 571	168 131	253 513	259 093	243 942	224 614	318 120	224 840	223 472	188 025	-
	Mauritius	54	48	66	54	65	46	82	65	52	73	62	61	-	-	-	-	-	-
	Mozambique	-	-	-	-	-	-	12 794	-	194 024	2 336 640	3 278 525	3 947 335	4 592 799	4 863 406	5 610 884	5 896 411	6 335 757	6 327 916
	Namibia	-	-	-	380 530	401 519	275 442	345 177	390 601	353 110	429 571	519 113	538 512	445 803	468 259	610 799	339 204	265 595	-
	Niger	1 162 824	808 968	865 976	726 666	806 204	778 175	1 162 824	978 855	872 925	815 895	646 757	1 340 142	888 345	681 783	760 718	817 707	886 531	1 308 234
	Nigeria	1 116 992	909 656	1 219 348	981 943	1 175 004	1 133 926	1 149 435	1 148 542	2 122 663	1 965 486	2 476 608	2 253 519	2 605 381	2 608 479	3 310 229	3 532 108	3 982 372	2 969 950
	Rwanda	1 282 012	1 331 494	1 373 247	733 203	371 550	1 391 931	1 145 759	1 331 494	1 279 581	906 552	-	998 086	1 066 847	1 205 514	1 289 293	1 638 369	1 418 762	-
	Sao Tome and Principe	-	-	-	-	-	51 938	47 074	47 757	46 026	37 026	43 488	44 034	50 953	47 830	53 917	22 370	7 293	-
	Senegal	-	-	-	-	450 071	628 773	-	861 276	948 823	1 145 112	1 120 094	931 682	960 478	1 414 383	1 195 402	1 346 158	1 555 310	1 170 234
	Sierra Leone	-	-	-	-	-	-	7 192	209 312	249 744	409 670	-	447 826	507 130	524 987	355 638	233 833	160 666	-
	South Africa	6 822	4 693	2 872	13 285	10 289	8 750	27 035	23 121	26 445	51 444	64 622	26 506	15 649	13 459	13 399	7 755	12 098	-
	Swaziland	-	-	-	-	-	-	38 875	23 754	4 410	30 420	45 581	18 791	14 860	11 469	9 485	8 883	3 757	-
	Togo	810 509	780 825	634 166	561 328	328 488	-	352 334	366 672	368 472	412 619	398 103	498 826	583 872	490 256	516 942	437 662	566 450	285 439
	Uganda	-	-	2 446 659	1 470 662	2 191 277	1 431 068	-	2 317 840	2 845 811	3 070 800	-	9 000 000	9 800 000	11 000 000	12 000 000	16 000 000	12 792 759	-
	United Republic of Tanzania	10 715 736	8 715 736	7 681 524	8 777 340	7 976 590	2 438 040	4 969 273	1 131 655	30 504 654	423 967	-	324 584	369 394	11 379 411	11 898 627	11 441 681	10 566 201	-
	Zambia	1 933 696	2 340 994	2 953 692	3 514 000	3 514 000	2 742 118	3 215 866	-	3 399 630	3 385 616	3 602 564	3 838 402	3 760 335	4 346 172	4 078 234	4 121 356	4 731 338	-
	Zimbabwe	662 613	581 168	420 137	877 734	324 188	761 791	1 696 192	1 849 383	1 719 960	1 804 479	1 533 960	680 900	1 348 137	1 820 835	1 815 470	1 496 896	1 535 877	-

Annex 3A: Reported malaria cases, 1990-2007

WHO region	Country/area	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Americas	Argentina	1 660	803	643	758	948	1 065	2 048	592	339	222	440	215	125	122	115	259	209	-
	Belize	3 033	3 317	5 341	8 586	9 957	9 413	6 605	4 014	2 614	1 850	1 486	1 097	928	-	1 057	1 577	828	-
	Bolivia	19 680	19 031	24 486	27 475	34 749	46 911	64 012	51 478	73 913	50 037	31 468	122 933	137 509	158 299	163 307	202 021	208 616	-
	Brazil	560 396	614 431	609 860	466 190	564 406	565 727	455 194	392 976	471 892	609 594	610 878	388 303	348 259	408 821	464 602	603 026	549 184	458 041
	Colombia	99 489	184 156	184 023	129 377	127 218	187 082	135 923	180 898	185 455	66 845	107 616	206 195	195 719	164 722	116 872	118 163	120 096	110 389
	Costa Rica	1 151	3 273	6 951	5 033	4 445	4 515	5 480	4 712	5 148	3 998	1 879	1 363	1 021	718	1 289	3 541	2 903	-
	Dominican Republic	356	377	698	987	1 670	1 808	1 414	816	2 006	3 589	1 215	1 038	1 296	1 296	2 355	3 837	3 525	-
	Ecuador	71 670	59 400	41 089	46 859	30 006	18 128	11 882	16 365	43 696	87 620	98 598	108 903	86 757	52 065	28 730	17 050	9 863	-
	El Salvador	9 269	5 933	4 539	3 887	2 803	3 362	5 888	2 719	1 182	1 230	745	362	117	84	112	66	44	-
	French Guiana	5 909	3 573	4 072	3 974	4 241	4 711	4 724	3 195	3 462	5 307	3 708	3 823	3 661	3 698	3 037	3 414	4 074	-
	Guatemala	41 711	57 829	57 560	41 868	22 057	24 178	20 268	32 099	47 689	45 098	53 311	35 824	35 478	31 122	28 943	39 567	31 093	-
	Guyana	22 681	42 204	39 702	33 172	39 566	59 311	-	32 103	41 200	27 283	24 018	27 122	21 895	27 627	28 866	38 984	20 997	-
	Haiti	4 806	25 511	13 457	853	23 140	-	18 877	-	34 449	1 196	16 897	9 837	-	9 837	10 802	21 778	32 739	-
	Honduras	53 095	73 352	70 838	44 513	52 110	59 446	74 487	65 863	42 979	46 740	35 122	24 149	17 223	14 123	17 293	16 007	11 561	-
	Jamaica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	382	184
	Mexico	44 513	26 565	16 170	15 793	12 864	7 329	6 293	4 805	25 023	13 450	7 362	4 895	4 624	3 819	3 406	2 967	-	-
	Nicaragua	35 785	27 653	26 866	44 037	41 490	69 444	75 606	42 819	33 903	38 676	24 014	10 482	7 695	6 717	6 897	6 642	3 114	-
	Panama	381	1 115	727	481	684	730	476	505	1 039	936	1 036	928	2 203	4 480	5 095	3 667	1 663	-
	Paraguay	2 912	2 983	1 289	436	583	898	637	567	2 091	9 947	6 853	2 710	2 778	1 392	694	376	823	-
	Peru	28 882	33 705	54 922	95 222	122 039	192 629	208 132	183 740	247 004	166 579	69 726	79 473	85 742	79 473	93 581	-	-	-
	Suriname	1 608	1 490	1 404	-	4 704	6 606	16 649	11 323	12 412	13 939	13 132	17 074	13 091	14 657	8 189	8 739	3 631	-
	Venezuela (Bolivarian Republic of)	46 910	43 454	21 416	12 539	13 727	16 371	18 858	22 400	21 862	19 086	29 736	29 491	29 491	31 719	46 655	45 049	37 062	-
Eastern Mediterranean	Afghanistan	317 479	297 605	-	-	88 302	-	303 955	202 767	288 070	-	-	364 243	626 839	585 602	261 456	245 881	271 601	433 412
	Djibouti	3 237	7 338	7 468	4 166	6 140	5 982	6 105	4 314	5 920	6 140	4 667	4 312	5 021	5 036	2 142	2 590	7 708	4 708
	Egypt	75	24	16	17	527	322	25	11	13	61	17	11	10	45	43	23	29	30
	Iran (Islamic Republic of)	77 470	96 340	76 971	64 581	51 089	67 532	56 362	38 684	32 951	23 110	19 716	19 303	15 558	23 562	13 821	18 966	15 909	15 712
	Iraq	3 924	1 764	5 752	49 863	98 243	98 705	49 840	13 959	9 684	4 143	1 860	1 265	952	347	155	47	24	3
	Morocco	837	494	405	198	206	197	102	125	121	60	59	59	107	73	56	100	83	75
	Oman	32 720	19 274	14 827	16 873	7 215	1 801	1 265	1 026	1 093	901	694	635	590	740	615	544	443	705
	Pakistan	79 689	66 586	99 015	92 634	108 586	111 836	98 035	77 480	73 516	91 774	82 526	125 292	107 666	125 152	126 719	127 826	124 910	128 570
	Saudi Arabia	15 666	9 962	19 623	18 380	10 032	18 751	21 007	20 631	40 796	13 166	6 608	3 074	2 612	1 724	1 232	1 059	1 278	2 864
	Somalia	-	-	-	3 049	-	-	-	-	-	9 055	10 364	10 364	96 922	23 349	36 732	28 529	49 256	36 773
	Sudan	7 508 704	6 947 787	9 326 944	9 867 778	8 562 205	6 347 143	4 595 092	4 065 460	5 062 000	4 215 308	4 332 827	4 223 414	3 516 456	3 730 993	2 599 669	2 853 275	2 233 987	2 778 207
	Syrian Arab Republic	107	54	456	966	583	626	345	130	60	43	42	79	27	24	13	28	34	37
	Yemen	11 384	12 717	29 320	31 262	37 201	500 000	416 246	1 394 495	-	2 781 640	1 394 495	107 758	187 159	174 529	158 561	200 560	217 270	223 299
Europe	Armenia	0	0	0	0	196	502	347	841	1 156	616	141	79	52	29	47	7	0	1
	Azerbaijan	24	113	27	23	667	2 840	13 135	9 911	5 175	2 315	1 526	1 058	506	482	386	242	143	110
	Georgia	1	2	1	0	1	1	7	1	16	51	245	439	472	315	256	155	60	25
	Kyrgyzstan	1	1	2	0	6	3	26	13	11	5	12	28	2 744	468	93	226	320	96
	Russian Federation	216	169	160	209	335	425	611	831	1 081	792	795	898	642	-	-	-	-	122
	Tajikistan	175	294	404	619	2 411	6 103	16 561	29 794	19 351	13 493	19 064	11 387	6 160	5 428	1 804	1 398	776	635
	Turkey	8 680	12 218	18 676	47 210	84 345	82 096	60 884	35 456	36 842	20 963	11 432	10 801	10 212	9 209	5 289	2 052	767	358
	Turkmenistan	1	17	11	3	9	10	14	14	137	49	24	5	8	7	3	1	0	0
	Uzbekistan	28	12	25	36	21	27	51	52	74	85	126	77	74	74	66	102	76	89

Annex 3A: Reported malaria cases, 1990-2007

WHO region	Country/area	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
South-East Asia	Bangladesh	53 875	63 578	115 660	125 402	166 564	152 729	100 864	68 594	60 023	63 723	60 396	361 586	307 236	491 602	215 678	190 724	362 042	-
	Bhutan	9 497	22 126	28 900	28 116	39 852	23 188	15 696	9 029	7 693	12 237	5 935	10 242	7 206	4 043	3 027	1 947	1 991	850
	Democratic People's Republic of Korea	-	-	-	-	-	-	-	-	1 085	7 980	73 742	296 540	241 190	60 559	33 803	11 507	9 353	-
	Democratic Republic of Timor-Leste	-	-	-	-	-	-	-	-	10 332	-	49 836	63 440	26 651	33 078	218 270	176 933	191 399	-
	India	2 018 783	2 117 460	2 125 826	2 207 431	2 511 453	2 988 231	3 035 588	2 660 057	2 222 748	2 284 713	2 031 790	2 085 484	1 841 227	1 869 403	1 915 363	1 816 569	1 785 109	1 476 562
	Indonesia	171 908	132 412	103 277	136 367	145 920	123 226	179 878	161 285	160 282	-	101 185	1 400 596	1 494 165	1 481 748	1 494 636	1 792 992	1 327 431	-
	Myanmar	989 042	939 257	789 672	702 239	701 043	656 547	664 507	568 262	548 066	121 031	-	574 352	721 739	716 806	602 883	506 041	475 297	-
	Nepal	22 856	29 135	23 234	16 380	9 442	9 718	6 628	8 957	8 498	9 699	7 616	146 351	133 431	196 605	140 687	178 056	154 765	-
	Sri Lanka	287 384	400 263	399 349	327 020	273 434	142 294	184 319	218 550	211 691	-	210 039	66 522	41 411	10 510	3 720	1 640	591	-
	Thailand	273 880	198 383	168 370	115 220	102 119	82 743	87 622	97 540	131 055	125 379	81 692	63 528	44 555	37 355	26 690	29 782	30 293	-
Western Pacific	Cambodia	123 796	102 930	91 000	99 200	85 012	76 923	74 883	88 029	58 874	64 679	62 439	110 161	100 194	119 712	91 855	67 036	89 109	59 848
	China	117 359	101 600	74 000	59 000	62 000	47 118	33 382	26 800	27 090	26 797	18 620	26 945	172 200	169 828	145 676	100 106	116 260	-
	Lao People's Democratic Republic	22 044	41 048	38 500	41 787	52 601	52 021	77 894	72 190	39 031	28 050	40 006	103 983	85 192	88 657	53 808	30 359	20 468	-
	Malaysia	50 500	39 189	36 853	39 890	58 958	59 208	51 921	26 649	13 491	11 106	12 705	12 780	11 019	6 338	6 154	5 569	5 294	-
	Papua New Guinea	104 900	86 500	86 500	66 797	65 000	99 000	71 013	38 105	20 900	18 564	81 192	1 643 075	1 587 580	1 650 662	1 868 413	1 788 318	1 676 681	-
	Philippines	86 200	86 400	95 778	64 944	61 959	56 852	40 545	42 005	50 709	37 061	36 596	34 787	37 005	48 441	50 850	46 485	35 110	-
	Republic of Korea	0	0	0	1	20	107	396	1 724	3 992	3 621	4 142	2 556	1 799	1 171	864	1 369	2 051	-
	Solomon Islands	116 500	141 400	153 359	126 123	131 687	118 521	84 795	68 125	72 808	63 169	67 884	76 417	74 865	90 606	90 297	76 390	75 337	-
	Vanuatu	28 805	19 466	13 330	10 469	3 771	8 318	5 654	6 099	6 181	5 152	6 768	18 927	34 231	42 863	39 730	32 273	21 184	-
	Viet Nam	123 796	187 994	225 928	156 069	140 120	100 116	84 625	65 859	72 091	75 102	74 316	188 122	184 901	164 283	128 382	99 061	91 350	-

Notes:

Cases reported before 2001 can be probable and confirmed or only confirmed cases depending on the country.

Cases reported can be autochthonous malaria cases only or may inlcude imported cases.

*Based on multiple Malaria Surveillance Summary Reports

Annex 3B: Reported malaria deaths, 1990-2007

WHO region	Country/area	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Africa	Algeria	-	-	-	-	-	-	-	-	2	6	1	1	0	-	-	-	-	-
	Angola	-	-	-	-	-	-	-	-	-	25 572	13 376	9 473	14 434	38 598	12 459	13 768	10 220	-
	Benin	-	-	-	-	-	-	-	-	682	544	740	468	707	560	944	322	1 392	-
	Botswana	-	-	-	-	-	-	-	141	23	49	30	27	23	18	19	11	42	-
	Burkina Faso	-	-	-	-	-	-	-	-	2 624	2 808	2 740	4 233	4 032	4 860	4 205	5 224	8 083	6 472
	Burundi	-	-	-	-	-	-	-	-	-	-	579	417	483	425	707	1 942	434	-
	Cameroon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	836	930	-
	Cape Verde	-	-	-	-	-	-	-	-	-	-	-	0	1	2	2	1	7	-
	Central African Republic	-	-	-	-	-	-	-	-	374	484	-	535	-	417	859	668	865	-
	Chad	-	-	-	-	-	-	-	-	-	-	-	936	944	970	-	-	815	-
	Comoros	-	-	-	-	-	-	-	-	-	50	82	16	-	-	28	92	56	-
	Congo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	253	-
	Côte d'Ivoire	-	-	-	-	-	-	-	-	1 337	974	730	-	-	-	-	-	-	-
	Democratic Republic of the Congo	-	-	-	-	-	-	-	-	-	-	2 540	-	1 928	16 498	-	-	24 347	-
	Eritrea	-	-	-	-	-	-	-	-	404	169	94	129	85	70	16	32	17	-
	Ethiopia	-	-	-	-	-	-	-	-	-	-	1 105	1 681	1 607	2 138	3 327	1 086	1 357	991
	Gabon	-	-	-	-	-	-	-	-	-	-	-	91	-	-	-	474	79	-
	Ghana	-	-	-	-	-	-	-	-	2 798	2 826	3 230	1 717	1 917	1 680	1 260	1 759	2 832	4 622
	Guinea	-	-	-	-	-	-	-	-	13	13	441	517	440	586	528	490	-	-
	Guinea-Bissau	-	-	-	-	-	-	-	-	-	-	1 065	635	780	1 137	565	565	507	-
	Kenya	-	-	-	-	-	-	-	-	665	1 545	683	-	135	-	-	-	-	-
	Liberia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	41	877	-
	Madagascar	-	-	-	-	-	-	-	-	-	640	591	1 300	1 268	1 091	1 194	1 407	590	371
	Malawi	57 649	-	-	-	-	-	-	35 982	-	4 747	7 139	3 355	5 775	4 767	3 457	5 070	7 132	-
	Mali	-	-	-	-	-	-	-	-	-	583	748	562	826	1 309	1 012	1 285	1 914	-
	Mauritania	-	-	-	-	-	-	-	-	279	525	491	337	100	-	-	-	67	-
	Mozambique	-	-	-	-	-	-	-	-	896	1 189	1 371	3 400	4 214	3 488	4 150	4 209	5 042	3 366
	Namibia	-	-	-	-	-	250	469	547	404	531	918	1 728	1 504	1 106	1 185	1 325	571	-
	Niger	-	-	-	-	-	-	-	1 018	1 823	2 165	1 009	4 018	2 433	3 135	1 382	9 958	2 570	1 349
	Nigeria	2 284	1 947	1 068	710	1 686	3 268	4 773	4 603	6 197	4 123	5 667	4 317	4 092	5 343	6 032	6 494	6 586	10 289
	Rwanda	-	-	-	-	-	-	-	-	2 736	1 881	2 678	4 301	3 200	2 707	2 365	2 587	2 347	-
	Sao Tome and Principe	-	-	-	-	-	-	-	-	154	-	-	248	321	193	168	85	26	-
	Senegal	-	-	-	-	-	-	-	1 205	1 029	1 235	1 337	1 515	1 226	1 602	1 524	1 587	1 678	1 935
	Sierra Leone	-	-	-	-	-	-	-	-	-	-	-	280	428	112	98	36	70	-
	South Africa	35	19	14	45	12	44	163	104	198	406	458	119	96	142	89	64	87	-
	Swaziland	-	-	-	-	-	-	-	-	109	149	-	55	53	30	28	17	15	-
	Togo	-	-	-	-	-	-	-	-	475	766	883	1 394	1 661	1 130	1 183	1 024	819	132
	Uganda	-	-	-	-	-	-	-	-	-	-	-	-	-	8 450	-	77 000	47 000	-
	United Republic of Tanzania	-	-	-	-	-	-	-	-	-	-	-	838	441	14 943	19 547	18 075	20 782	-
	Zambia	4 863	4 998	3 315	4 689	5 775	-	-	-	-	8 580	3 268	9 369	9 021	9 178	8 289	7 737	6 484	-
	Zimbabwe	-	-	-	-	-	-	-	1 192	1 248	1 139	1 788	412	1 844	1 044	1 809	1 916	-	-
Americas	Argentina	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	-	-	-
	Belize	-	-	-	-	-	-	-	-	-	-	-	0	0	-	0	-	1	-
	Bolivia	-	-	-	-	-	-	-	-	23	-	-	-	4	2	0	0	0	-
	Brazil	-	-	-	-	-	-	-	-	-	-	-	142	93	103	100	122	97	64
	Colombia	-	-	-	-	-	-	-	-	-	-	-	58	40	24	25	28	53	-
	Costa Rica	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	-	-	-
	Dominican Republic	-	-	-	-	-	-	-	-	14	-	-	16	11	12	16	16	10	-
	Ecuador	-	-	-	-	-	-	-	-	16	-	-	-	0	0	-	-	-	-
	El Salvador	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	-
	French Guiana	-	-	-	-	-	-	-	-	-	-	-	0	-	4	0	-	5	-
	Guatemala	-	-	-	-	-	-	-	-	9	-	-	-	0	0	1	0	1	-
	Guyana	-	-	-	-	-	-	-	-	34	-	-	-	-	-	8	22	20	-
	Haiti	-	-	-	-	-	-	-	-	25	-	-	16	-	16	-	29	32	-

Annex 3B: Reported malaria deaths, 1990-2007

WHO region	Country/area	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
	Honduras	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	1	0	-
	Mexico	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	-	-
	Nicaragua	-	-	-	-	-	-	-	-	-	-	-	2	8	7	1	6	1	-
	Panama	-	-	-	-	-	-	-	-	-	-	-	0	2	3	3	-	-	-
	Paraguay	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	-	-	-
	Peru	-	-	-	-	-	-	-	-	-	-	-	25	12	25	12	-	-	-
	Suriname	-	-	-	-	-	-	-	-	-	-	-	23	16	18	7	2	1	-
	Venezuela (Bolivarian Republic of)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eastern Mediterranean	Afghanistan	-	-	-	-	22	-	-	-	-	-	-	-	-	-	-	-	25	25
	Egypt	-	-	-	-	0	-	-	-	-	-	-	-	-	0	0	-	0	0
	Iran (Islamic Republic of)	-	-	-	-	-	-	-	22	-	3	4	2	2	5	1	1	1	0
	Iraq	-	-	-	-	0	-	-	-	-	-	-	0	0	0	0	0	0	0
	Morocco	-	-	-	-	-	-	-	0	-	-	-	-	-	-	2	1	2	0
	Pakistan	-	-	-	-	-	-	-	-	-	-	-	-	-	29	-	52	9	24
	Saudi Arabia	-	-	-	-	-	-	-	6	28	-	-	0	0	0	0	0	0	2
	Somalia	-	-	-	-	-	-	-	-	-	-	-	-	8	54	79	15	58	33
	Sudan	-	-	-	-	932	-	1 944	1 825	1 958	2 622	2 162	2 252	2 125	2 479	1 814	1 703	99	1 281
	Syrian Arab Republic	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	2	2	1
	Yemen	-	-	-	-	-	-	-	-	-	-	-	-	-	29	-	-	73	-
Europe	Armenia	-	-	-	-	-	-	-	-	0	0	-	0	0	0	0	0	0	0
	Azerbaijan	-	-	-	-	-	-	-	-	0	0	-	0	0	0	0	0	0	0
	Georgia	0	0	0	0	0	0	0	0	-	0	-	0	0	0	0	0	0	0
	Kyrgyzstan	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0
	Russian Federation	1	1	-	1	3	2	3	4	-	3	2	-	2	-	-	-	-	2
	Tajikistan	-	-	-	-	-	-	-	7	0	-	-	0	0	0	-	-	-	0
	Turkey	0	0	0	0	0	0	0	0	0	0	-	0	0	0	-	-	-	1
	Turkmenistan	0	0	0	0	0	0	0	0	0	-	-	0	0	0	0	-	-	0
	Uzbekistan	0	1	0	1	0	0	0	0	-	0	-	0	0	0	0	0	0	1
South-East Asia	Bangladesh	-	-	-	-	-	1 393	794	469	528	552	484	470	598	1 250	411	-	-	-
	Bhutan	-	-	-	-	-	-	25	14	17	-	-	14	11	15	5	5	6	2
	Democratic People's Republic of Korea	-	-	-	-	-	-	-	-	-	-	-	0	0	0	-	-	-	-
	Democratic Republic of Timor-Leste	-	-	-	-	-	-	-	-	-	-	-	-	-	100	65	88	68	-
	India	-	-	-	-	-	-	2 803	879	666	-	938	1 015	973	1 006	949	963	1 708	1 173
	Indonesia	-	-	-	-	-	-	148	199	45	-	-	68	197	-	-	-	494	-
	Myanmar	-	-	-	-	-	-	3 424	2 943	3 182	3 648	2 756	2 814	2 634	2 476	1 982	1 707	1 647	-
	Nepal	-	-	-	-	0	0	15	2	7	-	0	1	3	5	7	10	42	-
	Sri Lanka	-	-	-	-	-	-	26	61	115	-	-	53	30	2	2	0	0	-
	Thailand	1 287	-	-	-	-	-	826	764	688	740	625	424	361	325	230	71	113	-
Western Pacific	Cambodia	1 020	1 163	1 408	1 100	1 009	614	745	811	621	891	608	476	457	492	382	296	396	241
	China	35	-	52	19	43	34	30	46	24	67	39	28	42	52	31	48	38	-
	Lao People's Democratic Republic	372	457	438	418	609	620	608	606	427	338	350	244	195	187	105	77	21	-
	Malaysia	43	-	25	23	28	35	40	25	27	21	35	46	39	21	35	33	21	-
	Papua New Guinea	457	-	500	448	281	415	514	390	651	567	617	619	678	559	644	731	668	-
	Philippines	913	924	864	811	784	643	536	514	561	755	536	439	98	162	167	145	109	-
	Republic of Korea	0	0	0	0	0	0	0	0	0	0	0	-	0	0	-	-	-	-
	Solomon Islands	33	46	33	40	49	51	30	27	33	23	38	55	59	71	34	38	12	-
	Vanuatu	32	32	26	13	8	4	0	0	0	0	-	2	8	8	1	10	6	-
	Viet Nam	3 340	4 646	2 632	1 026	604	348	203	152	183	190	148	91	50	50	24	18	41	-

Note: Deaths reported before 2001 can be probable and confirmed or only confirmed deaths depending on the country.

ANNEX 4

a. Recommended policies and strategies for malaria control, 2007

b. Antimalarial drug policy, 2008

Annex 4A: Recommended policies and strategies for malaria control, 2007

		Insecticide-treated nets			Indoor residual spraying		Treatment				Malaria in pregnancy
WHO region/subregion	Country/area	Distribution - Free	Targeting population – All	Targeting population – Under 5 years old and pregnant women	Insecticide-resistance mgmt. Implementation	DDT is used for IRS	ACT policy adopted	ACT is free in public sectors	Parasitological confirmation for all age groups	Oral artemisinin monotherapies banned	IPT strategy used to prevent malaria during pregnancy
Africa	Algeria	-	-	-	-	-	-	-	-	-	-
	Angola	Y	Y	N	Y	N	Y	Y	Y	Y	Y
	Benin	Y	Y	N	Y	N	Y	N	Y	N	Y
	Botswana	N	N	Y	Y	N	Y	Y	Y	Y	N
	Burkina Faso	Y	Y	Y	Y	N	Y	Y	Y	N	Y
	Burundi	Y	Y	-	Y	N	Y	N	Y	N	N
	Cameroon	Y	Y	N	Y	N	Y	N	Y	N	Y
	Cape Verde	Y	Y	Y	N	N	N	Y	N	N	-
	Central African Republic	Y	Y	Y	N	N	Y	Y	Y	Y	Y
	Chad	Y	Y	Y	N	N	Y	N	Y	Y	Y
	Comoros	Y	Y	N	Y	N	Y	Y	Y	N	Y
	Congo	Y	Y	-	N	N	Y	N	Y	N	Y
	Côte d'Ivoire	Y	Y	N	Y	N	Y	N	Y	N	Y
	Democratic Republic of the Congo	Y	Y	Y	-	-	Y	Y	N	N	Y
	Equatorial Guinea	-	-	-	-	-	Y	-	-	-	-
	Eritrea	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
	Ethiopia	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Gabon	Y	Y	-	N	N	Y	Y	Y	Y	Y
	Gambia	Y	Y	Y	N	N	Y	N	Y	Y	Y
	Ghana	Y	N	-	Y	N	Y	N	Y	N	Y
	Guinea	Y	N	N	Y	N	Y	N	Y	N	Y
	Guinea-Bissau	-	Y	-	-	-	Y	N	N	N	Y
	Kenya	Y	Y	N	N	N	Y	N	N	Y	Y
	Liberia	-	-	-	-	-	Y	-	-	-	-
	Madagascar	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
	Malawi	Y	Y	N	N	N	Y	N	Y	Y	Y
	Mali	Y	Y	N	-	-	Y	Y	N	Y	Y
	Mauritania	Y	Y	Y	N	N	Y	N	Y	N	Y
	Mauritius	-	-	-	-	-	-	-	-	-	-
	Mozambique	Y	Y	N	N	Y	Y	N	Y	Y	Y
	Namibia	Y	Y	N	Y	Y	Y	N	N	Y	Y
	Niger	Y	N	N	Y	N	Y	Y	N	Y	Y
	Nigeria	Y	Y	-	N	N	Y	Y	Y	Y	Y
	Rwanda	Y	Y	N	Y	N	Y	Y	Y	Y	-
	Sao Tome and Principe	Y	Y	Y	Y	N	Y	N	Y	N	Y
	Senegal	Y	Y	Y	Y	N	Y	Y	Y	N	Y
	Sierra Leone	Y	Y	Y	N	N	Y	Y	Y	Y	Y
	South Africa	-	-	-	Y	Y	Y	N	Y	Y	N
	Swaziland	Y	Y	N	Y	Y	N	Y	N	N	-
	Togo	Y	N	N	Y	N	Y	N	Y	N	Y
	Uganda	Y	Y	N	Y	N	Y	Y	Y	Y	Y
	United Republic of Tanzania	Y	-	N	N	N	Y	N	N	Y	Y
	Zambia	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Zimbabwe	Y	Y	Y	-	Y	Y	N	N	Y	Y

Annex 4A: Recommended policies and strategies for malaria control, 2007

		Insecticide-treated nets			Indoor residual spraying		Treatment				Malaria in pregnancy
WHO region/subregion	Country/area	Distribution - Free	Targeting population – All	Targeting population – Under 5 years old and pregnant women	Insecticide-resistance mgmt. Implementation	DDT is used for IRS	ACT policy adopted	ACT is free in public sectors	Parasitological confirmation for all age groups	Oral artemisinin monotherapies banned	IPT strategy used to prevent malaria during pregnancy
Americas	Argentina	N	N	N	N	N	-	Y	N	N	-
	Belize	-	-	-	-	N	-	Y	-	-	-
	Bolivia	Y	N	Y	Y	N	Y	Y	Y	Y	-
	Brazil	N	Y	Y	Y	N	Y	Y	Y	Y	-
	Colombia	-	-	Y	Y	N	Y	Y	-	-	-
	Costa Rica	N	N	N	-	N	-	Y	-	-	-
	Dominican Republic	N	N	N	Y	N	N	Y	N	N	-
	Ecuador	-	-	Y	Y	N	Y	Y	-	Y	-
	El Salvador	-	Y	Y	Y	N	-	Y	Y	-	-
	French Guiana	N	-	-	N	-	-	-	-	Y	-
	Guatemala	-	-	-	-	N	-	Y	-	-	-
	Guyana	Y	Y	Y	N	Y	Y	Y	-	Y	-
	Haiti	Y	N	Y	Y	-	-	Y	Y	N	-
	Honduras	Y	-	-	-	N	-	Y	-	-	-
	Jamaica	-	-	-	-	-		-	-	-	-
	Mexico	-	-	Y	Y	N	-	Y	-	-	-
	Nicaragua	Y	Y	Y	N	N	-	Y	Y	N	-
	Panama	N	N	N	Y	N	-	Y	-	-	-
	Paraguay	N	N	N	N	N	N	Y	-	-	-
	Peru	-	-	Y	-	N	Y	Y	-	-	-
	Suriname	Y	Y	Y	N	N	Y	Y	Y	Y	-
	Venezuela (Bolivarian Republic of)	-	-	Y	-	N	-	Y	-	-	-
Eastern Mediterranean	Afghanistan	-	-	-	-	-	Y	-	-	-	-
	Djibouti	-	-	-	-	-	Y	-	-	-	-
	Egypt	-	-	-	-	-	Y	-	-	-	-
	Iran (Islamic Republic of)	N	Y	Y	Y	N	Y	Y	Y	Y	-
	Iraq	N	Y	Y	Y	N	Y	Y	Y	Y	-
	Morocco	-	-	-	-	-	Y	-	-	-	-
	Oman	-	-	-	-	-	-	-	-	-	-
	Pakistan	N	Y	Y	Y	N	Y	N	Y	Y	-
	Saudi Arabia	Y	Y	Y	Y	N	Y	Y	Y	Y	-
	Somalia	Y	Y	Y	N	N	-	N	Y	Y	Y
	Sudan	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
	Syrian Arab Republic	-	-	-	-	-	-	-	-	-	-
	Yemen	Y	Y	N	Y	N	Y	Y	Y	Y	-
Europe	Armenia	Y	Y	N	N	N	-	Y	N	N	-
	Azerbaijan	N	N	N	N	N	-	Y	N	N	-
	Georgia	N	N	N	N	N	-	Y	N	N	-
	Kyrgyzstan	Y	Y	N	Y	N		Y	N	N	-
	Russian Federation	-	-	-	-	-		-	-	-	-
	Tajikistan	Y	Y	Y	Y	N	Y	Y	Y	Y	-
	Turkey	N	N	N	Y	N	-	Y	-	-	-
	Turkmenistan	N	N	Y	Y	N	-	Y	N	N	-
	Uzbekistan	N	Y	Y	Y	N		Y	N	N	-

Annex 4A: Recommended policies and strategies for malaria control, 2007

		Insecticide-treated nets			Indoor residual spraying		Treatment				Malaria in pregnancy
WHO region/subregion	Country/area	Distribution - Free	Targeting population – All	Targeting population – Under 5 years old and pregnant women	Insecticide-resistance mgmt. Implementation	DDT is used for IRS	ACT policy adopted	ACT is free in public sectors	Parasitological confirmation for all age groups	Oral artemisinin monotherapies banned	IPT strategy used to prevent malaria during pregnancy
South-East Asia	Bangladesh	Y	Y	Y	N	N	Y	Y	Y	Y	-
	Bhutan	N	Y	Y	N	N	Y	Y	Y	Y	-
	Democratic People's Republic of Korea	Y	N	Y	Y	Y	-	N	N	N	-
	Democratic Republic of Timor-Leste	Y	Y	Y	N	N	Y	Y	Y	Y	-
	India	Y	Y	N	Y	Y	Y	Y	Y	Y	-
	Indonesia	Y	Y	Y	Y	N	Y	Y	Y	Y	-
	Myanmar	N	Y	Y	N	Y	Y	Y	Y	Y	-
	Nepal	-	Y	Y	Y	N	Y	Y	Y	Y	-
	Sri Lanka	Y	Y	Y	Y	N	Y	Y	Y	-	-
	Thailand	N	Y	Y	Y	N	Y	Y	Y	Y	-
Western Pacific	Cambodia	Y	Y	Y	N	N	Y	Y	Y	Y	-
	China	N	N	Y	N	N	Y	Y	N	N	-
	Lao People's Democratic Republic	N	N	Y	N	N	Y	Y	Y	Y	-
	Malaysia	N	Y	Y	Y	N	Y	Y	N	N	-
	Papua New Guinea	N	Y	Y	N	Y	Y	N	Y	Y	-
	Philippines	Y	Y	Y	Y	N	Y	Y	N	Y	-
	Republic of Korea	-	-	-	-	-	-	-	-	-	-
	Solomon Islands	Y	Y	Y	Y	N	Y	Y	N	Y	-
	Vanuatu	Y	Y	Y	N	N	Y	N	Y	-	-
	Viet Nam	-	Y	-	Y	N	Y	N	N	Y	-

(Y) = Actually implemented.
(N) = Not implemented.
(-) = Question not answered or not applicable.

Annex 4B: Antimalarial drug policy, 2008

		P. falciparum			*P.vivax*
WHO region	**Country/area**	**Uncomplicated**	**Severe**	**Prevention during pregnancy**	**Treatment**
Africa	Algeria	-		-	CQ
	Angola	AL	QN(7d)	SP(IPT)	-
	Benin	AL	QN(7d)	SP(IPT)	-
	Botswana	AL*	QN(7d)	CQ+PG	-
	Burkina Faso	AL*	QN(7d)	SP(IPT)	-
	Burundi	AS+AQ	QN(7d)	-	-
	Cameroon	AS+AQ	QN(7d)	SP (IPT)	-
	Cape Verde	CQ	QN(7d)	CQ weekly	-
	Central African Republic	AL*	QN(7d)	SP(IPT)	-
	Chad	AS+AQ* /AL*	QN(7d)	SP(IPT)	-
	Comoros	AL	QN(7d)	SP(IPT)	-
	Congo	AS+AQ*	QN(7d)	SP(IPT)	-
	Côte d'Ivoire	AS+AQ*	QN(7d)	SP(IPT)	-
	Democratic Republic of the Congo	AS+AQ	QN(7d)	SP (IPT)	-
	Equatorial Guinea	AS+AQ	QN(7d)	-	-
	Eritrea	CQ+SP	QN(7d)	-	CQ+PQ
	Ethiopia	AL	QN(7d)	-	CQ
	Gabon	AS+AQ	QN(7d)	SP(IPT)	-
	Gambia	AL	QN(7d)	SP(IPT)	-
	Ghana	AS+AQ	QN(7d)	SP (IPT)	-
	Guinea	AS+AQ*	QN(7d)	SP(IPT)	-
	Guinea-Bissau	AL*	QN(7d)	SP(IPT)	-
	Kenya	AL	QN(7d)	SP (IPT)	-
	Liberia	AS+AQ	QN(7d)	SP(IPT)	-
	Madagascar	AS+AQ	QN(7d)	SP (IPT)	-
	Malawi	AL	QN(7d)	SP (IPT)	-
	Mali	AL*	QN(7d)	SP(IPT)	-
	Mauritania	AS+AQ*	QN(7d)	-	-
	Mauritius	-	-	-	CQ
	Mozambique	AL*	QN(7d)	SP (IPT)	-
	Namibia	AL	QN(7d)	SP(IPT)	-
	Niger	AL	QN(7d)	SP(IPT)	-
	Nigeria	AL	QN(7d)	SP(IPT)	-
	Rwanda	AL	QN(7d)	SP (IPT)	-
	Sao Tome and Principe	AS+AQ	QN(7d)	SP (IPT)	-
	Senegal	AS+AQ	QN(7d)	SP (IPT)	-
	Sierra Leone	AS+AQ	QN(7d)	SP(IPT)	-
	South Africa	AL	QN(7d)	CQ+PG	-
	Swaziland	CQ	QN(7d)	CQ+PG	-
	Togo	AL	QN(7d)	SP(IPT)	-
	Uganda	AL	QN(7d)	SP (IPT)	-
	United Republic of Tanzania	AL / AS+AQ	QN(7d)	SP (IPT)	-
	Zambia	AL	QN(7d)	SP (IPT)	-
	Zimbabwe	AL*	QN(7d)	SP (IPT)	-
Americas	Argentina	-		-	CQ+PQ
	Belize	-	-	-	CQ+PQ
	Bolivia	-	-	-	CQ+PQ
	Brazil	-	AS or AM or QN	-	CQ+PQ(7d)
	Colombia	-	QN(7d)	-	CQ+PQ
	Costa Rica	-	-	-	CQ+PQ
	Dominican Republic	-	-	-	-
	Ecuador	-	-	-	CQ+PQ
	El Salvador	-	-	-	CQ+PQ

* Policy adopted, may not yet be implemented

Annex 4B: Antimalarial drug policy, 2008

		P. falciparum			*P.vivax*
WHO region	**Country/area**	**Uncomplicated**	**Severe**	**Prevention during pregnancy**	**Treatment**
	French Guiana	-	-	-	CQ+PQ
	Guatemala	-	-	-	CQ+PQ
	Guyana	-	-	-	CQ+PQ
	Haiti	-	-	-	-
	Honduras	-	-	-	CQ+PQ
	Mexico	-	-	-	CQ+PQ
	Nicaragua	-	QN+CL	-	CQ+PQ(7d)
	Panama	-	-	-	CQ+PQ
	Paraguay	-	-	-	CQ+PQ
	Peru	-	-	-	CQ+PQ
	Suriname	-	-	-	CQ+PQ
	Venezuela (Bolivarian Republic of)	-	-	-	CQ+PQ
Eastern Mediterranean	Afghanistan	CQ+SP	QN(7d)/AS+SP	-	CQ
	Djibouti	AS+SP*	QN	-	CQ+PQ(14d)
	Egypt	-	QN(7d)	-	CQ+PQ(14d)
	Iran (Islamic Republic of)	-	QN or AS	-	CQ+PQ(14d)
	Iraq	-	QN(7d)	-	CQ+PQ(14d)
	Morocco	-	QN(7d)	-	CQ+PQ(14d)
	Oman	-	QN(7d)	-	CQ+PQ(14d)
	Pakistan	AS+SP	QN/AM	-	CQ+PQ(5d)
	Saudi Arabia	-	QN(7d)	-	CQ+PQ(14d)
	Somalia	AS+SP	QN	SP(IPT)	-
	Sudan	AS+SP, AS+AQ	QN/AM/AS+SP	SP(IPT)	CQ+PQ(14d)
	Syrian Arab Republic	-	QN(7d)	-	CQ+PQ(14d)
	Yemen	AS+SP	QN(7d)	-	CQ+PQ(14d)
Europe	Armenia	-		-	CQ+PQ(14d)
	Azerbaijan	-	-	-	CQ+PQ(14d)
	Georgia	-	-	-	CQ+PQ(14d)
	Tajikistan	-	QN(7d)	-	CQ+PQ(14d)
	Turkey	-	-	-	CQ+PQ(14d)
	Turkmenistan	-	-	-	CQ+PQ(14d)

* Policy adopted, may not yet be implemented

Annex 4B: Antimalarial drug policy, 2008

		P. falciparum			*P.vivax*
WHO region	**Country/area**	**Uncomplicated**	**Severe**	**Prevention during pregnancy**	**Treatment**
South-East Asia	Bangladesh	CQ+PQ	QN/AM	-	CQ+PQ(14d)
	Bhutan	-	QN/AM	-	CQ+PQ(14d)
	Democratic People's Republic of Korea	-	-	-	CQ+PQ(14d)
	Democratic Republic of Timor-Leste	CQ+PQ	QN/AM	-	CQ+PQ(14d)
	India	CQ+PQ	QN/AM	-	CQ+PQ(14d)
	Indonesia	CQ+PQ	QN/AM	-	CQ+PQ(14d)
	Myanmar	CQ	QN/AS	-	CQ+PQ(14d)
	Nepal	CQ+PQ	QN	-	CQ+PQ(14d)
	Sri Lanka	-	QN(7d)	-	CQ+PQ(14d)
	Thailand	-	QN/AS	-	CQ+PQ(14d)
Western Pacific	Cambodia	AS+MQ	AM+MQ	-	CQ
	China	CQ+AT(5d)	AM; PR; AS	-	CQ+PQ(8d) , CQ+PQ(5d)
	Lao People's Democratic Republic	CQ	AS+AL	CQ (weekly)/SP(IPT)	CQ+PQ(14d)
	Malaysia	-	QN+T	-	CQ+PQ(14d)
	Papua New Guinea	AL*	AS/AM+AL*	CQ weekly	CQ+PQ(14d)
	Philippines	AL*	QN+T	CQ (weekly)/SP(IPT)	CQ+PQ(14d)
	Republic of Korea	-	-	-	CQ+PQ(14d)
	Solomon Islands	-	AS+AL	CQ	AL+PQ(14d)
	Vanuatu	AL*	QN(7d)	CQ (weekly)	AL+PQ(14d)
	Viet Nam	AS/CQ	AS inj/ QN inj	CQ (weekly)	CQ+PQ(14d)

AL=Artemether-Lumefantrine	DA=Dihydroartemisinin	PR=Pyronaridine
AM=Artemether	IPT=Intermittent Preventive Treatment	QN=Quinine
AQ=Amodiaquine	MQ=Mefloquine	SP=Sulfadoxine-pyrimethamine
AS=Artesunate	PG=Proguanil	T=Tetracycline
C= Clindamycin	PIP= Piperaquine	TRI=Trimethoprim
CQ=Chloroquine	PM=Pyrimethamine (used only in China)	
D= Doxycycline	PQ= Primaquine (normally used at 15 mg/day, but China policy is 22.5 mg/day)	

*Policy adopted.

ANNEX 5

Operational coverage of insecticide-treated nets, indoor residual spraying and antimalarial treatment, 2004–2006

Annex 5: Operational coverage of insecticide treated nets, indoor residual spraying and antimalarial treatment, 2004-2007

WHO region	Country/area	Year	No. of ITN + LLIN sold or delivered	No. of LLIN sold or delivered	No. of ITN sold or delivered	% ITN coverage	No. of households sprayed	No. of people protected by IRS	% IRS coverage	Any 1st-line treatment courses delivered (including ACT)	ACT treatment courses delivered	% Any antimalarial coverage total	% ACT coverage total	% Any antimalarial coverage public	% ACT coverage public
Africa	Algeria	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Angola	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	118 000	590 000	3.7	-	-	-	-	-	-
		2006	984 760	826 656	158 104	11.9	132 436	780 257	4.0	1 700 000	1 736 200	16.9	17.3	27.8	28.4
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Benin	2004	-	-	659 254	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	-	76 500	-	-	-	-	-	49 525	-	0.5	-	1.3
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Botswana	2004	45 190	-	45 190	-	136 670	65	78.9	23	0	0.1	-	0.8	-
		2005	-	-	-	-	120 627	59	68.9	-	0	-	-	-	-
		2006	4 000	1 500	2 500	0.9	127 746	72	72.1	89 023	0	297.3	0	3083.8	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Burkina Faso	2004	-	0	125 000	-	-	-	-	5 191 738	0	-	-	-	-
		2005	-	401 500	501 500	13.0	-	-	-	4 167 908	0	-	-	-	-
		2006	-	121 100	291 100	11.3	-	-	-	3 930 296	0	-	-	-	-
		2007	-	13 000	11 000	7.4	-	-	-	4 981 270	811 507	21.1	3.4	65.8	10.7
	Burundi	2004	420 793	63 993	356 800	14.6	-	-	-	70 000	0	-	-	-	-
		2005	476 119	476 119	676 318	40.0	79 784	478 704	6.5	1 229 170	1 221 290	-	-	-	-
		2006	274 800	274 800	62 608	27.5	-	-	-	1 707 651	1 707 651	24.1	24.1	51.4	51.4
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Cameroon	2004	-	0	140 443	-	-	-	-	-	-	-	-	-	-
		2005	-	0	404 755	-	-	-	-	3 583 332	0	24.9	-	70.7	-
		2006	1 097 510	16 800	1 080 710	12.1	-	-	-	-	0	-	0	-	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Cape Verde	2004	0	0	0	-	-	-	-	-	0	-	-	-	-
		2005	0	0	0	-	-	-	-	-	0	-	-	-	-
		2006	0	0	0	-	-	-	-	-	0	-	0	-	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Central African Republic	2004	-	-	6 434	-	-	-	-	954 857	86 886	18.2	1.7	48.8	4.4
		2005	-	-	0	-	-	-	-	-	-	-	-	-	-
		2006	-	125 828	134	5.9	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chad	2004	10 000	10 000	-	0.4	-	-	-	-	-	-	-	-	-
		2005	128 293	10 000	118 293	3.0	-	-	-	40 586	40 586	-	-	-	-
		2006	267 000	199 000	110 000	6.4	39 500	-	2.1	104 717	104 717	1.5	1.5	12.5	12.5
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Comoros	2004	11 000	11 000	11 000	5.7	-	-	-	-	-	-	-	-	-
		2005	25 000	0	25 000	9.0	-	-	-	960 163	17 218	-	-	-	-
		2006	78 750	0	78 750	21.9	-	-	-	855 000	54 720	141.7	9.5	362.2	24.4
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Congo	2004	-	-	2 450	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	200 000	-	10.8	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Côte d'Ivoire	2004	12 000	12 000	-	0.2	-	-	-	0	-	-	-	-	-

Annex 5: Operational coverage of insecticide treated nets, indoor residual spraying and antimalarial treatment, 2004-2007

WHO region	Country/area	Year	No. of ITN + LLIN sold or delivered	No. of LLIN sold or delivered	No. of ITN sold or delivered	% ITN coverage	No. of households sprayed	No. of people protected by IRS	% IRS coverage	Any 1st-line treatment courses delivered (including ACT)	ACT treatment courses delivered	% Any antimalarial coverage total	% ACT coverage total	% Any antimalarial coverage public	% ACT coverage public
	Côte d'Ivoire	2005	53 696	-	53 696	0.8	-	-	-	971 683	-	-	-	-	-
		2006	371 816	336 000	371 816	7.6	-	-	-	1 102 879	4 875	-	-	-	-
		2007	-	-	-	-	-	-	-	721 314	476 203	3.3	2.2	12.4	8.2
	Democratic Republic of the Congo	2004	877 161	-	-	3.1	-	-	-	0	-	-	-	-	-
		2005	791 135	-	-	2.7	-	-	-	0	-	-	-	-	-
		2006	2 379 384	-	-	7.8	-	-	-	1 681 211	1 681 211	2.2	2.2	6.9	6.9
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Equatorial Guinea	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Eritrea	2004	215 000	-	215 000	-	92 107	259 420	10.6	302 470	3 117	-	-	-	-
		2005	107 657	107 657	-	4.8	89 134	260 263	9.8	290 500	4 400	-	-	-	-
		2006	80 673	80 673	-	8.0	68 778	208 377	7.3	250 810	25 000	292.7	33.2	2140.3	242.7
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ethiopia	2004	0	0	0	-	845 693	4 228 465	8.1	9 725 000	25 000	-	-	-	-
		2005	4 243 157	4 243 157	0	15.8	782 581	3 912 903	7.3	3 500 000	3 193 993	-	-	-	-
		2006	9 070 718	9 070 718	0	48.3	1 196 897	5 984 485	10.9	6 950 000	6 806 744	-	-	-	-
		2007	7 178 443	7 178 443	0	72.5	1 590 964	5 303 213	14.1	5 450 400	4 032 640	12.1	15.4	91.9	116.4
	Gabon	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	326 548	-	-	49.8	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Gambia	2004	171 149	-	171 149	-	-	-	-	-	-	-	-	-	-
		2005	327 623	103 911	223 712	40.5	-	-	-	-	-	-	-	-	-
		2006	229 841	32 466	197 375	40.1	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ghana	2004	375 000	150 000	225 000	3.4	-	-	-	-	-	-	-	-	-
		2005	618 855	618 855	-	6.8	-	-	-	-	-	-	-	-	-
		2006	2 100 000	2 100 000	-	24.9	134 000	200 000	2.9	3 600 000	3 600 000	-	-	-	-
		2007	1 477 538	1 477 538	-	35.7	154 000	240 000	3.3	2 018 967	1 852 967	9.7	8.9	23.6	21.7
	Guinea	2004	59 000	0	59 000	-	-	-	-	-	0	-	0	-	0
		2005	149 500	149 500	0	3.3	9 872	-	0.7	-	-	-	-	-	-
		2006	144 689	87 500	57 189	6.4	2 800	-	0.2	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Guinea-Bissau	2004	-	-	-	-	-	-	-	149 467	0	-	-	-	-
		2005	-	20 000	-	2.5	-	-	-	163 667	0	-	-	-	-
		2006	-	182 906	-	24.7	-	-	-	71 133	0	3.8	0	6.4	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Kenya	2004	1 169 600	8 100	1 161 500	8.9	60 000	300 000	1.0	-	0	-	-	-	-
		2005	3 655 576	1 900 462	1 755 114	27.1	93 000	465 000	1.5	723 333	723 333	-	-	-	-
		2006	7 102 752	6 378 465	724 287	65.0	110 000	550 000	1.8	5 049 000	5 049 000	16.7	16.7	54.9	54.9
		2007	-	-	-	-	691 841	3 459 207	10.9	-	-	-	-	-	-
	Liberia	2004	-	64 000	-	3.8	-	-	-	-	-	-	-	-	-
		2005	-	150 000	-	12.4	-	-	-	-	-	-	-	-	-
		2006	-	446 000	-	36.9	-	-	-	-	862 903	-	35.6	-	91.1
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Madagascar	2004	253 921	-	-	2.8	102 400	485 395	2.7	-	-	-	-	-	-
		2005	871 570	-	-	9.4	250 000	409 155	6.3	-	-	-	-	-	-

Annex 5: Operational coverage of insecticide treated nets, indoor residual spraying and antimalarial treatment, 2004-2007

WHO region	Country/area	Year	No. of ITN + LLIN sold or delivered	No. of LLIN sold or delivered	No. of ITN sold or delivered	% ITN coverage	No. of households sprayed	No. of people protected by IRS	% IRS coverage	Any 1st-line treatment courses delivered (including ACT)	ACT treatment courses delivered	% Any antimalarial coverage total	% ACT coverage total	% Any antimalarial coverage public	% ACT coverage public
	Madagascar	2006	1 616 200	2 038 000	-	21.3	250 000	1 430 000	6.1	-	-	-	-	-	-
		2007	2 942 563	-	-	50.6	248 269	1 430 000	5.9	733 098	-	16.3	-	61	-
	Malawi	2004	1 295 498	-	1 295 498	-	-	-	-	-	0	-	-	-	-
		2005	815 620	-	815 620	-	-	-	-	27 903 000	0	-	-	-	-
		2006	1 508 735	120 000	1 388 735	22.2	-	-	-	27 903 000	0	209.1	0	800.1	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mali	2004	0	-	-	0.0	-	-	-	-	-	-	-	-	-
		2005	572 556	572 556	-	9.9	-	-	-	-	-	-	-	-	-
		2006	90 900	90 900	-	11.1	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mauritania	2004	-	-	13 178	-	-	-	-	0	0	-	-	-	-
		2005	-	-	-	-	-	-	-	0	0	-	-	-	-
		2006	-	49 616	23 863	6.9	-	-	-	0	0	0	0	0	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mauritius	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mozambique	2004	401 802	-	-	4.0	754 492	3 772 459	18.4	-	-	-	-	-	-
		2005	725 119	-	-	7.1	1 250 375	6 511 184	29.8	-	-	-	-	-	-
		2006	683 410	-	-	6.5	1 537 825	6 962 799	35.9	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Namibia	2004	68 000	68 000	-	16.5	292 552	267 517	109.5	-	-	-	-	-	-
		2005	120 000	120 000	-	34.0	550 854	319 441	203.5	-	-	-	-	-	-
		2006	133 000	133 000	-	46.8	573 045	461 863	209.0	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Niger	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	2 665 000	2 665 000	77.6	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	3 442 130	-	32.6	-	113.9	-
	Nigeria	2004	3 279 000	3 279 000	1 045 230	6.3	-	-	-	3 310 229	-	-	-	-	-
		2005	5 086 934	1 807 934	3 279 000	11.8	-	-	-	3 532 108	-	-	-	-	-
		2006	8 853 589	3 766 655	5 086 934	19.3	900	45 000	0.0	3 982 372	4 530 108	-	-	-	-
		2007	3 225 594	1 003 573	2 222 021	11.9	4 500	-	0.0	2 969 950	8 986 485	1.9	5.6	7.6	22.9
	Rwanda	2004	223 926	-	223 926	-	-	-	-	-	-	-	-	-	-
		2005	253 700	185 000	68 700	5.5	-	-	-	-	-	-	-	-	-
		2006	1 957 720	1 957 720	-	45.3	-	-	-	-	684 990	-	8.2	-	41.8
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sao Tome and Principe	2004	-	14 712	-	19.6	-	-	-	-	-	-	-	-	-
		2005	-	11 718	-	34.6	30 131	139 816	98.7	18 940	18 940	-	-	-	-
		2006	-	52 847	-	102.2	26 501	132 186	85.4	14 363	14 363	39.9	42	128	134.7
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Senegal	2004	223 731	200 000	-	3.5	-	-	-	1 195 402	0	-	-	-	-
		2005	402 706	70 000	-	4.6	-	-	-	1 346 158	0	-	-	-	-
		2006	342 328	400 000	-	11.1	-	-	-	1 555 310	1 036 872	-	-	-	-
		2007	-	-	-	-	272 401	678 971	20.2	990 141	990 141	21.6	21.6	51.4	51.4
	Sierra Leone	2004	84 967	0	84 967	-	-	-	-	-	-	-	-	-	-
		2005	284 787	100 000	184 787	10.2	-	-	-	-	-	-	-	-	-
	Sierra Leone	2006	1 301 164	1 301 164	0	48.8	-	-	-	2 116 580	2 116 580	24.3	24.3	57.4	57.4

Annex 5: Operational coverage of insecticide treated nets, indoor residual spraying and antimalarial treatment, 2004-2007

WHO region	Country/area	Year	No. of ITN + LLIN sold or delivered	No. of LLIN sold or delivered	No. of ITN sold or delivered	% ITN coverage	No. of households sprayed	No. of people protected by IRS	% IRS coverage	Any 1st-line treatment courses delivered (including ACT)	ACT treatment courses delivered	% Any antimalarial coverage total	% ACT coverage total	% Any antimalarial coverage public	% ACT coverage public
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	South Africa	2004	-	-	-	-	1 492 193	4	147.5	-	-	-	-	-	-
		2005	-	-	-	-	1 564 134	4	153.4	-	-	-	-	-	-
		2006	-	-	-	-	1 691 992	4	164.7	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Swaziland	2004	4 532	898	3 586	2.2	94 023	-	116.0	-	-	-	-	-	-
		2005	5 890	4 193	1 588	3.3	92 435	-	113.0	-	-	-	-	-	-
		2006	5 618	5 617	1	5.2	78 598	-	95.3	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Togo	2004	923 700	923 700	0	34.4	-	-	-	-	-	-	-	-	-
		2005	24 578	24 578	0	33.2	-	-	-	-	-	-	-	-	-
		2006	65 235	65 235	0	31.6	-	-	-	-	-	-	-	-	-
		2007	43 946	43 946	0	4.1	-	-	-	555 204	555 204	7.9	7.9	26.9	26.9
	Uganda	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	540 682	-	3.7	-	-	-	-	-	-	-	-	-
		2006	-	1 365 919	-	12.8	104 000	470 000	1.8	-	15 000 000	-	53.5	-	188
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	United Republic of Tanzania	2004	1 790 647	-	-	9.5	-	-	-	476 712	-	-	-	-	-
		2005	2 634 414	-	-	13.7	-	-	-	363 585	-	-	-	-	-
		2006	2 874 043	203 000	57 526	1.3	203 699	1 018 156	2.6	227 047	-	-	-	-	-
		2007	2 967 148	-	1 679 243	9.3	231 669	1 261 552	2.9	23 455 260	23 455 260	101.2	101.2	191.6	191.6
	Zambia	2004	176 082	136 045	40 037	14.4	175 192	772 644	8.2	-	-	-	-	-	-
		2005	516 999	488 219	28 780	20.7	236 759	1 163 802	10.9	-	-	-	-	-	-
		2006	1 162 578	1 162 578	-	30.6	537 877	2 408 080	24.4	-	-	-	-	-	-
		2007	2 458 183	2 458 183	-	68.9	657 695	-	29.2	3 036 982	3 036 982	29.2	29.2	54.5	54.5
	Zimbabwe	2004	99 771	-	99 771	-	1 211 338	2 031 489	46.5	1 815 470	0	-	-	-	-
		2005	81 461	-	81 461	-	1 271 474	1 888 480	48.5	1 496 896	0	-	-	-	-
		2006	815 344	-	815 344	-	1 183 007	1 506 925	44.7	1 535 877	0	114	0	500.8	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
Americas	Argentina	2004	-	-	-	-	1 490	-	0.3	77	0	15.7	-	24.4	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	-	-	-	4 390	-	0.9	127	0	25.4	-	39.5	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Belize	2004	-	-	-	-	19 308	-	35.8	1 463	0	-	-	-	-
		2005	-	-	-	-	19 308	-	35.0	1 463	0	-	-	-	-
		2006	-	-	-	-	11 174	-	19.8	1 151	0	2.7	0	88.6	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bolivia	2004	-	-	-	-	2 150	-	0.2	14 910	0	-	-	-	-
		2005	22 400	16 400	6 000	0.8	17 620	-	1.3	20 142	0	-	-	-	-
		2006	29 949	23 949	6 000	1.5	6 574	-	0.5	18 995	0	2.7	0	7.9	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Brazil	2004	-	-	-	-	-	-	-	744 099	0	-	-	-	-
		2005	-	-	-	-	437 417	-	9.3	1 223 538	0	21.4	0	195.5	0
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-
		2007	10 000	10 000	0	0.1	-	-	-	458 041	35 382	7.8	2.4	71.3	22.1
	Colombia	2004	-	-	-	-	20 526	-	0.6	122 804	0	12.3	0	68.3	0
		2005	170 000	20 000	150 000	2.2	-	-	-	-	-	-	-	-	-
		2006	-	-	-	-	20 526	-	0.6	145 525	0	-	-	-	-
	Colombia	2007	-	87 394	-	1.4	28 728	143 640	0.8	155 132	27 132	14.9	7.2	82.9	40

Annex 5: Operational coverage of insecticide treated nets, indoor residual spraying and antimalarial treatment, 2004-2007

WHO region	Country/area	Year	No. of ITN + LLIN sold or delivered	No. of LLIN sold or delivered	No. of ITN sold or delivered	% ITN coverage	No. of households sprayed	No. of people protected by IRS	% IRS coverage	Any 1st-line treatment courses delivered (including ACT)	ACT treatment courses delivered	% Any antimalarial coverage total	% ACT coverage total	% Any antimalarial coverage public	% ACT coverage public
	Costa Rica	2004	0	-	-	0.0	0	-	0.0	12 890	0	-	-	-	-
		2005	0	-	-	0.0	1 290	-	0.4	35 410	0	-	-	-	-
		2006	0	-	-	0.0	2 487	-	0.8	29 030	0	62.9	0	650	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dominican Republic	2004	0	0	0	-	1 104	4 968	0.1	2 355	0	-	-	-	-
		2005	0	0	0	-	2 801	12 605	0.2	3 837	0	-	-	-	-
		2006	0	0	0	-	14 009	63 041	0.8	3 525	0	1.1	0	65	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ecuador	2004	15 000	-	150 000	-	16 737	-	1.1	37 400	0	-	-	-	-
		2005	48 000	-	48 000	-	23 830	-	1.6	17 832	2 212	-	-	-	-
		2006	42 000	-	42 000	-	75 484	-	4.9	9 863	1 596	1.9	1.3	65	45.5
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	El Salvador	2004	0	0	0	-	5 100	26 520	0.5	112	0	-	-	-	-
		2005	0	500	0	0.0	5 300	27 560	0.5	66	0	-	-	-	-
		2006	0	0	0	-	4 527	23 540	0.4	44	0	51	0	79.4	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	French Guiana	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Guatemala	2004	-	-	-	-	21 616	-	1.4	89 260	0	-	-	-	-
		2005	-	-	-	-	16 946	-	1.1	78 362	0	-	-	-	-
		2006	-	213 757	-	5.4	8 012	-	0.5	73 956	0	13.7	0	154.6	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Guyana	2004	-	-	-	-	1 250	-	0.8	40 544	2 580	-	-	-	-
		2005	-	-	-	-	-	-	-	54 227	17 727	-	-	-	-
		2006	-	29 577	-	8.6	-	-	-	20 526	10 426	8.3	9.6	63.3	73.2
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Haiti	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	499	0	-	-	-	-
		2006	-	-	39 834	-	-	-	-	82 951	0	18.8	0	164.7	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Honduras	2004	-	-	-	-	800	-	0.1	17 293	0	-	-	-	-
		2005	-	-	-	-	-	-	-	16 007	0	-	-	-	-
		2006	1 924	1 924	-	0.1	189	-	0.0	11 561	0	5.1	0	65	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Jamaica	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mexico	2004	-	-	-	-	81 805	-	15.0	112 395	0	-	-	-	-
		2005	-	-	-	-	38 760	-	7.1	137 994	0	5.6	0	2413.2	0
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Nicaragua	2004	-	-	-	-	63 095	378 570	7.1	-	-	-	-	-	-
		2005	-	-	-	-	79 324	475 944	8.8	-	-	-	-	-	-
		2006	130 000	-	130 000	-	41 057	287 399	4.5	301 428	0	101.1	0	8382.7	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Panama	2004	-	-	-	-	4 594	-	0.7	41 638	0	-	-	-	-

Annex 5: Operational coverage of insecticide treated nets, indoor residual spraying and antimalarial treatment, 2004-2007

WHO region	Country/area	Year	No. of ITN + LLIN sold or delivered	No. of LLIN sold or delivered	No. of ITN sold or delivered	% ITN coverage	No. of households sprayed	No. of people protected by IRS	% IRS coverage	Any 1st-line treatment courses delivered (including ACT)	ACT treatment courses delivered	% Any antimalarial coverage total	% ACT coverage total	% Any antimalarial coverage public	% ACT coverage public
		2005	-	-	-	-	19 021	-	3.0	59 311	0	-	-	-	-
		2006	0	-	-	0.0	12 027	-	1.9	8 264	0	2.4	0	323	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Paraguay	2004	-	-	-	-	15 149	-	3.4	1 113	0	-	-	-	-
		2005	-	-	-	-	14 104	-	3.1	464	0	-	-	-	-
		2006	-	-	-	-	30 738	-	6.7	1 143	0	57.9	0	90.3	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Peru	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Suriname	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	45 503	-	-	187.7	-	-	-	-	-	-	-	-	-
		2006	6 790	-	-	27.8	2 156	5 627	22.1	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Venezuela (Bolivarian Republic of)	2004	-	-	-	-	56 763	-	3.9	53 410	0	-	-	-	-
		2005	-	-	-	-	2 905 230	-	198.2	37 988	0	-	-	-	-
		2006	-	-	-	-	20 691	-	1.4	38 650	0	4.5	0	67.8	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
Eastern Mediterranean	Afghanistan	2004	-	-	46 403	-	-	-	-	-	-	-	-	-	-
		2005	-	-	23 055	-	-	-	-	-	-	-	-	-	-
		2006	-	40 000	-	0.3	-	-	-	-	-	-	-	-	-
		2007	-	345 245	-	2.9	-	-	-	-	-	-	-	-	-
	Djibouti	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Egypt	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Iran (Islamic Republic of)	2004	20 000	-	-	0.4	223 980	-	10.6	-	-	-	-	-	-
		2005	20 000	-	-	0.4	264 848	-	12.4	-	-	-	-	-	-
		2006	20 000	-	-	0.4	234 578	-	10.9	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Iraq	2004	320 000	320 000	-	4.6	91 878	702 630	3.3	155	0	-	-	-	-
		2005	-	-	-	-	52 055	426 124	1.8	47	0	-	-	-	-
		2006	-	-	-	-	59 866	456 254	2.1	24	0	27.7	-	86.6	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Morocco	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oman	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pakistan	2004	2 000	2 000	-	0.0	241 524	1 690 668	0.8	-	-	-	-	-	-
	Pakistan	2005	140 000	130 000	10 000	0.2	271 572	1 901 004	0.9	-	-	-	-	-	-

Annex 5: Operational coverage of insecticide treated nets, indoor residual spraying and antimalarial treatment, 2004-2007

WHO region	Country/area	Year	No. of ITN + LLIN sold or delivered	No. of LLIN sold or delivered	No. of ITN sold or delivered	% ITN coverage	No. of households sprayed	No. of people protected by IRS	% IRS coverage	Any 1st-line treatment courses delivered (including ACT)	ACT treatment courses delivered	% Any antimalarial coverage total	% ACT coverage total	% Any antimalarial coverage public	% ACT coverage public
		2006	240 000	240 000	-	0.5	327 360	2 291 520	1.1	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Saudi Arabia	2004	460 000	-	-	7.2	-	-	-	-	-	-	-	-	-
		2005	81 364	-	-	1.2	-	-	-	-	-	-	-	-	-
		2006	0	0	0	-	94 350	-	3.5	1 278	-	28.8	-	86.7	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Somalia	2004	6 700	-	-	0.2	1 017	6 702	0.1	-	-	-	-	-	-
		2005	60 000	-	-	1.5	-	-	-	-	-	-	-	-	-
		2006	320 000	-	-	7.6	483	2 898	0.0	200 000	200 000	12.1	12.1	135.2	135.2
		2007	-	-	-	-	66	-	0.0	-	-	-	-	-	-
	Sudan	2004	414 000	130 000	284 000	2.4	465 454	2 327 272	6.4	-	-	-	-	-	-
		2005	307 300	538 764	40 300	3.9	555 311	2 776 555	7.5	-	-	-	-	-	-
		2006	537 199	1 051 088	12 199	9.2	595 486	2 977 432	7.9	2 888 943	2 283 167	-	-	-	-
		2007	2 175 000	1 095 000	1 080 000	19.5	649 937	3 846 738	8.4	2 677 199	2 690 000	10	10.6	32.2	34
	Syrian Arab Republic	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Yemen	2004	9 530	0	9 530	-	36 905	-	0.9	153 986	0	-	-	-	-
		2005	163 000	150 000	13 000	1.5	56 645	-	1.3	240 560	0	-	-	-	-
		2006	200 000	200 000	0	3.2	75 042	-	1.7	512 000	0	13.9	0	153.2	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
Europe	Armenia	2004	0	0	0	-	6 653	26 612	-	47	-	-	-	-	-
		2005	0	0	0	-	474	1 896	-	7	-	-	-	-	-
		2006	0	0	0	-	2 372	9 488	-	0	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Azerbaijan	2004	0	0	0	-	56 253	213 761	7.3	386	0	-	-	-	-
		2005	0	0	0	-	62 380	249 518	8.1	242	0	-	-	-	-
		2006	0	0	0	-	47 161	188 643	6.1	143	0	71.5	-	86.6	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Georgia	2004	-	-	-	-	6 183	24 732	8.2	500	-	-	-	-	-
		2005	-	-	-	-	13 272	53 088	17.8	300	-	-	-	-	-
		2006	-	-	-	-	13 200	52 800	17.9	200	-	241.5	-	288.7	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Kyrgyzstan	2004	0	0	3 200	-	8 000	40 000	1.0	93	0	-	-	-	-
		2005	0	0	0	-	8 000	40 000	1.0	210	0	-	-	-	-
		2006	0	0	20 000	-	16 800	83 200	2.1	320	0	85.1	0	86.6	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Russian Federation	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tajikistan	2004	22 952	-	22 952	-	34 093	238 651	3.5	3 588	151	-	-	-	-
		2005	19 993	-	19 993	-	40 235	685 130	4.0	2 309	81	-	-	-	-
		2006	15 150	15 150	0	0.6	-	-	-	1 344	28	-	56.7	-	65.2
		2007	26 438	26 438	-	1.6	60 475	941 667	5.9	0	-	0	-	0	-

Annex 5: Operational coverage of insecticide treated nets, indoor residual spraying and antimalarial treatment, 2004-2007

WHO region	Country/area	Year	No. of ITN + LLIN sold or delivered	No. of LLIN sold or delivered	No. of ITN sold or delivered	% ITN coverage	No. of households sprayed	No. of people protected by IRS	% IRS coverage	Any 1st-line treatment courses delivered (including ACT)	ACT treatment courses delivered	% Any antimalarial coverage total	% ACT coverage total	% Any antimalarial coverage public	% ACT coverage public
	Turkey	2004	-	-	-	-	50 184	250 920	3.5	419 938	-	-	-	-	-
		2005	-	-	-	-	41 370	206 850	2.9	854 004	-	-	-	-	-
		2006	-	-	-	-	62 669	313 345	4.3	1 139 577	-	93022.8	-	123983	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Turkmenistan	2004	-	-	-	-	-	-	-	3	-	-	-	-	-
		2005	-	-	-	-	-	-	-	1	-	-	-	-	-
		2006	-	-	-	-	14 070	70 350	-	0	-	-	-	-	-
		2007	-	-	-	-	17 368	86 840	-	-	-	-	-	-	-
	Uzbekistan	2004	-	0	0	-	18 203	109 219	4.7	66	0	-	-	-	-
		2005	-	5 296	0	0.5	19 169	115 046	4.9	102	0	-	-	-	-
		2006	-	0	0	-	20 351	122 106	5.1	76	0	72.4	0	86.6	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
South-East Asia	Bangladesh	2004	168 500	3 500	-	0.0	-	-	-	-	-	-	-	-	-
		2005	305 000	5 000	-	0.0	-	-	-	-	37 754	-	-	-	-
		2006	-	-	-	-	-	-	-	-	35 448	-	0.3	-	8.7
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Bhutan	2004	33 349	-	33 349	-	37 797	179 117	41.1	2 670	-	-	-	-	-
		2005	70 232	-	70 232	-	17 530	68 582	18.6	1 825	-	-	-	-	-
		2006	-	50 361	-	21.0	36 073	155 899	37.6	1 868	905	-	-	-	-
		2007	-	50 298	-	41.4	21 954	75 037	22.6	91 839	150 819	22.3	89.8	3935.7	15865
	Democratic People's Republic of Korea	2004	20 000	-	20 000	-	-	-	-	200 000	-	-	-	-	-
		2005	69 947	20 000	49 947	1.2	-	-	-	100 000	-	-	-	-	-
		2006	120 000	20 000	100 000	2.4	-	-	-	100 000	-	69.7	-	925.9	-
		2007	-	-	-	-	1 567	5 205	0.1	-	-	-	-	-	-
	Democratic Republic of Timor-Leste	2004	-	29 162	-	5.8	-	-	-	-	-	-	-	-	-
		2005	-	0	-	-	-	-	-	-	-	-	-	-	-
		2006	-	-	-	-	-	-	-	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	India	2004	1 200 000	0	1 200 000	-	-	52 118 040	-	1 915 363	-	-	-	-	-
		2005	2 720 000	0	2 720 000	-	-	62 935 123	-	1 816 342	57 700	-	-	-	-
		2006	1 495 000	0	1 495 000	-	-	69 457 913	-	1 780 777	242 300	-	-	-	-
		2007	7 000 000	0	7 000 000	-	-	70 131 019	-	1 476 562	550 000	1.7	1.3	70.6	56
	Indonesia	2004	155 000	150 000	5 000	0.3	-	749 500	-	-	-	-	-	-	-
		2005	-	-	-	-	-	-	-	-	-	-	-	-	-
		2006	-	2 000 000	-	3.7	-	-	-	250 000	-	4.2	-	12.2	-
		2007	-	-	250 000	3.9	-	-	-	-	-	-	-	-	-
	Myanmar	2004	181 072	62 631	118 441	1.6	4 165	19 704	0.1	-	-	-	-	-	-
		2005	222 886	14 295	208 591	2.0	4 733	31 855	0.1	433 135	143 385	-	-	-	-
		2006	538 436	84 546	453 890	3.6	2 951	12 360	0.0	1 000 710	392 085	5.4	3	136.9	74.4
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Nepal	2004	-	-	-	-	239 999	1 199 995	5.5	50 724	0	-	-	-	-
		2005	40 600	40 600	-	0.4	217 192	1 085 960	4.9	81 813	0	-	-	-	-
		2006	113 017	113 017	-	1.4	222 563	1 112 817	4.9	70 674	0	9.2	0	39.5	0
		2007	154 300	154 300	-	2.7	-	-	-	-	-	-	-	-	-
	Sri Lanka	2004	-	-	14 001	1.9	309 541	1 155 353	25.3	3 720	-	-	-	-	-
		2005	-	223 000	4 500	8.8	276 424	955 120	22.5	1 640	-	-	-	-	-
		2006	-	100 000	0	10.5	199 593	792 355	16.2	591	-	18.2	-	86.6	-
		2007	-	-	-	-	92 609	358 104	7.5	-	-	-	-	-	-
	Thailand	2004	-	-	340 760	-	322 875	1 156 678	4.2	51 271	3 438	-	-	-	-

Annex 5: Operational coverage of insecticide treated nets, indoor residual spraying and antimalarial treatment, 2004-2007

WHO region	Country/area	Year	No. of ITN + LLIN sold or delivered	No. of LLIN sold or delivered	No. of ITN sold or delivered	% ITN coverage	No. of households sprayed	No. of people protected by IRS	% IRS coverage	Any 1st-line treatment courses delivered (including ACT)	ACT treatment courses delivered	% Any antimalarial coverage total	% ACT coverage total	% Any antimalarial coverage public	% ACT coverage public
	Thailand	2005	-	-	259 849	-	300 074	834 949	3.9	6 238	20 246	-	-	-	-
		2006	-	9 000	185 290	1.0	207 156	695 854	2.7	65 804	34 848	0.5	0.5	188.1	213.7
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
Western Pacific	Cambodia	2004	267 144	-	-	7.3	0	0	0.0	89 993	84 421	-	-	-	-
		2005	500 318	-	-	13.5	0	0	0.0	77 782	75 082	-	-	-	-
		2006	452 316	-	-	12.0	0	0	0.0	141 535	112 495	-	-	-	-
		2007	456 581	120 598	-	3.1	0	0	0.0	91 839	150 819	16.6	37.2	87.7	196.2
	China	2004	77 290	0	77 290	-	-	-	-	145 676	0	-	-	-	-
		2005	61 354	0	61 354	-	-	-	-	100 106	0	-	-	-	-
		2006	50 090	0	50 090	-	-	-	-	116 260	0	3.3	0	86.6	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Lao People's Democratic Republic	2004	259 600	-	259 600	-	-	-	-	16 200	16 200	-	-	-	-
		2005	670 000	150 000	520 000	23.7	-	-	-	77 760	77 760	-	-	-	-
		2006	320 000	-	320 000	16.3	-	-	-	140 640	140 640	-	-	-	-
		2007	422 900	134 000	288 900	19.6	-	-	-	164 160	164 160	100.5	104.7	682.7	711.2
	Malaysia	2004	136 751	0	136 751	-	66 561	211 696	7.4	6 154	0	-	-	-	-
		2005	325 343	0	325 343	-	25 635	112 122	2.8	5 569	0	-	-	-	-
		2006	423 282	0	423 282	-	26 874	111 623	2.9	5 294	0	0.5	0	86.9	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Papua New Guinea	2004	8 418	-	8 418	-	-	-	-	7 958 122	362 071	-	-	-	-
		2005	228 421	228 421	-	7.5	-	-	-	3 896 627	321 296	-	-	-	-
		2006	461 231	461 231	-	22.2	2 000	10 000	0.2	4 822 368	395 185	98.2	11.5	249.1	29.2
		2007	53 500	53 500	-	23.5	-	24 699	-	-	-	-	-	-	-
	Philippines	2004	-	-	-	-	-	-	-	-	-	-	-	-	-
		2005	-	35 000	-	0.2	-	-	-	-	-	-	-	-	-
		2006	411 781	47 000	362 775	2.1	-	-	-	-	-	-	-	-	-
		2007	-	196 000	200 000	2.3	-	-	-	-	-	-	-	-	-
	Republic of Korea	2004	-	-	-	-	-	-	-	2 070	-	-	-	-	-
		2005	-	-	-	-	-	-	-	710	-	-	-	-	-
		2006	-	-	-	-	-	-	-	1 045	-	16.1	-	33.1	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Solomon Islands	2004	15 712	-	-	6.9	18 070	99 099	19.7	-	-	-	-	-	-
		2005	48 665	-	-	20.7	11 137	63 364	11.9	-	-	-	-	-	-
		2006	59 904	53 162	6 742	24.9	16 849	93 487	17.5	-	-	-	-	-	-
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Vanuatu	2004	14 132	0	14 132	-	-	-	-	181 037	0	-	-	-	-
		2005	9 265	9 265	0	8.6	-	-	-	135 705	0	-	-	-	-
		2006	22 834	22 834	0	29.2	-	-	-	131 000	0	140.7	0	535.5	0
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-
	Viet Nam	2004	-	-	-	-	1 885 000	-	9.9	1 624 000	183 333	-	-	-	-
		2005	1 201 000	1 000	1 200 000	2.8	2 000 000	-	10.3	1 600 000	161 667	-	-	-	-
		2006	800 000	-	800 000	1.9	1 900 000	-	9.7	1 600 000	231 508	76.4	14	1516.8	277.4
		2007	-	-	-	-	-	-	-	-	-	-	-	-	-

ITN = Insecticide-treated nets

LLIN = Long lasting insecticide-treated nets

ACT = Artemisinin-based combination therapy

ANNEX 6

a. Household surveys of mosquito net ownership and usage, 2000–2007

b. Household surveys of antimalarial treatment, 2001–2007

Annex 6A: Household surveys of mosquito nets ownership and usage, 2001-2007

WHO region/subregion	Country/area	Year	Source	Subgroup	% of HH with ≥ 1 any net	% of HH with ≥ 1 ever treated net	% of HH with ≥ 1 ITN	% of children <5 years who slept under any net	% of children <5 years who slept under ever treated net	% of children <5 years who slept under an ITN	% of pregnant women who slept under any net	% of pregnant women who slept under ever treated net	% of pregnant women who slept under an ITN
Africa	Angola	2006	MIS 2006-07	Total	33	-	28	21	-	18	-	-	22
		2006	MIS 2006-07	Urban	34	-	29	19	-	17	-	-	15
		2006	MIS 2006-07	Rural	31	-	26	22	-	19	-	-	26
	Benin	2001	DHS 2001-02	Total	40	-	-	32	-	7	-	-	-
		2001	DHS 2001-02	Urban	49	-	-	43	-	14	-	-	-
		2001	DHS 2001-02	Rural	35	-	-	27	-	4	-	-	-
		2006	DHS 2006	Total	56	-	25	47	-	20	-	-	20
		2006	DHS 2006	Urban	66	-	29	55	-	25	-	-	25
		2006	DHS 2006	Rural	50	-	21	42	-	18	-	-	17
	Burkina Faso	2003	DHS 2003	Total	40	15	6	20	7	2	24	8	3
		2003	DHS 2003	Urban	46	24	15	23	11	6	25	13	8
		2003	DHS 2003	Rural	39	12	3	19	6	1	24	8	2
		2006	MICS 2006	Total	52	-	23	18	-	10	-	-	-
		2006	MICS 2006	Urban	65	-	45	33	-	24	-	-	-
		2006	MICS 2006	Rural	47	-	15	14	-	6	-	-	-
	Burundi	2000	MICS 2000	Total	-	-	-	3	-	1	-	-	-
		2000	MICS 2000	Urban	-	-	-	28	-	15	-	-	-
		2000	MICS 2000	Rural	-	-	-	1	-	0	-	-	-
		2005	MICS 2005	Total	13	-	8	13	-	8	-	-	-
		2005	MICS 2005	Urban	49	-	34	51	-	40	-	-	-
		2005	MICS 2005	Rural	11	-	6	12	-	7	-	-	-
	Cameroon	2000	MICS 2000	Total	-	-	-	11	-	1	-	-	-
		2000	MICS 2000	Urban	-	-	-	18	-	3	-	-	-
		2000	MICS 2000	Rural	-	-	-	9	-	1	-	-	-
		2004	DHS 2004	Total	20	2	1	12	1	1	12	2	1
		2004	DHS 2004	Urban	24	3	2	17	2	2	15	3	3
		2004	DHS 2004	Rural	17	1	1	7	1	0	10	0	0
		2006	MICS 2006	Total	32	-	20	27	-	13	-	-	-
		2006	MICS 2006	Urban	33	-	20	32	-	14	-	-	-
		2006	MICS 2006	Rural	30	-	20	22	-	12	-	-	-
	Central African Republic	2000	MICS 2000	Total	-	-	-	31	-	2	-	-	-
		2000	MICS 2000	Urban	-	-	-	48	-	2	-	-	-
		2000	MICS 2000	Rural	-	-	-	20	-	1	-	-	-
		2006	MICS 2006	Total	36	-	17	33	-	15	-	-	-
		2006	MICS 2006	Urban	54	-	27	52	-	24	-	-	-
		2006	MICS 2006	Rural	26	-	12	22	-	10	-	-	-
	Chad	2000	MICS 2000	Total	-	-	-	27	-	1	-	-	-
		2000	MICS 2000	Urban	-	-	-	58	-	1	-	-	-
		2000	MICS 2000	Rural	-	-	-	19	-	0	-	-	-
		2004	DHS 2004	Total	64	-	-	-	-	-	-	-	-
		2004	DHS 2004	Urban	77	-	-	-	-	-	-	-	-
		2004	DHS 2004	Rural	61	-	-	-	-	-	-	-	-
	Comoros	2000	MICS 2000	Total	-	-	-	36	-	9	-	-	-
		2000	MICS 2000	Urban	-	-	-	57	-	17	-	-	-
		2000	MICS 2000	Rural	-	-	-	31	-	7	-	-	-
	Congo	2005	DHS 2005	Total	76	9	8	68	7	6	64	5	4
		2005	DHS 2005	Urban	82	9	8	77	7	6	70	4	4
		2005	DHS 2005	Rural	68	9	8	60	7	6	59	5	5
	Côte d'Ivoire	2000	MICS 2000	Total	-	-	-	10	-	1	-	-	-
		2000	MICS 2000	Urban	-	-	-	12	-	2	-	-	-

Annex 6A: Household surveys of mosquito nets ownership and usage, 2001-2007

WHO region/subregion	Country/area	Year	Source	Subgroup	% of HH with ≥ 1 any net	% of HH with ≥ 1 ever treated net	% of HH with ≥ 1 ITN	% of children <5 years who slept under any net	% of children <5 years who slept under ever treated net	% of children <5 years who slept under an ITN	% of pregnant women who slept under any net	% of pregnant women who slept under ever treated net	% of pregnant women who slept under an ITN
		2000	MICS 2000	Rural	-	-	-	8	-	1	-	-	-
		2005	AIS 2005	Total	20	-	3	-	-	-	-	-	-
		2005	AIS 2005	Urban	17	-	3	-	-	-	-	-	-
		2005	AIS 2005	Rural	23	-	2	-	-	-	-	-	-
		2006	MICS 2006	Total	27	-	6	17	-	6	-	-	-
		2006	MICS 2006	Urban	22	-	6	16	-	8	-	-	-
		2006	MICS 2006	Rural	31	-	6	18	-	4	-	-	-
	Democratic Republic of the Congo	2001	MICS 2001	Total	-	-	-	12	-	1	-	-	-
		2001	MICS 2001	Urban	-	-	-	15	-	2	-	-	-
		2001	MICS 2001	Rural	-	-	-	10	-	0	-	-	-
	Equatorial Guinea	2000	MICS 2000	Total	-	-	-	15	-	1	-	-	-
		2000	MICS 2000	Urban	-	-	-	30	-	3	-	-	-
		2000	MICS 2000	Rural	-	-	-	10	-	0*	-	-	-
	Eritrea	2002	DHS 2002	Total	34	-	-	12	-	4*	-	-	3*
		2002	DHS 2002	Urban	28	-	-	14	-	5*	-	-	5*
		2002	DHS 2002	Rural	37	-	-	11	-	4	-	-	2
	Ethiopia	2000	DHS 2000	Total	1	-	0	-	-	-	-	-	-
		2000	DHS 2000	Urban	3	-	0	-	-	-	-	-	-
		2000	DHS 2000	Rural	1	-	0	-	-	-	-	-	-
		2005	DHS 2005	Total	6	4	3	2	2	2	2	1	1
		2005	DHS 2005	Urban	11	8	5	9	7	4	11	10	6
		2005	DHS 2005	Rural	5	-	3	2*	-	1	-	-	1
		2007	MIS 2007	Total	56	54	53	35*	33	33*	37	35	35
		2007	MIS 2007[a]	Total	69	-	65	-	-	42	-	-	43
		2007	MIS 2007	Urban	41	40	40	41	37	36	37	34	34
		2007	MIS 2007	Rural	59	57	56	34	33	33	37	36	34
	Gabon	2000	DHS 2000	Total	-	-	-	-	-	-	-	-	-
	Gambia	2000	MICS 2000	Total	-	-	-	42	-	15	-	-	-
		2000	MICS 2000	Urban	-	-	-	36	-	7	-	-	-
		2000	MICS 2000	Rural	-	-	-	46	-	19	-	-	-
		2006	MICS 2006	Total	59	-	50	63	-	49	-	-	-
		2006	MICS 2006	Urban	49	-	13	55	-	38	-	-	-
		2006	MICS 2006	Rural	70	-	38	68	-	55	-	-	-
	Ghana	2003	DHS 2003	Total	18	-	3	15	-	4	-	-	3
		2003	DHS 2003	Urban	10	-	2	9	-	4	-	-	2
		2003	DHS 2003	Rural	24	-	4	18	-	4	-	-	3
		2006	MICS 2006	Total	30	-	19	33	-	22	-	-	-
		2006	MICS 2006	Urban	21	-	15	22	-	16	-	-	-
		2006	MICS 2006	Rural	37	-	22	38	-	25	-	-	-
	Guinea	2005	DHS 2005	Total	27	2	4	12	1	1	13	1	1
		2005	DHS 2005	Urban	28	2	6	16	1	3	11	1	4
		2005	DHS 2005	Rural	27	2	3	11	1	1	13	1	1
	Guinea-Bissau	2000	MICS 2000	Total	-	-	-	67	-	7	-	-	-
		2000	MICS 2000	Urban	-	-	-	75	-	19	-	-	-
		2000	MICS 2000	Rural	-	-	-	64	-	3	-	-	-
		2006	MICS 2006	Total	79	-	44	73	-	39	-	-	-
		2006	MICS 2006	Urban	82	-	35	80	-	32	-	-	-
		2006	MICS 2006	Rural	78	-	49	71	-	42	-	-	-
	Kenya	2000	MICS 2000	Total	-	-	-	16	-	3	-	-	-
		2000	MICS 2000	Urban	-	-	-	35	-	4	-	-	-

Annex 6A: Household surveys of mosquito nets ownership and usage, 2001-2007

WHO region/subregion	Country/area	Year	Source	Subgroup	% of HH with ≥ 1 any net	% of HH with ≥ 1 ever treated net	% of HH with ≥ 1 ITN	% of children <5 years who slept under any net	% of children <5 years who slept under ever treated net	% of children <5 years who slept under an ITN	% of pregnant women who slept under any net	% of pregnant women who slept under ever treated net	% of pregnant women who slept under an ITN
		2000	MICS 2000	Rural	-	-	-	10	-	3	-	-	-
		2003	DHS 2003	Total	22	9	8	15	-	6	13	-	5
		2003	DHS 2003	Urban	38	15	14	33	-	12	26	-	7
		2003	DHS 2003	Rural	17	7	6	11	-	5	10	-	5
	Liberia	2005	MIS 2005	Total	18	-	6	11	-	3	-	-	-
	Madagascar	2000	MICS 2000	Total	-	-	-	30	-	0	-	-	-
		2000	MICS 2000	Urban	-	-	-	32	-	0	-	-	-
		2000	MICS 2000	Rural	-	-	-	30	-	0	-	-	-
		2003	DHS 2003-04	Total	39	-	-	-	-	-	-	-	-
		2003	DHS 2003-04	Urban	44	-	-	-	-	-	-	-	-
		2003	DHS 2003-04	Rural	37	-	-	-	-	-	-	-	-
	Malawi	2000	DHS 2000	Total	13	-	-	8	-	3	-	-	-
		2000	DHS 2000	Urban	32	-	-	21	-	12	-	-	-
		2000	DHS 2000	Rural	10	-	-	6	-	2	-	-	-
		2004	DHS 2004	Total	42	34	27	20	18	15	19	18	15
		2004	DHS 2004	Urban	56	48	41	39	35	30	38	36	30
		2004	DHS 2004	Rural	39	32	25	17	15	12	16	15	12
		2006	MICS 2006	Total	50	-	36	29	-	23	-	-	-
		2006	MICS 2006	Urban	72	-	56	52	-	43	-	-	-
		2006	MICS 2006	Rural	47	-	34*	26	-	21*	-	-	-
	Mali	2001	DHS 2001	Total	54	-	-	-	-	-	-	-	-
		2001	DHS 2001	Urban	58	-	-	-	-	-	-	-	-
		2001	DHS 2001	Rural	53	-	-	-	-	-	-	-	-
		2006	DHS 2006	Total	69	-	50	41	-	27	-	-	29
		2006	DHS 2006	Urban	72	-	54	41	-	29	-	-	22
		2006	DHS 2006	Rural	68	-	48	41	-	26	-	-	31
	Mauritania	2000	DHS 2000-01	Total	56	-	-	-	-	-	-	-	-
		2000	DHS 2000-01	Urban	40	-	-	-	-	-	-	-	-
		2000	DHS 2000-01	Rural	67	-	-	-	-	-	-	-	-
		2003	DHS 2003-04	Total	56	-	1	31	-	2	-	-	-
		2003	DHS 2003-04	Urban	43	-	1	26	-	2	-	-	-
		2003	DHS 2003-04	Rural	66	-	1	35	-	2	-	-	-
	Mozambique	2003	DHS 2003 (National report)	Total	-	-	-	10	-	-	-	-	-
		2003	DHS 2003 (National report)	Urban	-	-	-	16	-	-	-	-	-
		2003	DHS 2003 (National report)	Rural	-	-	-	7	-	-	-	-	-
	Namibia	2000	DHS 2000	Total	13	-	-	7	-	-	-	-	-
		2000	DHS 2000	Urban	11	-	-	5	-	-	-	-	-
		2000	DHS 2000	Rural	15	-	-	8	-	-	-	-	-
	Niger	2000	MICS 2000	Total	-	-	-	17	-	1	-	-	-
		2000	MICS 2000	Urban	-	-	-	36	-	4	-	-	-
		2000	MICS 2000	Rural	-	-	-	14	-	1	-	-	-
		2006	CDC-MMP National Survey	Total	-	-	65	-	-	56	-	-	48
		2006	DHS 2006	Total	69	69	43	15	15	7	13	13	7
		2006	DHS 2006	Urban	76	75	37	32	32	15	30	30	15
		2006	DHS 2006	Rural	68	67	44	12	12	6	11	11	5
	Nigeria	2003	DHS 2003	Total	12	3	2	6	-	1	5	-	1
		2003	DHS 2003	Urban	5	2	1	4	-	1	3	-	0
		2003	DHS 2003	Rural	16	4	3	7	-	1	6	-	2
	Rwanda	2000	DHS 2000	Total	7	-	-	6	-	4	-	-	-
		2000	MICS 2000	Total	-	-	-	6	-	5	-	-	-

Annex 6A: Household surveys of mosquito nets ownership and usage, 2001-2007

WHO region/subregion	Country/area	Year	Source	Subgroup	% of HH with ≥ 1 any net	% of HH with ≥ 1 ever treated net	% of HH with ≥ 1 ITN	% of children <5 years who slept under any net	% of children <5 years who slept under ever treated net	% of children <5 years who slept under an ITN	% of pregnant women who slept under any net	% of pregnant women who slept under ever treated net	% of pregnant women who slept under an ITN
		2000	DHS 2000	Urban	30	-	-	27	-	21	-	-	-
		2000	MICS 2000	Urban	-	-	-	28	-	24	-	-	-
		2000	DHS 2000	Rural	3	-	-	2	-	1	-	-	-
		2000	MICS 2000	Rural	-	-	-	2	-	2	-	-	-
		2005	DHS 2005	Total	18	18	15	15	15	13	20	20	17
		2005	DHS 2005	Urban	40	40	32	32	31	25	35	35	29
		2005	DHS 2005	Rural	14	14	12	13	13	11	18	18	16
	Sao Tome and Principe	2000	MICS 2000	Total	-	-	-	43	-	23	-	-	-
		2000	MICS 2000	Urban	-	-	-	60	-	32	-	-	-
		2000	MICS 2000	Rural	-	-	-	27	-	14	-	-	-
		2006	MICS 2006	Total	49	-	36	53	-	42	-	-	-
		2006	MICS 2006	Urban	58	-	44	62	-	51	-	-	-
		2006	MICS 2006	Rural	37	-	25*	41	-	29*	-	-	-
	Senegal	2000	MICS 2000	Total	-	-	-	15	-	2*	-	-	-
		2000	MICS 2000	Urban	-	-	-	13	-	2*	-	-	-
		2000	MICS 2000	Rural	-	-	-	16	-	2	-	-	-
		2005	DHS 2005	Total	38	27	20	14	10	7	14	10	9
		2005	DHS 2005	Urban	32	25	18	14	10	7	15	11	10
		2005	DHS 2005	Rural	44	29	22	14	9	7	14	10	8
		2006	MIS 2006	Total	57	-	36	28	-	16	-	-	17
		2006	MIS 2006	Urban	47	-	34	23	-	15	-	-	12
		2006	MIS 2006	Rural	65	-	38	30	-	17	-	-	20
	Sierra Leone	2000	MICS 2000	Total	-	-	-	15	-	2	-	-	-
		2000	MICS 2000	Urban	-	-	-	13	-	4	-	-	-
		2000	MICS 2000	Rural	-	-	-	16	-	1	-	-	-
		2005	MICS 2005	Total	20	-	5	20	-	5	-	-	-
		2005	MICS 2005	Urban	15	-	5	15	-	5	-	-	-
		2005	MICS 2005	Rural	22	-	5	22	-	5	-	-	-
	Swaziland	2000	MICS 2000	Total	-	-	-	0	-	0	-	-	-
		2000	MICS 2000	Urban	-	-	-	0	-	0	-	-	-
		2000	MICS 2000	Rural	-	-	-	0	-	0	-	-	-
	Togo	2000	MICS 2000	Total	-	-	-	15	-	2	-	-	-
		2000	MICS 2000	Urban	-	-	-	19	-	4	-	-	-
		2000	MICS 2000	Rural	-	-	-	13	-	1	-	-	-
		2005	CDC-MMP National Survey	Total	-	-	63	-	-	44	-	-	-
		2006	MICS 2006	Total	46	-	40	41	-	38	-	-	-
		2006	MICS 2006	Urban	44	-	37	39	-	36	-	-	-
		2006	MICS 2006	Rural	47	-	42	42	-	40	-	-	-
	Uganda	2000	DHS 2000-01	Total	13	-	-	7	-	0	-	-	1
		2000	DHS 2000-01	Urban	33	-	-	21	-	1	-	-	0
		2000	DHS 2000-01	Rural	9	-	-	6	-	0	-	-	1
		2004	AIS 2004-05	Total	26	-	-	-	-	-	-	-	-
		2004	AIS 2004-05	Urban	60	-	-	-	-	-	-	-	-
		2004	AIS 2004-05	Rural	20	-	-	-	-	-	-	-	-
		2006	DHS 2006	Total	34	21	16	22	13	10	24	13	10
		2006	DHS 2006	Urban	61	36	26	49	29	21	49	27	23
		2006	DHS 2006	Rural	29	19	14	18	11	8	22	12	9
	United Republic of Tanzania	1999	DHS 1999	Total	30	-	1	21	-	2	-	-	-
		1999	DHS 1999	Urban	57	-	-	48	-	5	-	-	-
		1999	DHS 1999	Rural	21	-	-	13	-	1	-	-	-

Annex 6A: Household surveys of mosquito nets ownership and usage, 2001-2007

WHO region/subregion	Country/area	Year	Source	Subgroup	% of HH with ≥ 1 any net	% of HH with ≥ 1 ever treated net	% of HH with ≥ 1 ITN	% of children <5 years who slept under any net	% of children <5 years who slept under ever treated net	% of children <5 years who slept under an ITN	% of pregnant women who slept under any net	% of pregnant women who slept under ever treated net	% of pregnant women who slept under an ITN
		2004	DHS 2004-05	Total	46	29	23	31	20	16	-	20	16
		2004	DHS 2004-05	Urban	74	54	47	63	46	40	-	47	39
		2004	DHS 2004-05	Rural	36	20	14	24	13	10	-	13	10
	Zambia	1999	MICS 1999	Total	-	-	-	6	-	1	-	-	-
		1999	MICS 1999	Urban	-	-	-	9	-	2	-	-	-
		1999	MICS 1999	Rural	-	-	-	5	-	1	-	-	-
		2001	DHS 2001-02	Total	27	16	12	16	-	7	17	-	9
		2001	DHS 2001-02	Urban	35	18	14	22	-	9	23	-	11
		2001	DHS 2001-02	Rural	23	14	11	14	-	7	15	-	8
		2006	MIS 2006	Total	50	-	44	27	-	23	-	-	24
		2006	MIS 2006	Urban	51	-	45	31	-	26	-	-	18
		2006	MIS 2006	Rural	50	-	44	24	-	21	-	-	27
	Zimbabwe	1999	DHS 1999	Total	10	-	-	3	-	-	-	-	-
		2005	DHS 2005-06	Total	20	10	9	7	4	3	7	3	3
		2005	DHS 2005-06	Urban	34	14	11	16	7	5	16	7	6
		2005	DHS 2005-06	Rural	13	8	7	3	3	2	4	2	2
Americas	Colombia	2000	DHS 2000	Total	31	-	3	24	-	-	-	-	-
		2000	DHS 2000	Urban	31	-	3	23	-	-	-	-	-
		2000	DHS 2000	Rural	32	-	4	26	-	-	-	-	-
	Guatemala	1999	MICS 1999	Total	-	-	-	6	-	1	-	-	-
	Haiti	2000	DHS 2000	Total	-	-	-	-	-	-	-	-	-
		2000	DHS 2000	Urban	-	-	-	-	-	-	-	-	-
		2000	DHS 2000	Rural	-	-	-	-	-	-	-	-	-
		2005	DHS 2005	Total	6	-	-	-	-	-	-	-	-
		2005	DHS 2005	Urban	11	-	-	-	-	-	-	-	-
		2005	DHS 2005	Rural	4	-	-	-	-	-	-	-	-
	Honduras	2005	DHS 2005-06	Total	-	-	-	-	-	-	-	-	-
		2005	DHS 2005-06	Urban	-	-	-	-	-	-	-	-	-
		2005	DHS 2005-06	Rural	-	-	-	-	-	-	-	-	-
	Nicaragua	2001	DHS 2001	Total	42	-	-	-	-	-	-	-	-
		2001	DHS 2001	Urban	46	-	-	-	-	-	-	-	-
		2001	DHS 2001	Rural	37	-	-	-	-	-	-	-	-
	Suriname	2000	MICS 2000	Total	-	-	-	77	-	3	-	-	-
Eastern Mediterranean	Djibouti	2006	MICS 2006	Total	26	-	18	9	-	1	-	-	-
		2006	MICS 2006	Urban	26	-	18	9	-	1	-	-	-
		2006	MICS 2006	Rural	22	-	12	8	-	1	-	-	-
	Iraq	2000	MICS 2000	Total	-	-	-	7	-	0	-	-	-
		2000	MICS 2000	Urban	-	-	-	7	-	0	-	-	-
		2000	MICS 2000	Rural	-	-	-	8	-	0	-	-	-
	Somalia	2006	MICS 2006	Total	22	-	12	18	-	9	-	-	-
		2006	MICS 2006	Urban	27	-	16	25	-	15	-	-	-
		2006	MICS 2006	Rural	20	-	10	14	-	6	-	-	-
	Sudan	2000	MICS 2000	Total	-	-	-	23	-	0	-	-	-
		2000	MICS 2000	Urban	-	-	-	26	-	1	-	-	-
		2000	MICS 2000	Rural	-	-	-	21	-	0	-	-	-
		2006	National Household Survey	Total	-	-	18	-	-	28	-	-	-
Europe	Azerbaijan	2000	MICS 2000	Total	-	-	-	12	-	1	-	-	-
		2000	MICS 2000	Urban	-	-	-	7	-	1	-	-	-
		2000	MICS 2000	Rural	-	-	-	18	-	2	-	-	-

Annex 6A: Household surveys of mosquito nets ownership and usage, 2001-2007

WHO region/subregion	Country/area	Year	Source	Subgroup	% of HH with ≥ 1 any net	% of HH with ≥ 1 ever treated net	% of HH with ≥ 1 ITN	% of children <5 years who slept under any net	% of children <5 years who slept under ever treated net	% of children <5 years who slept under an ITN	% of pregnant women who slept under any net	% of pregnant women who slept under ever treated net	% of pregnant women who slept under an ITN
	Tajikistan	2005	MICS 2005	Total	5	-	2	2	-	1	-	-	-
		2005	MICS 2005	Urban	2	-	0	1	-	0	-	-	-
		2005	MICS 2005	Rural	6	-	3	2	-	2	-	-	-
South-East Asia	Democratic Republic of Timor-Leste	2002	MICS 2002	Total	-	-	-	48	-	8	-	-	-
		2002	MICS 2002	Urban	-	-	-	75	-	12	-	-	-
		2002	MICS 2002	Rural	-	-	-	39	-	6	-	-	-
	India	2000	MICS 2000	Total	-	-	-	-	-	-	-	-	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	-	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	-	-
		2005	DHS 2005-06	Total	36	-	-	-	-	-	-	-	-
		2005	DHS 2005-06	Urban	32	-	-	-	-	-	-	-	-
		2005	DHS 2005-06	Rural	37	-	-	-	-	-	-	-	-
	Indonesia	2000	MICS 2000	Total	-	-	-	32	-	0	-	-	-
		2000	MICS 2000	Urban	-	-	-	23	-	0	-	-	-
		2000	MICS 2000	Rural	-	-	-	38	-	0	-	-	-
		2002	DHS 2002-03	Total	-	-	-	-	-	-	-	-	-
		2002	DHS 2002-03	Urban	-	-	-	-	-	-	-	-	-
		2002	DHS 2002-03	Rural	-	-	-	-	-	-	-	-	-
Western Pacific	Cambodia	2005	DHS 2005	Total	96	10	5	88	9	4	86	9	4
		2005	DHS 2005	Urban	95	7	2	82	5	2	82	5	2
		2005	DHS 2005	Rural	96	10	5	89	10	5	87	9	5
	Lao People's Democratic Republic	2000	MICS 2000	Total	-	-	-	82	-	18	-	-	-
		2000	MICS 2000	Urban	-	-	-	97	-	11	-	-	-
		2000	MICS 2000	Rural	-	-	-	78	-	20	-	-	-
	Viet Nam	2000	MICS 2000	Total	-	-	-	96	-	16	-	-	-
		2000	MICS 2000	Urban	-	-	-	94	-	4	-	-	-
		2000	MICS 2000	Rural	-	-	-	96	-	19	-	-	-
		2005	AIS 2005	Total	97	-	12	95	-	13	-	-	15
		2005	AIS 2005	Urban	90	-	5	89	-	3	-	-	1
		2005	AIS 2005	Rural	99	-	14	96	-	15	-	-	19
		2006	MICS 2006	Total	97	-	19	94	-	5	-	-	-
		2006	MICS 2006	Urban	92	-	5	88	-	12	-	-	-
		2006	MICS 2006	Rural	99	-	23	95	-	3	-	-	-

*Data updated by DHS since the original publication.

[a]Percentages calculated using the population at risk.

AIS = AIDS Indicator Survey.

CDC-MMP = Centers for Disease Control and Prevention - Malaria Measles Partnership.

DHS = Demographic and Health Survey.

MICS = Multiple Indicator Cluster Survey.

MIS = Malaria Indicator Survey.

Annex 6B: Household surveys of antimalarial treatment, 2001-2007

WHO region	Country/area	Year	Source	Subgroup	% of children < 5 with fever who took SP/ Fansidar same or next day	% of children < 5 with fever who took chloroquine same or next day	% of children < 5 years with fever who took ACT same or next day	% of children < 5 years with fever who took any antimalarial drugs same or next day	% of children < 5 years with fever who took SP/ Fansidar	% of children < 5 years with fever who took chloroquine	% of children < 5 years with fever who took ACT	% of children < 5 years with fever who took any antimalarial drugs	% of pregnant women who took at least 2 doses SP/Fansidar
Africa	Angola	2006	MIS 2006-07	Total	-	-	-	18	0	14	2	29	3
		2006	MIS 2006-07	Urban	-	-	-	27	-	-	-	38	4
		2006	MIS 2006-07	Rural	-	-	-	12	-	-	-	23	1
	Benin	2001	DHS 2001-02	Total	-	-	-	-	1	59	-	60*	-
		2001	DHS 2001-02	Urban	-	-	-	-	-	-	-	62*	-
		2001	DHS 2001-02	Rural	-	-	-	-	-	-	-	60*	-
		2006	DHS 2006	Total	-	-	-	42	1	49	0	54	3
		2006	DHS 2006	Urban	-	-	-	48	-	-	-	57	3
		2006	DHS 2006	Rural	-	-	-	39	-	-	-	53	3
	Burkina Faso	2003	DHS 2003	Total	0	44	-	45	0	48	-	50	-
		2003	DHS 2003	Urban	1	50	-	56	1	52	-	60	-
		2003	DHS 2003	Rural	0	43	-	44	0	47	-	48	-
		2006	MICS 2006	Total	-	-	-	41	0	46	-	48	1
		2006	MICS 2006	Urban	-	-	-	61	-	-	-	70	2
		2006	MICS 2006	Rural	-	-	-	36	-	-	-	42	1
	Burundi	2000	MICS 2000	Total	-	-	-	-	2	23	-	31	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	42	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	31	-
		2005	MICS 2005	Total	-	-	-	19	2	2	3	30	-
		2005	MICS 2005	Urban	-	-	-	22	-	-	-	28	-
		2005	MICS 2005	Rural	-	-	-	19	-	-	-	30	-
	Cameroon	2000	MICS 2000	Total	-	-	-	-	1	48	-	66	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	71	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	64	-
		2004	DHS 2004	Total	1	14	-	40	1	20	-	66	-
		2004	DHS 2004	Urban	1	13	-	46	1	17	-	72	-
		2004	DHS 2004	Rural	1	15	-	34	1	22	-	61	-
		2006	MICS 2006	Total	-	-	-	38	2	8	2	58	6
		2006	MICS 2006	Urban	-	-	-	53	-	-	-	69	8
		2006	MICS 2006	Rural	-	-	-	29	-	-	-	50	4
	Central African Republic	2000	MICS 2000	Total	-	-	-	-	0	66	-	69	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	76	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	65	-
		2006	MICS 2006	Total	-	-	-	42	4	29	3	57	9
		2006	MICS 2006	Urban	-	-	-	48	-	-	-	68	15
		2006	MICS 2006	Rural	-	-	-	36	-	-	-	47	5
	Chad	2000	MICS 2000	Total	-	-	-	-	1	31	-	32	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	41	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	30	-
		2004	DHS 2004	Total	-	-	-	-	-	-	-	-	-
		2004	DHS 2004	Urban	-	-	-	-	-	-	-	-	-
		2004	DHS 2004	Rural	-	-	-	-	-	-	-	-	-
	Comoros	2000	MICS 2000	Total	-	-	-	-	4	62	-	63	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	65	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	62	-
	Congo	2005	DHS 2005	Total	1	20	4	22	1	24	7	48	-
		2005	DHS 2005	Urban	1	12	3	20	1	19	10	42	-
		2005	DHS 2005	Rural	0	17	1	23	1	28	4	52	-
	Côte d'Ivoire	2000	MICS 2000	Total	-	-	-	-	3	56	-	58	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	69	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	50	-

Annex 6B: Household surveys of antimalarial treatment, 2001-2007

WHO region	Country/area	Year	Source	Subgroup	% of children < 5 with fever who took SP/ Fansidar same or next day	% of children < 5 with fever who took chloroquine same or next day	% of children < 5 years with fever who took ACT same or next day	% of children < 5 years with fever who took any antimalarial drugs same or next day	% of children < 5 years with fever who took SP/ Fansidar	% of children < 5 years with fever who took chloroquine	% of children < 5 years with fever who took ACT	% of children < 5 years with fever who took any antimalarial drugs	% of pregnant women who took at least 2 doses SP/Fansidar
		2005	AIS 2005	Total	-	-	-	-	-	-	-	-	-
		2005	AIS 2005	Urban	-	-	-	-	-	-	-	-	-
		2005	AIS 2005	Rural	-	-	-	-	-	-	-	-	-
		2006	MICS 2006	Total	-	-	-	26	2	31	3	36*	8
		2006	MICS 2006	Urban	-	-	-	32	-	-	-	45	10
		2006	MICS 2006	Rural	-	-	-	23	-	-	-	32	7
	Democratic Republic of the Congo	2001	MICS 2001	Total	-	-	-	-	1	45	-	52	-
		2001	MICS 2001	Urban	-	-	-	-	-	-	-	63	-
		2001	MICS 2001	Rural	-	-	-	-	-	-	-	47	-
	Equatorial Guinea	2000	MICS 2000	Total	-	-	-	-	-	41	-	49	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	55	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	43	-
	Eritrea	2002	DHS 2002	Total	-	-	-	2	1	2	-	4	-
		2002	DHS 2002	Urban	-	-	-	2	-	-	-	4	-
		2002	DHS 2002	Rural	-	-	-	2	-	-	-	4	-
	Ethiopia	2000	DHS 2000	Total	-	-	-	-	1	2	-	3	-
		2000	DHS 2000	Urban	-	-	-	-	-	-	-	-	-
		2000	DHS 2000	Rural	-	-	-	-	-	-	-	-	-
		2005	DHS 2005	Total	0	0	-	1	1	1	-	3	-
		2005	DHS 2005	Urban	0	1	-	2	1	3	-	4	-
		2005	DHS 2005	Rural	-	-	-	1*	-	-	-	3*	-
		2007	MIS 2007	Total	-	-	-	4*	-	-	-	10*	-
		2007	MIS 2007	Urban	-	-	-	4*	-	-	-	13*	-
		2007	MIS 2007	Rural	-	-	-	4	-	-	-	9	-
		2007	MIS 2007[a]	Total	-	-	-	5	-	-	-	12	-
	Gabon	2000	DHS 2000	Total	-	-	-	-	-	39	-	-	-
	Gambia	2000	MICS 2000	Total	-	-	-	-	3	55	-	55	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	58	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	54	-
		2006	MICS 2006	Total	-	-	-	52	13*	58*	0	63	33
		2006	MICS 2006	Urban	-	-	-	54	-	-	-	59	31
		2006	MICS 2006	Rural	-	-	-	52	-	-	-	65	34
	Ghana	2003	DHS 2003	Total	-	-	-	44	0	59	-	63	1
		2003	DHS 2003	Urban	-	-	-	49	-	-	-	65	1
		2003	DHS 2003	Rural	-	-	-	41	-	-	-	61	1
		2006	MICS 2006	Total	-	-	-	48	1	42	4	61*	27
		2006	MICS 2006	Urban	-	-	-	58	-	-	-	69	35
		2006	MICS 2006	Rural	-	-	-	44	-	-	-	57	24
	Guinea	2005	DHS 2005	Total	0	20	-	31	1	27	0	44	3
		2005	DHS 2005	Urban	0	26	-	40	1	33	61	52	8
		2005	DHS 2005	Rural	0	19	-	28	1	26	35	42	1
	Guinea-Bissau	2000	MICS 2000	Total	-	-	-	-	3	58	-	58	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	72	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	52	-
		2006	MICS 2006	Total	-	-	-	27	2	41	-	46	7
		2006	MICS 2006	Urban	-	-	-	47	-	-	-	60	9
		2006	MICS 2006	Rural	-	-	-	18	-	-	-	39	7
	Kenya	2000	MICS 2000	Total	-	-	-	-	26	44	-	65	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	64	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	65	-
		2003	DHS 2003	Total	6	-	-	11	11	3	-	27	4

Annex 6B: Household surveys of antimalarial treatment, 2001-2007

WHO region	Country/area	Year	Source	Subgroup	% of children < 5 with fever who took SP/ Fansidar same or next day	% of children < 5 with fever who took chloroquine same or next day	% of children < 5 years with fever who took ACT same or next day	% of children < 5 years with fever who took any antimalarial drugs same or next day	% of children < 5 years with fever who took SP/ Fansidar	% of children < 5 years with fever who took chloroquine	% of children < 5 years with fever who took ACT	% of children < 5 years with fever who took any antimalarial drugs	% of pregnant women who took at least 2 doses SP/Fansidar
		2003	DHS 2003	Urban	5	-	-	8	7	3	-	22	4
		2003	DHS 2003	Rural	7	-	-	12	12	4	-	28	4
	Liberia	2005	MIS 2005	Total	-	-	-	-	-	-	-	-	-
	Madagascar	2000	MICS 2000	Total	-	-	-	-	1	30	-	61	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	62	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	61	-
		2003	DHS 2003-04	Total	-	-	-	-	1	33	-	34	-
		2003	DHS 2003-04	Urban	-	-	-	-	-	-	-	36	-
		2003	DHS 2003-04	Rural	-	-	-	-	-	-	-	34	-
	Malawi	2000	DHS 2000	Total	-	-	-	-	23	1	-	27	-
		2000	DHS 2000	Urban	-	-	-	-	-	-	-	34	-
		2000	DHS 2000	Rural	-	-	-	-	-	-	-	26	-
		2004	DHS 2004	Total	-	-	-	23	23	1	-	28	43
		2004	DHS 2004	Urban	-	-	-	37	8	1	-	42	51
		2004	DHS 2004	Rural	-	-	-	21	7	0	-	27	42
		2006	MICS 2006	Total	-	-	-	20	20	1	0	24	45
		2006	MICS 2006	Urban	-	-	-	24	-	-	-	30	52
		2006	MICS 2006	Rural	-	-	-	20	-	-	-	23	44
	Mali	2001	DHS 2001	Total	-	-	-	-	-	38	-	-	-
		2001	DHS 2001	Urban	-	-	-	-	-	-	-	-	-
		2001	DHS 2001	Rural	-	-	-	-	-	-	-	-	-
		2006	DHS 2006	Total	-	-	-	15	2	22	-	32	4
		2006	DHS 2006	Urban	-	-	-	16	-	-	-	35	10
		2006	DHS 2006	Rural	-	-	-	14	-	-	-	31	2
	Mauritania	2000	DHS 2000-01	Total	-	-	-	-	-	-	-	-	-
		2000	DHS 2000-01	Urban	-	-	-	-	-	-	-	-	-
		2000	DHS 2000-01	Rural	-	-	-	-	-	-	-	-	-
		2003	DHS 2003-04	Total	-	-	-	12	1	28	-	33	-
		2003	DHS 2003-04	Urban	-	-	-	9	-	-	-	27	-
		2003	DHS 2003-04	Rural	-	-	-	13	-	-	-	38	-
	Mozambique	2003	DHS 2003 (National report)	Total	-	-	-	8	11	15	-	15	-
		2003	DHS 2003 (National report)	Urban	-	-	-	6	-	-	-	13	-
		2003	DHS 2003 (National report)	Rural	-	-	-	9	-	-	-	16	-
	Namibia	2000	DHS 2000	Total	-	-	-	-	-	14	-	14	-
		2000	DHS 2000	Urban	-	-	-	-	-	-	-	6	-
		2000	DHS 2000	Rural	-	-	-	-	-	-	-	19	-
	Niger	2000	MICS 2000	Total	-	-	-	-	0	48	-	48	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	59	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	47	-
		2006	CDC-MMP National Survey	Total	-	-	-	-	-	-	-	-	-
		2006	DHS 2006	Total	0	22	-	25	1	29	-	33	0
		2006	DHS 2006	Urban	2	29	-	34	2	38	-	45	1
		2006	DHS 2006	Rural	0	20	-	23	0	27	-	31	0
	Nigeria	2003	DHS 2003	Total	0	24	-	25	0	33	-	34	1
		2003	DHS 2003	Urban	0	30	-	31	1	38	-	39	-
		2003	DHS 2003	Rural	0	22	-	23	0	31	-	32	-
	Rwanda	2000	DHS 2000	Total	-	-	-	-	1	5	-	9	-
		2000	DHS 2000	Urban	-	-	-	-	-	-	-	12	-
		2000	DHS 2000	Rural	-	-	-	-	-	-	-	9	-
		2000	MICS 2000	Total	-	-	-	-	2	7	-	13	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	21	-

Annex 6B: Household surveys of antimalarial treatment, 2001-2007

WHO region	Country/area	Year	Source	Subgroup	% of children < 5 with fever who took SP/ Fansidar same or next day	% of children < 5 with fever who took chloroquine same or next day	% of children < 5 years with fever who took ACT same or next day	% of children < 5 years with fever who took any antimalarial drugs same or next day	% of children < 5 years with fever who took SP/ Fansidar	% of children < 5 years with fever who took chloroquine	% of children < 5 years with fever who took ACT	% of children < 5 years with fever who took any antimalarial drugs	% of pregnant women who took at least 2 doses SP/Fansidar
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	12	-
		2005	DHS 2005	Total	2	-	-	7	4	-	-	12	0
		2005	DHS 2005	Urban	1	-	-	7	2	-	-	11	1
		2005	DHS 2005	Rural	2	-	-	7	4	-	-	13	0
	Sao Tome and Principe	2000	MICS 2000	Total	-	-	-	-	1	61	-	61	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	62	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	61	-
		2006	MICS 2006	Total	-	-	-	17	1	2	6	25	-
		2006	MICS 2006	Urban	-	-	-	17	-	-	-	22	-
		2006	MICS 2006	Rural	-	-	-	16*	-	-	-	28*	-
	Senegal	2000	MICS 2000	Total	-	-	-	-	1	36	-	36*	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	53*	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	30	-
		2005	DHS 2005	Total	1	8	-	12	1	17	-	27	9
		2005	DHS 2005	Urban	1	11	-	16	2	23	-	34	11
		2005	DHS 2005	Rural	0	7	-	10	0	13	-	22	8
		2006	MIS 2006	Total	-	-	-	11	0	7	-	22	49
		2006	MIS 2006	Urban	-	-	-	12	-	-	-	19	55
		2006	MIS 2006	Rural	-	-	-	10	-	-	-	24	46
	Sierra Leone	2000	MICS 2000	Total	-	-	-	-	4	60	-	61	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	61	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	61	-
		2005	MICS 2005	Total	-	-	-	45	1	46	1	52	2
		2005	MICS 2005	Urban	-	-	-	49	-	-	-	58	5
		2005	MICS 2005	Rural	-	-	-	44	-	-	-	50	1
	Swaziland	2000	MICS 2000	Total	-	-	-	-	6	23	-	26	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	28	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	27	-
	Togo	2000	MICS 2000	Total	-	-	-	-	3	59	-	60	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	62	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	59	-
		2005	CDC-MMP National Survey	Total	-	-	-	-	-	-	-	-	-
		2006	MICS 2006	Total	-	-	-	38	3	32	1	48	18
		2006	MICS 2006	Urban	-	-	-	49	-	-	-	57	18
		2006	MICS 2006	Rural	-	-	-	32	-	-	-	43	18
	Uganda	2000	DHS 2000-01	Total	-	-	-	-	-	-	-	-	-
		2000	DHS 2000-01	Urban	-	-	-	-	-	-	-	-	-
		2000	DHS 2000-01	Rural	-	-	-	-	-	-	-	-	-
		2004	AIS 2004-05	Total	-	-	-	-	-	-	-	-	-
		2004	AIS 2004-05	Urban	-	-	-	-	-	-	-	-	-
		2004	AIS 2004-05	Rural	-	-	-	-	-	-	-	-	-
		2006	DHS 2006	Total	10	20	1	29	19	41	3	61	16
		2006	DHS 2006	Urban	2	10	0	27	6	24	4	58	17
		2006	DHS 2006	Rural	3	13	1	29	6	28	3	62	16
	United Republic of Tanzania	1999	DHS 1999	Total	-	-	-	-	-	-	-	53	-
		1999	DHS 1999	Urban	-	-	-	-	-	-	-	62	-
		1999	DHS 1999	Rural	-	-	-	-	-	-	-	52	-
		2004	DHS 2004-05	Total	21	2	5	51	24	2	2	58	22
		2004	DHS 2004-05	Urban	22	2	2	57	-	-	-	65	29
		2004	DHS 2004-05	Rural	21	2	5	50	-	-	-	57	20

Annex 6B: Household surveys of antimalarial treatment, 2001-2007

WHO region	Country/area	Year	Source	Subgroup	% of children < 5 with fever who took SP/ Fansidar same or next day	% of children < 5 with fever who took chloroquine same or next day	% of children < 5 years with fever who took ACT same or next day	% of children < 5 years with fever who took any antimalarial drugs same or next day	% of children < 5 years with fever who took SP/ Fansidar	% of children < 5 years with fever who took chloroquine	% of children < 5 years with fever who took ACT	% of children < 5 years with fever who took any antimalarial drugs	% of pregnant women who took at least 2 doses SP/Fansidar
	Zambia	1999	MICS 1999	Total	-	-	-	-	2	56	-	58	-
		1999	MICS 1999	Urban	-	-	-	-	-	-	-	58	-
		1999	MICS 1999	Rural	-	-	-	-	-	-	-	58	-
		2001	DHS 2001-02	Total	1	36	-	37	2	50	-	52	-
		2001	DHS 2001-02	Urban	2	33	-	36	5	46	-	49	-
		2001	DHS 2001-02	Rural	1	36	-	37	2	51	-	53	-
		2006	MIS 2006	Total	-	-	-	37	33	-	13	58	61
		2006	MIS 2006	Urban	-	-	-	49	-	-	-	74	71
		2006	MIS 2006	Rural	-	-	-	35	-	-	-	55	56
	Zimbabwe	1999	DHS 1999	Total	-	-	-	-	-	-	-	-	-
		2005	DHS 2005-06	Total	1	3	-	3	1	4	-	5	6
		2005	DHS 2005-06	Urban	0	1	-	1	0	1	-	1	3
		2005	DHS 2005-06	Rural	1	4	-	5	1	5	-	6	8
Americas	Colombia	2000	DHS 2000	Total	-	-	-	-	-	-	-	-	-
		2000	DHS 2000	Urban	-	-	-	-	-	-	-	-	-
		2000	DHS 2000	Rural	-	-	-	-	-	-	-	-	-
	Guatemala	1999	MICS 1999	Total	-	-	-	-	-	-	-	-	-
	Haiti	2000	DHS 2000	Total	-	-	-	-	-	12	-	12	-
		2000	DHS 2000	Urban	-	-	-	-	-	-	-	7	-
		2000	DHS 2000	Rural	-	-	-	-	-	-	-	13	-
		2005	DHS 2005	Total	-	-	-	-	-	4	-	5	-
		2005	DHS 2005	Urban	-	-	-	-	-	4	-	7	-
		2005	DHS 2005	Rural	-	-	-	-	-	4	-	4	-
	Honduras	2005	DHS 2005-06	Total	-	-	-	-	-	-	-	1	-
		2005	DHS 2005-06	Urban	-	-	-	-	-	-	-	1	-
		2005	DHS 2005-06	Rural	-	-	-	-	-	-	-	0	-
	Nicaragua	2001	DHS 2001	Total	-	-	-	-	0	2	-	2	-
		2001	DHS 2001	Urban	-	-	-	-	-	-	-	1	-
		2001	DHS 2001	Rural	-	-	-	-	-	-	-	3	-
	Suriname	2000	MICS 2000	Total	-	-	-	-	-	-	-	-	-
Eastern Mediterranean	Djibouti	2006	MICS 2006	Total	-	-	-	3	4	5	0	10	-
		2006	MICS 2006	Urban	-	-	-	3	-	-	-	10	-
		2006	MICS 2006	Rural	-	-	-	0	-	-	-	0	-
	Iraq	2000	MICS 2000	Total	-	-	-	-	0	1	-	1	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	1	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	2	-
	Somalia	2006	MICS 2006	Total	-	-	-	3	2	6	1	8	1
		2006	MICS 2006	Urban	-	-	-	7	-	-	-	14	1
		2006	MICS 2006	Rural	-	-	-	1	-	-	-	6	1
	Sudan	2000	MICS 2000	Total	-	-	-	-	1	49	-	50	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	61	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	42	-
		2006	National Household Survey	Total	-	-	-	-	-	-	-	-	-
Europe	Azerbaijan	2000	MICS 2000	Total	-	-	-	-	-	0	-	1	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	1	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	1	-
	Tajikistan	2005	MICS 2005	Total	-	-	-	1	0	0	0	2	-
		2005	MICS 2005	Urban	-	-	-	0	-	-	-	1	-
		2005	MICS 2005	Rural	-	-	-	2	-	-	-	2	-

Annex 6B: Household surveys of antimalarial treatment, 2001-2007

WHO region	Country/area	Year	Source	Subgroup	% of children < 5 with fever who took SP/ Fansidar same or next day	% of children < 5 with fever who took chloroquine same or next day	% of children < 5 years with fever who took ACT same or next day	% of children < 5 years with fever who took any antimalarial drugs same or next day	% of children < 5 years with fever who took SP/ Fansidar	% of children < 5 years with fever who took chloroquine	% of children < 5 years with fever who took ACT	% of children < 5 years with fever who took any antimalarial drugs	% of pregnant women who took at least 2 doses SP/Fansidar
South-East Asia	Democratic Republic of Timor-Leste	2002	MICS 2002	Total	-	-	-	-	12	43	-	47	-
		2002	MICS 2002	Urban	-	-	-	-	-	-	-	56	-
		2002	MICS 2002	Rural	-	-	-	-	-	-	-	45	-
	India	2000	MICS 2000	Total	-	-	-	-	-	-	-	12	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	14	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	10	-
		2005	DHS 2005-06	Total	-	-	-	-	-	-	-	-	-
		2005	DHS 2005-06	Urban	-	-	-	-	-	-	-	-	-
		2005	DHS 2005-06	Rural	-	-	-	-	-	-	-	-	-
	Indonesia	2000	MICS 2000	Total	-	-	-	-	0	3	-	4	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	6	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	4	-
		2002	DHS 2002-03	Total	-	-	-	-	0	1	-	1	-
		2002	DHS 2002-03	Urban	-	-	-	-	-	-	-	1	-
		2002	DHS 2002-03	Rural	-	-	-	-	-	-	-	1	-
Western Pacific	Cambodia	2005	DHS 2005	Total	-	-	-	-	-	0	-	0	-
		2005	DHS 2005	Urban	-	-	-	-	-	0	-	1	-
		2005	DHS 2005	Rural	-	-	-	-	-	0	-	0	-
	Lao People's Democratic Republic	2000	MICS 2000	Total	-	-	-	-	0	9	-	9	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	2	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	11	-
	Viet Nam	2000	MICS 2000	Total	-	-	-	-	1	4	-	7	-
		2000	MICS 2000	Urban	-	-	-	-	-	-	-	10	-
		2000	MICS 2000	Rural	-	-	-	-	-	-	-	6	-
		2005	AIS 2005	Total	-	-	-	-	-	-	-	-	-
		2005	AIS 2005	Urban	-	-	-	-	-	-	-	-	-
		2005	AIS 2005	Rural	-	-	-	-	-	-	-	-	-
		2006	MICS 2006	Total	-	-	-	2	2	0	0	3	-
		2006	MICS 2006	Urban	-	-	-	2	-	-	-	2	-
		2006	MICS 2006	Rural	-	-	-	2	-	-	-	3	-

*Data updated by DHS since the original publication.

[a]Percentages calculated using the population at risk.

AIS = AIDS Indicator Survey.

CDC-MMP = Centers for Disease Control and Prevention - Malaria Measles Partnership.

DHS = Demographic and Health Survey.

MICS = Multiple Indicator Cluster Survey.

MIS = Malaria Indicator Survey.

ANNEX 7

Funding for malaria control, 2004–2007

Annex 7: Funding for malaria control, 2004-2007

			Contributions reported by donors (US$)			Contributions reported by countries (US$)						
WHO region	Country/area	Year	Global Fund[a]	PMI[b]	The World Bank[c]	Government	Global Fund	The World Bank	Bilaterals	UN agencies	European Union	Other
Africa	Angola	2004	-	1 000 000	-	-	-	-	-	-	-	-
		2005	19 510 833	1 300 000	-	-	-	-	2 100 000	1 062 266	-	18 607 895
		2006	3 203 423	7 500 000	-	-	-	330 000	9 000 000	1 540 225	-	4 554 259
		2007	8 559 054	-	-	-	-	-	-	-	-	-
	Benin	2004	1 725 397	2 000 000	-	1 800 000	2 400 000	-	-	1 100 000	-	2 000 000
		2005	1 094 616	2 000 000	-	1 250 000	-	-	-	1 100 000	-	-
		2006	387 527	1 774 000	31 000 000	-	-	31 000 000	-	1 100 000	-	5 328 000
		2007	361 858	-	-	-	-	-	-	-	-	-
	Botswana	2004	-	-	-	356 525	-	-	-	-	-	-
		2005	-	-	-	391 131	-	-	-	-	-	-
	Burkina Faso	2004	2 298 000	-	-	197 387	2 925 513	-	200 000	1 153 484	-	207 561
		2005	4 193 558	-	-	200 000	4 193 558	-	215 247	457 411	-	359 861
		2006	-	-	12 000 000	1 119 648	-	12 000 000	200 000	747 985	-	325 000
		2007	-	-	-	1 058 476	-	-	-	117 037	-	-
	Burundi	2004	4 631 017	500 000	-	12 499 046	7 447 706	342 200	61 250	1 951 729	-	-
		2005	6 260 398	500 000	-	15 832 380	6 344 420	250 000	61 250	675 000	300 000	70 000
		2006	3 638 269	-	-	19 165 713	3 973 999	-	61 250	1 815 974	-	170 000
		2007	2 881 171	-	-	-	-	-	-	-	-	-
	Cameroon	2004	1 886 215	-	-	7 147 000	-	-	-	195 000	-	-
		2005	5 155 782	-	-	7 504 000	12 416 102	-	-	195 000	-	-
		2006	8 606 164	-	-	7 880 000	4 472 742	-	-	280 000	-	-
		2007	5 122 854	-	-	-	-	-	-	-	-	-
	Central African Republic	2004	-	-	-	90 000	-	-	-	117 000	90 000	-
		2005	1 872 782	-	-	100 000	6 329 201	-	-	118 000	90 000	-
		2006	4 217 076	-	-	100 000	4 263 622	-	-	125 000	100 000	-
		2007	4 287 672	-	-	-	-	-	-	-	-	-
	Chad	2004	-	-	-	40 000	-	-	487 626	634 000	-	-
		2005	-	-	-	40 000	-	-	794 348	1 921 000	-	-
		2006	-	-	-	40 000	-	-	808 109	604 000	-	-
	Comoros	2004	599 483	-	-	-	-	-	-	1 534 631	-	-
		2005	455 769	-	-	80 000	-	-	-	96 000	-	-
		2006	479 379	-	-	80 000	-	-	-	-	-	-
		2007	390 246	-	-	-	-	-	-	-	-	-
	Côte d'Ivoire	2004	-	-	-	2 341 786	-	-	60 642	1 460 519	-	-
		2005	-	-	-	-	-	-	60 642	2 409 826	-	-
		2006	-	-	-	2 427 239	-	-	738 245	3 016 659	-	-
		2007	4 325 690	-	-	-	-	-	-	-	-	-
	Democratic Republic of the Congo	2004	1 441 186	2 900 000	-	-	-	-	-	-	-	-
		2005	18 579 231	2 050 000	30 000 000	-	-	-	-	-	-	-
		2006	6 471 520	-	-	-	-	-	-	-	-	-
		2007	5 184 339	-	13 000 000	-	-	-	-	-	-	-
	Equatorial Guinea	2006	3 483 905	-	-	-	-	-	-	-	-	-
		2007	1 799 583	-	-	-	-	-	-	-	-	-
	Eritrea	2004	756 152	600 000	-	-	1 080 209	1 006 250	-	1 455 171	-	92 030
		2005	1 537 418	474 366	2 000 000	-	1 537 424	880 620	-	491 000	-	272 500
		2006	1 140 635	-	-	-	1 716 844	453 400	-	408 613	-	180 000
		2007	3 137 002	-	-	-	-	-	-	-	-	-
	Ethiopia	2004	-	2 000 000	-	-	21 757 639	11 120	1 624 311	1 602 052	-	8 444
		2005	20 023 422	2 000 000	-	-	-	695 037	685 738	620 894	-	630 703
		2006	70 074 800	2 563 000	21 500 000	-	71 421 627	15 128 000	-	14 128 937	-	14 639 958
		2007	17 480 252	-	12 200 000	-	58 609 473	14 699 888	-	5 593 555	-	21 442 875

Annex 7: Funding for malaria control, 2004-2007

			Contributions reported by donors (US$)			Contributions reported by countries (US$)						
WHO region	Country/area	Year	Global Fund[a]	PMI[b]	The World Bank[c]	Government	Global Fund	The World Bank	Bilaterals	UN agencies	European Union	Other
	Gabon	2004	1 224 253	-	-	-	-	-	-	-	-	-
		2005	3 091 210	-	-	-	-	-	-	-	-	-
		2006	4 059 253	-	-	-	-	-	-	-	-	-
		2007	3 063 767	-	-	-	-	-	-	-	-	-
	Gambia	2004	1 456 473	-	-	135 570	1 456 473	-	-	710 000	-	554 600
		2005	3 772 423	-	-	145 900	3 772 423	-	-	400 000	-	200 000
		2006	2 521 319	-	-	459 014	2 521 319	-	-	400 000	-	200 000
		2007	6 803 737	-	-	-	-	-	-	-	-	-
	Ghana	2004	2 034 960	1 000 000	-	-	-	-	-	-	-	-
		2005	15 370 497	1 300 000	-	-	-	-	-	-	-	-
		2006	5 177 461	1 478 000	-	24 830 000	21 762 030	-	12 530 000	4 000	70 000	-
		2007	13 723 225	-	10 000 000	-	15 527 108	5 000 000	17 000 000	22 840	-	13 233
	Guinea	2004	1 220 983	-	-	-	885 349	-	-	232 462	-	8 164
		2005	3 406 208	300 000	-	-	-	-	-	54 397	-	34 686
		2006	-2 225 574	-	8 100 000	-	-	-	-	-	-	-
		2007	2 833 474	-	-	-	-	-	-	-	-	-
	Guinea-Bissau	2004	192 906	-	-	-	-	-	-	-	-	-
		2005	1 076 489	-	-	-	-	-	-	-	-	-
		2006	200 000	-	-	-	-	-	-	-	-	-
		2007	677 067	-	-	-	-	-	-	-	-	-
	Kenya	2004	3 699 906	1 200 000	-	1 233 505	-	-	5 563 684	830 802	-	-
		2005	-	1 200 000	-	379 494	53 698 910	-	14 525 404	672 911	-	441 400
		2006	52 188 969	5 470 000	-	308 660	39 858 515	-	6 236 657	30 000	-	119 971
		2007	4 949 799	-	6 000 000	-	-	-	-	-	-	-
	Liberia	2004	2 797 574	300 000	-	-	-	-	-	-	-	-
		2005	3 387 041	450 000	-	27 216	5 024 741	-	-	-	-	-
		2006	5 956 306	-	-	44 569	5 098 262	-	-	-	-	-
	Madagascar	2004	3 781 455	2 000 000	-	-	6 744 844	-	-	-	-	-
		2005	17 576 016	2 300 000	-	-	31 927 971	-	-	-	-	-
		2006	5 834 491	2 169 000	-	-	12 786 722	90 000	475 000	12 751 000	-	29 190 207
		2007	20 964 506	-	-	-	-	-	-	-	-	-
	Malawi	2004	-	1 500 000	-	-	-	-	-	-	-	-
		2005	-	2 125 000	-	-	-	-	-	-	-	-
		2006	6 363 507	2 045 000	5 000 000	12 000 000	6 300 000	3 000 000	-	2 700 000	-	-
		2007	11 594 207	-	-	-	-	-	-	-	-	-
	Mali	2004	266 500	1 800 000	-	-	-	-	-	-	-	-
		2005	746 721	2 425 000	-	-	-	-	-	-	-	-
		2006	802 828	2 490 000	11 300 000	-	-	-	-	-	-	-
		2007	4 216 975	-	-	-	-	-	-	-	-	-
	Mauritania	2004	432 745	-	-	-	-	-	-	-	-	-
		2005	248 254	-	-	-	-	-	-	-	-	-
		2006	600 105	-	11 300 000	-	14	-	-	-	-	-
		2007	1 346 380	-	-	-	-	-	-	-	-	-
	Mozambique	2004	6 653 718	1 500 000	-	-	-	-	-	-	-	-
		2005	-	2 100 000	-	-	-	-	-	-	-	-
		2006	5 380 306	6 259 000	-	-	-	-	-	-	-	-
		2007	12 432 871	-	-	-	-	-	-	-	-	-
	Namibia	2004	349 654	-	-	-	-	-	-	100 000	-	-
		2005	1 370 770	-	-	-	1 323 641	-	-	-	-	-
		2006	1 930 312	-	-	-	1 135 789	-	-	-	-	-

Annex 7: Funding for malaria control, 2004-2007

			Contributions reported by donors (US$)			Contributions reported by countries (US$)						
WHO region	Country/area	Year	Global Fund[a]	PMI[b]	The World Bank[c]	Government	Global Fund	The World Bank	Bilaterals	UN agencies	European Union	Other
	Namibia	2007	6 789 375	-	-	-	-	-	-	-	-	-
	Niger	2004	2 882 940	-	-	444 231	11 257 988	-	-	313 775	-	210 852
		2005	10 216 624	-	-	342 346	-	-	-	-	-	-
		2006	4 914 290	-	10 000 000	-	-	-	-	-	-	-
		2007	2 608 119	-	-	-	-	-	-	-	-	-
	Nigeria	2004	8 851 119	2 400 000	-	390 625	-	-	-	-	-	-
		2005	5 784 648	2 900 000	-	1 953 125	15 000 000	-	-	-	-	-
		2006	13 107 787	2 661 000	180 000 000	10 000 000	16 000 000	2 000 000	-	8	-	-
		2007	28 022 180	-	-	11 000 000	20 000 000	28 700 000	-	-	-	-
	Rwanda	2004	7 428 843	1 000 000	-	-	-	-	-	-	-	-
		2005	4 395 064	1 000 000	-	-	-	-	-	-	-	-
		2006	32 601 503	1 479 000	-	-	-	-	-	-	-	-
		2007	1 391 593	-	-	-	-	-	-	-	-	-
	Sao Tome and Principe	2004	-	-	-	401 191	-	-	1 000 000	55 891	-	306 988
		2005	1 051 345	-	-	39 485	1 279 913	-	1 000 000	15 758	-	23 693
		2006	834 299	-	-	46 831	1 532 972	66 000	1 000 000	36 450	-	40 000
		2007	394 662	-	-	-	-	-	-	-	-	-
	Senegal	2004	1 026 770	2 500 000	-	2 705 267	2 857 143	-	-	221 900	-	4 949 358
		2005	10 634 063	2 500 000	-	2 705 267	10 634 063	-	-	426 718	-	3 997 426
		2006	8 958 051	2 168 000	16 600 000	2 705 267	8 958 051	-	-	139 532	-	3 403 767
		2007	1 063 231	-	-	-	1 067 834	-	-	257 078	-	-
	Sierra Leone	2005	2 043 498	-	-	158 667	6 784 566	191 833	-	-	-	-
		2006	3 985 298	-	-	174 533	3 155 047	-	-	-	1 047 500	-
		2007	927 301	-	-	-	-	-	-	-	-	-
	Swaziland	2005	231 500	-	-	-	-	-	-	-	-	-
		2006	393 800	-	-	-	-	-	-	-	-	-
		2007	129 215	-	-	-	-	-	-	-	-	-
	Togo	2004	2 146 271	-	-	-	1 007 724	-	56 578	191 088	-	4 026 967
		2005	4 356 862	-	-	-	1 102 231	-	-	55 006	-	89 397
		2006	633 065	-	-	57 906	3 110 435	-	151 956	19 248	-	-
		2007	5 159 581	-	-	-	-	-	-	-	-	-
	Uganda	2004	9 749 358	3 000 000	-	-	-	-	-	-	-	-
		2005	31 149 704	3 000 000	-	91 084 448	40 899 062	-	-	2 000 000	-	9 500 000
		2006	27 715 494	9 500 000	-	131 823 468	47 854 144	-	-	7 000 000	-	19 000 000
		2007	5 175 831	-	-	-	-	-	-	-	-	-
	United Republic of Tanzania	2004	8 484 970	1 300 000	-	-	-	-	1 800 000	-	-	-
		2005	21 802 333	1 700 000	-	-	-	-	-	-	-	-
		2006	23 601 011	11 500 000	-	-	-	-	-	-	-	-
		2007	23 373 562	-	25 000 000	-	-	-	-	-	-	-
	Zambia	2004	11 899 516	4 000 000	-	588 571	-	-	-	-	-	-
		2005	10 145 802	4 000 000	20 000 000	1 160 000	-	-	-	-	-	-
		2006	5 483 132	7 659 000	-	-	-	-	-	-	-	-
		2007	14 170 170	-	-	460 380	1 400 000	11 000 000	-	450 000	-	5 000 000
	Zimbabwe	2004	-	-	-	-	1 415 000	-	-	-	-	-
		2005	3 861 938	-	-	-	3 861 937	-	-	-	-	-
		2006	724 675	-	-	-	1 439 313	-	-	-	-	-
		2007	9 047 742	-	-	-	-	-	-	-	-	-
Americas	Argentina	2004	-	-	-	2 580 180	-	-	-	-	-	-
		2005	-	-	-	2 580 180	-	-	-	-	-	-
		2006	-	-	-	2 287 066	-	-	-	-	-	-
	Belize	2004	-	-	-	100 000	-	-	-	-	-	-

Annex 7: Funding for malaria control, 2004-2007

			Contributions reported by donors (US$)			Contributions reported by countries (US$)						
WHO region	Country/area	Year	Global Fund[a]	PMI[b]	The World Bank[c]	Government	Global Fund	The World Bank	Bilaterals	UN agencies	European Union	Other
	Belize	2005	-	-	-	100 000	-	-	-	-	-	-
	Bolivia	2004	780 367	600 000	-	1 212 074	1 212 074	-	200 000	-	-	-
		2005	1 630 869	750 000	-	853 312	1 170 737	-	200 000	20 000	-	-
		2006	2 369 685	-	-	812 500	1 817 739	-	125 000	20 000	-	-
		2007	330 171	-	-	-	-	-	-	-	-	-
	Brazil	2004	-	-	-	40 695 955	-	-	-	-	-	-
		2005	-	-	-	73 469 000	-	-	-	-	-	-
		2007	-	-	-	106 000 000	-	350 000	-	-	-	125 000
	Colombia	2004	-	-	-	13 702 460	-	-	-	-	-	-
		2005	-	-	-	13 702 460	-	-	-	-	-	-
		2006	-	-	-	13 702 460	-	-	-	-	-	-
		2007	-	-	-	16 000 000	3 000 000	-	-	-	-	500 000
	Costa Rica	2004	-	-	-	2 980 000	-	-	-	-	-	-
		2005	-	-	-	3 250 000	-	-	-	-	-	-
		2006	-	-	-	4 940 000	-	-	-	-	-	-
	Dominican Republic	2004	-	-	-	448 254	-	-	-	-	-	-
		2005	-	468 000	-	1 581 000	-	-	-	-	-	-
		2006	-	-	-	2 119 311	-	-	-	-	-	-
	Ecuador	2004	-	-	-	5 396 633	-	-	-	-	-	-
		2005	-	-	-	5 854 985	-	-	-	-	-	-
		2006	-	-	-	7 057 375	2 742 372	-	-	-	-	-
	El Salvador	2004	-	-	-	1 617 318	-	-	-	10 000	-	-
		2005	-	-	-	1 757 954	-	-	-	20 000	-	-
		2006	-	-	-	1 910 820	-	-	-	30 000	-	-
	Guatemala	2005	2 710 226	-	-	2 681 975	-	-	-	-	-	-
		2006	4 597 397	-	-	2 392 626	-	-	-	-	-	-
		2007	1 393 228	-	-	-	-	-	-	-	-	-
	Guyana	2004	-	-	-	115 236	-	-	-	-	-	-
		2005	926 765	-	-	756 331	1 404 308	-	-	-	-	-
		2006	-	-	-	68 774	65 100	-	-	-	49 654	-
		2007	346 454	-	-	-	-	-	-	-	-	-
	Haiti	2004	2 643 772	680 000	-	-	4 094 000	-	-	-	-	-
		2005	267 081	992 000	-	-	3 296 000	-	-	-	-	-
		2006	3 633 293	-	-	-	2 674 000	-	-	-	-	-
		2007	2 764 914	-	-	-	-	-	-	-	-	-
	Honduras	2004	2 603 713	285 000	-	4 850 000	1 375 070	-	-	-	-	-
		2005	1 748 517	340 000	-	4 850 000	2 234 419	-	-	-	-	-
		2006	750 972	-	-	789 327	1 190 010	-	-	-	-	-
		2007	1 415 404	-	-	-	-	-	-	-	-	-
	Mexico	2004	-	-	-	28 060 594	-	-	-	-	-	-
		2005	-	-	-	11 743 099	-	-	-	-	-	-
	Nicaragua	2004	1 899 753	-	-	-	-	-	-	-	-	-
		2005	1 045 462	-	-	-	-	-	-	-	-	-
		2006	908 506	-	-	-	692 596	-	-	40 000	-	-
		2007	611 813	-	-	-	-	-	-	-	-	-
	Panama	2004	-	-	-	93 440	-	-	-	-	-	-
		2005	-	-	-	776 471	-	-	-	-	-	-
		2006	-	-	-	425 226	-	-	-	-	-	-
	Peru	2004	-	800 000	-	3 600 000	-	-	-	-	-	-

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			Contributions reported by donors (US$)			Contributions reported by countries (US$)						
WHO region	Country/area	Year	Global Fund[a]	PMI[b]	The World Bank[c]	Government	Global Fund	The World Bank	Bilaterals	UN agencies	European Union	Other
	Peru	2005	-	300 000	-	3 600 000	-	-	-	-	-	-
	Suriname	2004	-	-	-	160 628	-	-	-	-	-	-
		2005	1 511 350	-	-	160 628	-	-	-	-	-	-
		2006	848 802	-	-	-	-	-	-	-	-	-
		2007	1 037 217	-	-	-	-	-	-	-	-	-
	Venezuela (Bolivarian Republic of)	2004	-	-	-	48 142 544	-	-	-	-	-	-
		2005	-	-	-	2 446 124	-	-	-	-	-	-
Eastern Mediterranean	Afghanistan	2004	-	400 000	-	-	-	-	-	157 452	-	527 844
		2005	-	1 000 000	-	-	750 000	-	-	-	-	500 000
		2006	2 222 644	-	-	-	-	-	-	156 000	-	872 356
		2007	2 909 565	-	-	-	1 022 069	-	-	156 000	-	872 356
	Djibouti	2007	1 218 232	-	-	-	-	-	-	-	-	-
	Iran (Islamic Republic of)	2004	-	-	-	6 704 500	-	-	-	12 500	-	40 000
		2005	-	-	-	6 950 000	-	-	-	30 000	-	-
		2006	-	-	-	6 950 000	-	-	-	60 000	-	-
	Iraq	2004	-	-	-	3 754 000	-	-	-	205 000	-	-
		2005	-	-	-	1 725 000	-	-	-	209 123	-	-
		2006	-	-	-	1 592 000	-	-	-	165 020	-	-
	Pakistan	2004	1 268 500	-	-	900 200	4 500 000	-	-	84 450	-	2 230 000
		2005	1 790 008	-	-	1 300 050	4 407 000	-	-	-	-	-
		2006	1 211 616	-	-	1 500 500	-	-	-	67 000	-	1 420 000
	Saudi Arabia	2004	-	-	-	16 530 000	-	-	-	-	-	-
		2005	-	-	-	20 853 000	-	-	-	-	-	-
		2006	-	-	-	27 285 333	-	-	-	28 000	-	-
		2007	-	-	-	27 360 000	-	-	-	28 000	-	-
	Somalia	2004	4 682 032	-	-	-	12 886 413	-	-	215 989	-	-
		2005	3 872 872	-	-	-	29 000 000	-	-	-	-	-
		2006	4 331 509	-	-	-	50 400 000	-	-	104 000	-	-
		2007	6 482 615	-	-	-	55 000 000	-	-	1 204 812	-	-
	Sudan	2004	4 903 414	2 000 000	-	861 538	-	-	-	1 219 231	-	607 692
		2005	11 382 445	2 500 000	-	4 278 554	12 903 414	-	765 000	1 074 662	732 830	2 938 309
		2006	7 877 068	1 972 000	17 700 000	12 185 187	13 692 691	11 000 000	7 399 410	2 369 200	39 900	315 722
		2007	11 131 052	-	-	11 800 000	4 903 414	11 000 000	1 468 893	500 000	-	-
	Yemen	2004	1 461 532	-	-	2 001 569	1 661 532	1 150 000	-	564 866	-	-
		2005	1 664 079	-	-	1 932 139	2 498 099	1 150 000	-	-	-	-
		2006	1 952 517	-	-	1 954 894	7 761 094	-	-	408 000	-	-
		2007	2 394 449	-	-	-	-	-	-	-	-	-
Europe	Armenia	2004	-	-	-	-	-	-	-	4 850	-	-
		2005	-	-	-	-	-	-	-	6 000	-	-
		2006	-	-	-	-	-	-	-	27 671	-	-
	Azerbaijan	2004	-	-	-	-	-	-	-	-	-	50 000
		2005	-	-	-	-	-	-	-	-	-	53 000
		2006	-	-	-	-	-	-	-	-	-	30 000
	Georgia	2004	360 950	-	-	571 567	438 900	-	-	-	-	-
		2005	284 750	-	-	354 800	206 800	-	-	-	-	-
		2006	160 600	-	-	116 938	160 600	-	-	-	-	-
		2007	882 530	-	-	-	-	-	-	-	-	-
	Kyrgyzstan	2004	-	107 000	-	59 095	-	-	-	-	-	289 800
		2005	-	-	-	63 190	-	-	-	-	-	170 500
		2006	933 345	-	-	67 900	933 345	-	-	-	-	-

Annex 7: Funding for malaria control, 2004-2007

			Contributions reported by donors (US$)			Contributions reported by countries (US$)						
WHO region	Country/area	Year	Global Fund[a]	PMI[b]	The World Bank[c]	Government	Global Fund	The World Bank	Bilaterals	UN agencies	European Union	Other
	Kyrgyzstan	2007	759 045	-	-	-	-	-	-	-	-	-
	Tajikistan	2004	-	45 000	-	102 726	-	-	-	612 000	100 000	-
		2005	-	-	-	108 039	1 425 218	-	-	20 000	-	-
		2006	1 221 833	-	-	110 885	1 346 783	-	-	-	-	-
		2007	1 550 168	-	-	-	1 346 783	-	-	20 000	-	-
	Turkey	2004	-	-	-	33 642 069	-	-	-	10 000	-	-
		2005	-	-	-	38 220 474	-	-	-	10 000	-	-
		2006	-	-	-	38 072 421	-	-	-	15 000	-	-
	Turkmenistan	2004	-	-	-	295 885	-	-	-	-	-	-
		2005	-	-	-	4 066 200	-	-	-	-	-	-
		2006	-	-	-	4 083 000	-	-	-	-	-	-
	Uzbekistan	2004	-	-	-	104 005	-	-	62 000	-	-	-
		2005	450 290	-	-	108 944	556 543	-	13 889	-	-	-
		2006	359 034	-	-	104 728	715 233	-	-	-	-	-
		2007	1 104 061	-	-	-	-	-	-	-	-	-
South-East Asia	Bangladesh	2004	-	-	-	65 000	-	84 000	-	185 000	-	-
		2005	-	-	-	68 000	-	292 000	-	185 000	-	-
		2006	-	-	-	360 000	4 107 720	17 445 000	-	225 000	-	-
		2007	7 805 224	-	-	-	-	-	-	-	-	-
	Bhutan	2005	503 587	-	-	542 000	513 422	-	177 778	15 450	-	-
		2006	405 429	-	-	698 000	487 535	-	177 778	27 300	-	-
		2007	339 056	-	-	702 000	381 297	-	177 778	-	-	-
	Democratic People's Republic of Korea	2004	-	-	-	1 200 000	-	-	-	700 000	-	-
		2005	-	-	-	1 200 000	-	-	-	759 493	-	-
		2006	-	-	-	1 800 000	-	-	-	1 000 000	-	-
	Democratic Republic of Timor-Leste	2004	983 486	-	-	-	924 000	-	-	-	-	-
		2005	438 089	-	-	-	-	-	-	-	-	-
		2006	934 229	-	-	200 000	1 123 063	-	-	36 000	882 000	100 000
	India	2004	-	400 000	-	54 750 000	-	1 372 056	-	-	-	-
		2005	856 717	700 000	-	72 397 500	912 325	9 512 474	-	-	-	-
		2006	12 562 309	-	-	87 895 000	8 227 900	22 400 000	-	-	-	-
		2007	-	-	-	99 010 000	15 727 050	29 500 000	-	-	-	-
	Indonesia	2004	4 556 562	700 000	-	2 012 470	23 000 000	-	1 000 000	47 059	-	-
		2005	5 762 398	1 100 000	-	-	-	-	1 000 000	-	-	-
		2006	3 655 692	-	-	17 785 920	-	-	1 000 000	408 000	-	19 000 000
		2007	2 079 182	-	-	-	-	-	-	-	-	-
	Myanmar	2004	-	100 000	-	105 859	-	-	500 000	-	-	-
		2005	3 091 409	2 759 000	-	129 219	-	-	122 942	1 204 528	-	-
		2006	-	-	-	-	1 900 000	-	200 000	1 120 000	-	-
	Nepal	2004	528 075	700 000	-	1 002 461	692 708	2 387 354	-	49 231	-	-
		2005	-	600 000	-	978 923	1 191 077	2 752 123	-	65 154	-	-
		2006	1 029 025	-	-	1 035 415	1 420 708	799 615	-	32 317	-	-
		2007	4 535 241	-	-	-	-	-	-	-	-	-
	Sri Lanka	2004	1 706 498	-	-	4 117 528	5 197 000	-	-	34 100	-	-
		2005	649 756	-	-	3 873 427	730 140	-	-	18 580	-	-
		2006	122 367	-	-	3 053 110	1 808 135	-	-	22 500	-	-
		2007	740 564	-	-	-	-	-	-	-	-	-
	Thailand	2004	660 000	-	-	16 135 000	625 000	-	-	36 208	-	164 485
		2005	1 305 633	-	-	14 000 000	-	-	-	-	-	54 000
		2006	1 171 755	-	-	12 106 552	-	-	-	-	-	-

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WHO region	Country/area	Year	Global Fund[a]	PMI[b]	The World Bank[c]	Government	Global Fund	The World Bank	Bilaterals	UN agencies	European Union	Other
	Thailand	2007	1 337 893	-	-	10 697 000	-	-	-	-	-	-
Western Pacific	Cambodia	2004	506 199	1 400 000	-	933 156	537 378	490 014	-	520 000	-	-
		2005	5 209 206	1 400 000	-	1 332 647	1 345 572	283 494	-	500 000	-	-
		2006	3 124 027	1 479 000	-	1 282 500	1 901 220	306 709	-	500 000	-	-
		2007	4 484 321	-	-	1 456 419	5 762 926	918 403	-	500 000	-	106 927
	China	2004	1 615 467	-	-	-	1 601 665	-	-	-	-	-
		2005	1 023 466	-	-	-	1 281 332	-	-	-	-	-
		2006	8 748 069	-	-	-	960 999	-	-	-	-	-
		2007	13 332 982	-	-	-	-	-	-	-	-	-
	Lao People's Democratic Republic	2004	1 269 544	-	-	406 334	2 471 668	-	-	-	-	-
		2005	6 356 531	-	-	446 967	4 691 324	-	-	-	-	-
		2006	3 943 599	-	-	491 663	4 132 726	-	-	-	-	-
		2007	7 267 767	-	-	-	-	-	-	-	-	-
	Papua New Guinea	2004	2 185 723	-	-	54 581	2 185 723	-	-	-	-	-
		2005	3 256 526	-	-	19 060	3 256 526	-	-	-	-	-
		2006	372 986	-	-	139 300	372 986	-	-	45 203	-	-
		2007	2 957 519	-	-	-	-	-	-	-	-	-
	Philippines	2004	3 669 663	-	-	63 000	2 700 000	-	-	800 000	-	-
		2005	2 305 524	-	-	63 000	4 000 000	-	-	800 000	-	-
		2006	9 309 756	-	-	63 000	8 900 000	-	-	800 000	-	-
		2007	15 237 049	-	-	-	-	-	-	-	-	-
	Republic of Korea	2004	-	-	-	402 994	-	-	-	700 000	-	-
		2005	-	-	-	392 783	-	-	-	877 000	-	-
		2006	-	-	-	354 737	-	-	-	1 136 000	-	-
	Solomon Islands	2004	-	-	-	-	462 710	163 860	90 000	185 850	-	131 250
		2005	-	-	-	209 873	631 603	163 860	90 000	185 850	-	131 250
		2006	-	-	-	150 252	959 599	163 860	90 000	255 000	-	112 200
	Vanuatu	2004	-	-	-	634 301	509 686	-	-	159 853	-	-
		2005	-	-	-	666 832	457 799	-	-	179 574	-	-
		2006	-	-	-	717 474	917 252	-	-	179 574	-	-
	Viet Nam	2004	3 218 217	-	-	4 516 129	-	-	308 847	-	-	-
		2005	6 608 531	-	-	4 838 710	7 324 769	-	375 255	-	-	-
		2006	2 528 426	-	-	4 193 548	6 063 633	-	337 930	-	-	-

[a]Source: The Global Fund web site (Malaria specific grants, Integrated and Health Systems Strengthening grants are not included)

[b]Source: PMI web site

[c]Source: The World Bank web site, funds for 3 years

*(US$8 million, in IDA cofinancing by the Russian Federation)

Half of the world's population is at risk of malaria, and an estimated 250 million cases led to nearly a million deaths in 2006. The advent of long-lasting insecticidal nets and artemisinin-based combination therapy, plus a revival of support for indoor residual spraying of insecticide, present a new opportunity for large-scale malaria control. The *World Malaria Report 2008* describes the global distribution of cases and deaths, how WHO-recommended control strategies have been adopted and implemented in endemic countries, sources of funding for malaria control, and recent evidence that prevention and treatment alleviate the burden of disease.

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