WORLD MALARIA REPORT 2013

World Health Organization

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WORLD MALARIA REPORT 2013

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"If political commitment wanes, the great progress that has been achieved could be undone in some places in a single transmission season."

Foreword

Dr Margaret Chan
Director-General
World Health Organization

This year's *World Malaria Report* documents remarkable progress in the global fight against malaria, and includes updated burden estimates for the 2000-2012 period. The report shows that increased political commitment and the expansion of global malaria investments since 2000 have led to major gains against this preventable disease, saving an estimated 3.3 million lives.

Each year we have a better understanding of global malaria trends and the burden of disease, as measured against the situation in 2000. According to the latest estimates, malaria mortality rates were reduced by about 42% globally and by 49% in the WHO African Region between 2000 and 2012. During the same period, malaria incidence rates declined by 25% around the world, and by 31% in the African Region. These substantial reductions occurred as a result of a major scale-up of vector control interventions, diagnostic testing, and treatment with artemisinin-based combination therapies, or ACTs.

This progress is no cause for complacency. The absolute numbers of malaria cases and deaths are not going down as fast as they could. The disease still took an estimated 627 000 lives in 2012, mostly those of children under five years of age in Africa. This means 1300 young lives lost to malaria every day – a strong reminder that victory over this ancient foe is still a long way off. The fact that so many people are dying from mosquito bites is one of the greatest tragedies of the 21st century.

If political commitment wanes, the great progress that has been achieved could be undone in some places in a single transmission season. In the last few years, we have started seeing the first signs of a potential slow-down. In 2011 and 2012, the delivery of long-lasting insecticidal nets to endemic countries slowed down and indoor residual spraying programmes levelled off. During this period, malaria mortality rates continued to go down but at a slower pace. In 2013, bednet deliveries picked up again, and the pipeline for next year is even stronger. Nonetheless, even greater efforts will be needed to protect everyone at risk.

As the international community gradually moves towards a post-2015 development agenda, we must not lose sight of what the world's most vulnerable populations expect from us. The concept of *universal health coverage* represents both a social value and an approach to health care that generates better health for entire populations, reduces social inequalities, and protects people from poverty induced by health-care costs. It is a key concept that is already at the centre of the global health debate, and also the debate about the next set of development goals. Progress against malaria provides good evidence of the tangible benefits of population-wide access to life-saving interventions.

The world also needs to stay focused on addressing the global funding gap for malaria prevention and control. The currently available funding is far less than required to reach universal access to malaria interventions. To achieve our goal, we need an accelerated effort in scaling up vector control tools. We also need to ensure that the most vulnerable groups – children under five, infants and pregnant women – get access to WHO-recommended intermittent preventive therapies, where appropriate. While progress in expanding diagnostic testing and quality-assured treatment has been immense in recent years, we are far from achieving universal access.

In addition, parasite resistance to artemisinin – the core compound in the world's most effective antimalarial medicines – and mosquito resistance to insecticides remain major concerns. If not addressed with appropriate urgency, they could threaten the remarkable progress made since 2000. Though WHO has issued global strategies to tackle these challenges, progress in their adoption by countries has been slow, primarily due to inadequate financing. In April 2013, on World Malaria Day, WHO launched an *Emergency response to artemisinin resistance in the Greater Mekong subregion* to guide countries in the scale-up and implementation of efforts to eliminate resistant parasites. The funding gap for this effort is also substantial.

Strengthening health infrastructures, vital registration and surveillance systems is equally critical to further progress. Based on reported data, 59 countries are meeting the MDG target of reversing the incidence of malaria, and 52 countries are on track to reduce their malaria case incidence rates by 75%, in line with World Health Assembly and Roll Back Malaria targets for 2015. However, these 52 countries account for only 4%, or eight million, of the total estimated malaria cases around the world. In 41 endemic countries, including most high-burden countries, we cannot make a reliable assessment of malaria trends. A concerted effort to improve surveillance systems is needed to remove this gap in our understanding of the malaria situation.

WHO is grateful for the commitment of ministries of health in endemic countries and their many development partners. We are confident that, if we remain determined and act with urgency, we can beat this ancient enemy once and for all.

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Abbreviations

ABER	annual blood examination rate
ACD	active case detection
ACT	artemisinin-based combination therapy
AIDS	acquired immunodeficiency syndrome
AL	artemether-lumefantrine
ALMA	African Leaders Malaria Alliance
AMFm	Affordable Medicine Facility–malaria
AMP	Alliance for Malaria Prevention
ANC	antenatal care
ANVR	Africa Network for Vector Resistance
API	annual parasite index
AQ	amodiaquine
AT	atovaquone
ARDS	acute respiratory distress syndrome
AusAID	Australian Agency for International Development
CDC	US Centers for Disease Control and Prevention
CFR	case fatality rate
CHAI	Clinton Health Access Initiative
CIDA	Canadian International Development Agency
CS	circumsporozoite
DDT	dichloro-diphenyl-trichloroethane
DFID	The United Kingdom Department for International Development
DHS	demographic and health survey
DIPI	domestic investment priority index
DTP	diphtheria–tetanus–pertussis
E8	Elimination Eight
EPI	Expanded Programme on Immunization
ERAR	Emergency response to artemisinin resistance in the Greater Mekong subregion
ERG	expert review group (but evidence review group in 2013 report)
FIND	Foundation for Innovative New Diagnostics
G6PD	glucose-6-phosphate dehydrogenase
Global Fund	The Global Fund to Fight AIDS, Tuberculosis and Malaria
GMAP	Global Malaria Action Plan
GMP	Global Malaria Programme, WHO
GNI	gross national income
GPARC	Global Plan for Artemisinin Resistance Containment
GPIRM	Global Plan for Insecticide Resistance
GSK	GlaxoSmithKline
HIV	human immunodeficiency virus
HMIS	health management information system
iCCM	integrated community case management
IEC	information, education and communication
IHME	Institute for Health Metrics and Evaluation
IM	intramuscular
IPT	intermittent preventive treatment
IPTc	intermittent preventive treatment for children
IPTi	intermittent preventive treatment in infants
IPTp	intermittent preventive treatment in pregnancy
IQR	interquartile range
IRS	indoor residual spraying
ISGlobal	Barcelona Institute for Global Health
ITN	insecticide-treated mosquito net
LLIN	long-lasting insecticidal net
MAP	Malaria Atlas Project
MDG	Millennium Development Goal
MERG	RBM Monitoring and Evaluation Reference Group
MICS	multiple indicator cluster survey
MIS	malaria indicator survey
MPAC	Malaria Policy Advisory Committee
MVI	Malaria Vaccine Initiative, PATH
NGO	nongovernmental organization
NMCP	National malaria control programme
OECD	Organisation for Economic Co-operation and Development
P.	*Plasmodium*
PATH	Program for Appropriate Technology in Health
PCD	passive case detection
PMI	The United States President's Malaria Initiative
QA	quality assurance
RAM	Rotarians Against Malaria
RBM	Roll Back Malaria
RDT	rapid diagnostic test
SAGE	WHO Strategic Advisory Group of Experts on Immunization
SMC	seasonal malaria chemoprevention
SP	sulfadoxine-pyrimethamine
SPR	slide positivity rate
TDR	Special Programme for Research and Training in Tropical Diseases
TEG	technical expert group
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNSE	Office of the United Nations Special Envoy for Malaria
USAID	United States Agency for International Development
VCAG	Vector Control Advisory Group
WER	WHO Weekly Epidemiological Record
WHA	World Health Assembly
WHO	World Health Organization
WHOPES	WHO Pesticide Evaluation Scheme

Abbreviations of WHO Regions / Offices

AFR	WHO African Region
AFRO	WHO Regional Office for Africa
AMR	WHO Region of the Americas
AMRO	WHO Regional Office for the Americas
EMR	WHO Eastern Mediterranean Region
EMRO	WHO Regional Office for the Eastern Mediterranean
EUR	WHO European Region
EURO	WHO Regional Office for Europe
SEAR	WHO South-East Asia Region
SEARO	WHO Regional Office for South-East Asia
WPR	WHO Western Pacific Region
WPRO	WHO Regional Office for the Western Pacific

Summary and Key Points

The *World Malaria Report 2013* summarizes information received from malaria-endemic countries and other sources, and updates the analyses presented in the 2012 report. It highlights the progress made towards the global malaria targets set for 2015, and describes current challenges for global malaria control and elimination.

Since 2000, a tremendous expansion in the financing and coverage of malaria control programmes has led to a wide-scale reduction in malaria incidence and mortality. Based on reported data, 59 out of 103 countries that had ongoing malaria transmission in 2000 are meeting the Millennium Development Goal (MDG) target of reversing the incidence of malaria. Of these, 52 are on track to meet Roll Back Malaria (RBM) and World Health Assembly targets of reducing malaria case incidence rates by 75% by 2015, including 8 countries of the WHO African Region. In 41 countries it is not possible to assess trends using reported data because of inconsistencies in the completeness of reporting over time, changes in diagnostic practice or health-service use. For these countries, which accounted for 80% of cases in 2000, inferences about malaria trends need to be based on estimates of the malaria case incidence and mortality rates.

Worldwide, between 2000 and 2012, estimated malaria mortality rates fell by 42% in all age groups and by 48% in children under 5 years of age. If the annual rate of decrease that has occurred over the past 12 years is maintained, then malaria mortality rates are projected to decrease by 52% in all ages, and by 60% in children under 5 years of age by 2015; this represents substantial progress towards the World Health Assembly target of reducing malaria mortality rates by 75% by 2015.

Modelling suggests that an estimated 3.3 million malaria deaths were averted between 2001 and 2012, and that 69% of these lives saved were in the 10 countries with the highest malaria burden in 2000; thus, progress is being made where it matters most. About 3 million (90%) of the deaths averted between 2001 and 2012 are estimated to be in children under 5 years of age in sub-Saharan Africa. These account for 20% of the 15 million child deaths that are estimated to have been averted in sub-Saharan Africa since 2000 through overall reductions in child mortality rates. Thus, decreases in malaria deaths have contributed substantially to progress towards achieving the target for MDG 4, which is to reduce, by two thirds, the under-five mortality rate between 1990 and 2015.

Nevertheless, between 2011 and 2012, the pace of decrease in estimated malaria mortality rates slowed. This slowing is partly because the model that is used to estimate malaria deaths in children under 5 years of age in Africa uses insecticide-treated mosquito net (ITN) coverage as an input, and ITN coverage flattened in 2011–2012 following decreases in funding for malaria control in 2011. In 2012, financing of malaria programmes was estimated to be less than half of the estimated US$ 5.1 billion required globally. Thus, millions of people at risk of malaria still do not have access to interventions such as an ITN, indoor residual spraying (IRS), diagnostic testing and artemisinin-based combination therapies (ACTs). As a result, an estimated 207 million cases (uncertainty interval, 135–287 million) and 627 000 malaria deaths (uncertainty interval, 473 000–789 000) are estimated to have occurred in 2012. There is an urgent need to increase funding for malaria control and to expand programme coverage, in order to meet international targets for reducing malaria cases and deaths.

Policy development

Several new and updated malaria control policies, operational manuals, plans and initiatives were released in 2013, following meetings of WHO's Malaria Policy Advisory Committee (MPAC).

1. The MPAC, which came into operation in 2012, continued its work in 2013; its mandate is to provide strategic advice and technical input to WHO on all aspects of malaria control and elimination. In accordance with the MPAC recommendations, WHO issued guidance on a range of policy areas, including achieving universal coverage with long-lasting insecticidal nets (LLINs), estimating the longevity of LLINs, and capacity-building in malaria entomology and vector control.
2. Other WHO guidance published in 2013 includes (i) an operational manual for IRS; (ii) an operational manual for larval source management; (iii) test procedures for insecticide resistance monitoring in malaria vector mosquitoes; (iv) a field guide on seasonal malaria chemoprevention (SMC); (v) a handbook on the management of severe malaria; (vi) a framework for action to respond to artemisinin resistance in the Greater Mekong subregion; (vii) a field handbook on malaria control in complex emergencies (developed in conjunction with several partner agencies); and (viii) three training manuals.

Financing malaria control

The total international and domestic funding committed to malaria control was estimated to be US$ 2.5 billion in 2012 – substantially less than the amount that will be needed to reach the global targets.

3. International disbursements to malaria-endemic countries have increased markedly, from less than US$ 100 million in 2000 to US$ 1.6 billion in 2011, and an estimated US$ 1.94 billion in 2012 and US$ 1.97 billion in 2013. However, increases in international funding have slowed in recent years, to an average of 4% per year between 2009 and 2013, compared to an average of 43% per year between 2005 and 2009.
4. Reported data suggest that global domestic financing for malaria increased over the period 2005–2012, from US$ 436 million in 2005 to US$ 522 million in 2012. It is estimated that domestic government malaria spending rose at a rate of 4% per year between 2005 and 2012.

5. Global resource requirements for malaria control were estimated in the 2008 RBM Global Malaria Action Plan (GMAP) to exceed US$ 5.1 billion per year between 2011 and 2020. Combining both domestic and international funds, the resources available for malaria control globally were estimated to be US$ 2.5 billion in 2012, leaving a gap of US$ 2.6 billion. Projections of both domestic and international resources available between 2013 and 2016 indicate that total funding for malaria control will reach approximately US$ 2.85 billion between 2014 and 2016, which is substantially below the amount required to achieve universal access to malaria interventions.
6. International investments in malaria control have been targeted to countries with higher mortality rates and lower national incomes, particularly those in Africa. However, domestic government investments are highest in wealthier countries and lowest in countries with the highest malaria mortality rates. The low rates of domestic spending in countries with higher disease burdens is principally because these countries have lower national incomes per capita.
7. There is variation in the priority given to malaria control by domestic governments that have similar levels of resource availability. Countries that display greater commitment – as measured by a domestic investment priority index – showed greater success in reducing malaria case incidence between 2000 and 2012 than did other countries.

Progress in vector control

In sub-Saharan Africa, the proportion of the population with access to an ITN in their household increased dramatically from 2005 to 2011 but the rate flattened during the last 2 years, reaching 42% in 2013. Increased deliveries of ITNs during the next 2 years should increase ITN coverage.

Insecticide-treated mosquito nets

8. By 2012, 34 countries in the African Region and 83 countries worldwide had adopted the WHO recommendation to provide ITNs to all persons at risk for malaria. A total of 88 countries, including 39 in Africa, distribute ITNs free of charge.
9. Every year, at least 150 million ITNs are needed to maintain a supply of 450 million ITNs in households over each 3-year period and protect all populations at risk of malaria in sub-Saharan Africa. Between 2004 and 2010, the number of ITNs delivered annually by manufacturers to malaria-endemic countries in sub-Saharan Africa increased from 6 million to 145 million. However, only 92 million ITNs were delivered by manufacturers in 2011, and only 70 million were delivered in 2012. The estimated numbers of ITNs delivered in 2013 (136 million) and financed by donors for 2014 (approximately 200 million) are close to the number of ITNs required annually to protect all populations at risk. However, even with the increase in yearly deliveries, the projected 3-year total of ITNs delivered in 2012–2014 (about 400 million) will still be below the minimum number needed to protect all persons at risk of malaria. The appropriate levels of ITN deliveries need to be maintained each year, to ensure the availability of ITNs in households and access to an ITN for every person at risk of malaria.
10. The percentage of households owning at least one ITN in sub-Saharan Africa is estimated to have risen from 3% in 2000 to 56% in 2012, but declined slightly to 54% in 2013. The proportion of the population with access to an ITN in their household increased during the same period, reaching 42% in 2013. The proportion of the population sleeping under an ITN – which represents the population directly protected – was estimated to be 36% in 2013.
11. A comparison of the proportion of the population with access to an ITN, and the proportion sleeping under an ITN, suggests that a high percentage (86%) of the population with access to an ITN actually uses it, indicating that efforts to encourage ITN use have been successful. Lack of availability of nets is the main constraint to increasing the number of at-risk persons sleeping under an ITN.
12. Use of ITNs among vulnerable populations, pregnant women and children under 5 years of age is higher than use among the population as a whole. This indicates that these groups remain protected as countries scale up for universal ITN coverage, and it highlights the need to increase access to ITNs among all persons at risk.

Indoor residual spraying

13. IRS remains a powerful vector control tool for reducing and interrupting malaria transmission. In 2012, a total of 88 countries, including 40 in the African Region, recommended IRS for malaria control.
14. In 2012, 135 million people (4% of the global population at risk of malaria) were protected by IRS worldwide. In the African Region, the proportion of the population at risk that was protected rose from less than 5% in 2005 to 11% in 2010, but fell to 8% in 2012, with 58 million people benefiting from the intervention. The decrease in the number of people protected by IRS in Africa appears to be partly due to increased use of more costly non-pyrethroid insecticides (in response to the threat of insecticide resistance) in a setting of limited IRS budgets. The use of non-pyrethroids for IRS may become increasingly important as a resistance-management tool, because all currently approved LLINs are pyrethroid based.

Insecticide resistance

15. Mosquito resistance to at least one insecticide used for malaria control has been identified in at least 64 malaria-endemic countries worldwide. In May 2012, WHO and RBM released the Global Plan for Insecticide Resistance Management (GPIRM) in malaria vectors; the GPIRM is a five-pillar strategy for managing the threat of insecticide resistance. Stakeholders in the global malaria community have begun activities related to implementing the strategy laid out in the GPIRM.
16. Monitoring insecticide resistance is a necessary element of the implementation of insecticide-based vector control interventions. In 2012, a total of 58 countries reported that they had adopted a policy of routine monitoring of insecticide resistance.

Progress on chemoprevention

Among African countries reporting this information to WHO, the median percentage of pregnant women attending antenatal care (ANC) who received at least one dose of intermittent preventive treatment (IPT) during pregnancy in 2012 was 64%, whereas 38% received at least two doses and 23% received at least three doses, indicating that there is considerable scope for improving protection for pregnant women.

17. In sub-Saharan Africa, an estimated 35 million pregnant women and a large portion of the estimated 26 million infants born each year would benefit from IPT. In addition, about 25 million children in the Sahel subregion of Africa could be protected from malaria through SMC.

18. A total of 36 sub-Saharan African countries with moderate to high malaria transmission had adopted IPT for pregnant women (IPTp) as national policy by the end of 2012. This policy was also adopted by Papua New Guinea (in the Western Pacific Region) in 2009.

19. Among 26 of the 36 moderate to high transmission countries in the African Region that have adopted IPTp as national policy – and for which data are available – a median of 64% of pregnant women attending ANC received at least one dose of IPTp in 2012, 38% received at least two doses and 23% received at least three doses. In 13 countries in the African Region for which household survey data were available for 2010–2012, the weighted average of all pregnant women who received one dose of IPTp during pregnancy was 37%, whereas 23% received two doses and 8% received three doses.

20. Since October 2012, WHO has recommended that IPTp be given at each scheduled antenatal visit after the first trimester. Analysis of household survey data reveals that the proportion of pregnant women who receive IPTp is well below the proportion who attend ANC. The estimated proportion of ANC visits in which IPTp could be given but is not is high, at 72%. A lower proportion of women receive IPTp during ANC visits than receive tetanus toxoid (another key component of ANC). This indicates that the capacity to deliver preventive services during ANC visits is high, and that barriers to IPTp can be overcome.

21. All infants at risk of *Plasmodium falciparum* infection in sub-Saharan African countries with moderate-to-high malaria transmission and low levels of parasite resistance to the recommended agent sulfadoxine-pyrimethamine (SP) should receive preventive malaria treatment through immunization services at defined intervals that correspond to routine vaccination schedules. Only one country, Burkina Faso, has adopted a national policy of IPT for infants (IPTi) since the WHO recommendation was issued in 2009.

22. In March 2012, WHO issued a recommendation on SMC for children aged 3–59 months, and in August 2013, WHO released a field guide for implementation of SMC. Two endemic countries have adopted SMC, and several countries involved in evaluating the policy have indicated that they plan to adopt this policy and expand SMC coverage beyond their study populations.

Progress in diagnostic testing and malaria treatment

The numbers of procured rapid diagnostic tests (RDTs) and ACTs are increasing, as is the reported rate of diagnostic testing in the public sector in the African Region, which increased from 37% in 2010 to 61% in 2012. As a result, there has been a decrease in the number of suspected malaria cases treated presumptively with antimalarial drugs. However, millions of people with suspected malaria still do not receive a diagnostic test, and many people with confirmed infections do not receive appropriate treatment with a quality assured antimalarial.

Diagnostic testing

23. Implementation of universal diagnostic testing in the public and private sectors would substantially reduce the global requirements for antimalarial treatment. In 2012, 41 of 44 countries with ongoing malaria transmission in the African Region, and 49 of 55 countries in other WHO regions, reported having adopted a policy of providing parasitological diagnosis for all age groups. This represents an increase of 6 countries in the African Region since 2009.

24. Malaria diagnostic testing is provided free of charge in the public sector in 85 countries around the world. From 2010 to 2012, the proportion of suspected malaria cases receiving a diagnostic test in the public sector increased from 37% to 61% in the African Region, and from 44% to 64% globally. Most of the increase in testing in the African Region is attributable to increased use of RDTs, which accounted for 40% of all cases tested in the region in 2012.

25. The number of patients tested by microscopic examination increased to a peak of 188 million in 2012, with India accounting for over 120 million blood-slide examinations. The number of RDTs supplied by manufacturers increased from 88 million in 2010 to 205 million in 2012. This included increased sales for both *P. falciparum*-specific tests and combination tests that can detect more than one parasite species.

26. A total of 48 countries reported deployment of RDTs at the community level, and 15 million patients were reported as having been tested through such programmes in 2012. Household survey data from 14 countries collected during 2010–2012 suggest that diagnostic testing is not as widely available in the private sector as it is in the public sector.

27. RDTs are increasingly used for diagnostic testing of suspected malaria cases in health facilities, including for the diagnosis of *P. vivax*. Among 42 countries reporting the type of RDTs used, 15 reported deploying RDTs that could detect *P. vivax* specifically. In these countries, the proportion of *P. vivax* cases confirmed by RDT (rather than microscopy) was similar to the proportion of *P. falciparum* cases confirmed by RDT.

Treatment

28. ACTs are recommended as the first-line treatment of malaria caused by *P. falciparum*, the most dangerous of the Plasmodium parasites that infect humans. By 2012, 79 countries and territories had adopted ACTs as first-line treatment

for *P. falciparum* malaria. *P. vivax* malaria should be treated with chloroquine where that drug is effective, or by an appropriate ACT in areas where *P. vivax* is resistant to chloroquine. Treatment of *P. vivax* should include an effective schizontocidal medicine combined with a 14-day course of primaquine to prevent relapse.

29. From reports of manufacturers and the Affordable Medicines Facility-malaria (AMFm) initiative, the number of ACT treatment courses delivered to the public and private sectors increased from 11 million globally in 2005 to 76 million in 2006, and reached 331 million in 2012. The increases in ACT procurement in routine public sector in 2012 were due primarily to an increase of about 50% in public sector deliveries between 2011 to 2012. Drugs procured for the public and private sector through the AMFm initiative – which is now in a transitional phase towards eventual integration into the routine grant-making process for the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) – decreased slightly from 156 million treatment courses in 2011 to 150 million in 2012.

30. It has been difficult to track the extent to which patients with confirmed malaria received antimalarial medicines, because information linking diagnostic testing and treatment has been limited in both household surveys and routine health-information systems. An estimate of the proportion of patients in the public sector potentially treated with ACTs (rather than a less effective antimalarial) can be made by comparing the number of ACT treatments distributed by national malaria control programmes (NMCPs) with the number of presumed (i.e. treated without testing) and confirmed (i.e. confirmed by microscopy or RDT) cases of *P. falciparum* malaria (adjusted for reporting completeness or estimated, in situations where reported data are lacking). This proportion varies by WHO region, but has increased over time in the African Region, where it reached 60% in 2012.

31. In nine countries in the African Region with more than one household survey between 2006 and 2012, the proportion of febrile children given antimalarial treatment comprising ACTs increased over time, in both the public and private sectors. In the most recent surveys, the median proportion of children receiving an antimalarial who received an ACT was 68%; however, because a substantial portion of children are not brought for care of fever, and not all children with suspected malaria are given a diagnostic test, the proportion of all children with malaria who receive an ACT is likely to be substantially lower. In an analysis of 26 household surveys conducted in 2010–2012 that used a positive RDT among febrile children as a proxy for confirmed malaria, the mean proportion of all children with confirmed malaria who received an ACT was 16% (range, 1%–42%). Increased access to care for fever, as well as appropriate diagnostic testing and therapeutic management at all places of care, is needed to ensure that all patients with malaria receive prompt and effective treatment.

32. In the African Region in 2012, the total number of tests (both microscopy and RDTs) was almost equal to the number of ACTs distributed by NMCPs – an increased ratio compared to previous years. However, in most malaria-endemic areas, the ratio is expected to exceed 2, because less than half of suspected malaria cases will have confirmed malaria and require treatment with an ACT.

Antimalarial drug resistance

33. WHO recommends that oral artemisinin-based monotherapies be progressively withdrawn from the market and replaced with ACTs – a policy that was endorsed by the World Health Assembly in 2007. The number of countries that still allow the marketing of these products decreased from 55 in 2008 to 9 as of November 2013; 6 of those 9 countries are in the African Region. The number of pharmaceutical companies marketing these products dropped from 38 in 2010 to 30 in 2013. Most of the countries that allow marketing of these medicines are in the African Region, whereas most of the manufacturers are in India.

34. Therapeutic efficacy studies remain the gold standard for guiding drug policy; such studies should be undertaken every 2 years. In 2011 and 2012, studies of first- or second-line antimalarial treatments were completed in 48 of 67 (72%) countries where *P. falciparum* efficacy studies were possible – an increase from 31 of 75 (41%) countries during 2008–2009. (In 32 countries with ongoing malaria transmission, efficacy studies are currently impracticable because of low malaria incidence, or because the countries are endemic for *P. vivax* only.)

35. Parasite resistance to artemisinins has now been detected in four countries of the Greater Mekong subregion: Cambodia, Myanmar, Thailand and Viet Nam. Despite the observed changes in parasite sensitivity to artemisinins, ACTs continue to cure patients, provided that the partner drug is still efficacious. In Cambodia's Pailin province, resistance has been found to both of the components of multiple ACTs; therefore, special provisions for directly observed therapy using a non-artemisinin-based combination (atovaquone + proguanil) have been introduced.

    In April 2013, WHO released the *Emergency response to artemisinin resistance in the Greater Mekong subregion: Regional framework for action 2013–2015*. The document describes priority areas in which action is needed in the coming years to contain artemisinin resistance.

Malaria surveillance, monitoring and evaluation

In 2012, in 62 countries of 103 that had ongoing malaria transmission in 2000, reporting was considered to be sufficiently consistent to make a reliable judgement about malaria trends for 2000–2012. In the 41 remaining countries, which account for 80% of estimated cases, it is not possible to reliably assess malaria trends using the data submitted to WHO. Information systems are weakest, and the challenges for strengthening systems are greatest, where the malaria burden is greatest.

36. In 2012, routine health information systems detected only 14% of the cases estimated to occur globally. Case detection rates were lowest in countries with the highest numbers

of malaria cases. Similarly, the proportion of deaths that are reported was lowest in countries with the greatest number of malaria deaths. Surveillance systems do not need to detect all cases in order to reliably assess trends; however, case detection efforts do need to be reasonably uniform over time. Countries with fewer estimated cases of malaria appear to be most able to assess trends in incidence. In the 41 countries that account for 80% of estimated cases in 2000, it is not possible to reliably assess malaria trends 2000—2012 using the data submitted to WHO. Thus, information systems are weakest where the malaria burden is greatest.

37. In contrast to routinely reported data, household surveys are more commonly undertaken in countries with the highest number of malaria cases. Fifty countries, of which 34 were in the African Region, had at least one household survey over the 3 year period 2011–2013. Indicators most commonly measured were those on the availability of ITNs and the use of antimalarial medicines. Only 25% of surveys included questions on fever cases receiving a finger stick or heel prick, whereas 90% enquired about malaria treatment – a finding that will need to change if progress towards universal diagnostic testing is to be tracked. The number of surveys that measure parasite prevalence has increased since 2005, rising to 81% of all surveys conducted between 2011 and 2013.

Impact of malaria control

Since 2000, more than half of the countries that had ongoing malaria transmission in 2000 have recorded decreases in the incidence of confirmed malaria, or in reported admissions and deaths (or both). Estimated malaria mortality rates worldwide fell by 42% between 2000 and 2012 in all age groups, and by 48% in children under 5 years of age. If the annual rate of decrease that has occurred over the past 12 years is maintained, then malaria mortality rates are projected to decrease by 52% in all ages, and by 60% in children under 5 years of age, by 2015.

38. An estimated 3.4 billion people were at risk of malaria in 2012. Of this total, 2.2 billion were at low risk (<1 reported case per 1000 population), of whom 94% were living in geographic regions other than the African Region. The 1.2 billion at high risk (>1 case per 1000 population) were living mostly in the African Region (47%) and the South-East Asia Region (37%).

39. Based on *reported* data, 59 out of 103 countries that had ongoing malaria transmission in 2000 are meeting the MDG target of reversing the incidence of malaria. Of these, 52 are on track to meet RBM and World Health Assembly targets of reducing malaria case incidence rates by 75% by 2015, including 8 countries of the African Region.

40. Decreases in the incidence of *P. falciparum* are, on average, larger than those of *P. vivax*, suggesting that *P. vivax* responds more slowly to control measures, possibly because of its biological characteristics. As a result, many NMCPs need to give greater attention to the control of *P. vivax* as they near elimination, particularly in areas outside sub-Saharan Africa. In countries where both species are transmitted, *P. vivax* predominates in countries that are in the pre-elimination and elimination phases.

41. Of 97 countries with ongoing transmission in 2013, 12 are classified as being in the pre-elimination phase of malaria control, and 7 as being in the elimination phase. A further 7 countries are classified as being in the prevention of introduction phase. In 2012, the European Region reported only 255 indigenous cases; hence, it is close to attaining the goal of eliminating malaria from the region by 2015, as set out in the 2005 Tashkent Declaration. Nonetheless, recent outbreaks in Greece and Turkey highlight the continual threat of reintroduction, and the need for continued vigilance to ensure that any resurgence is rapidly contained.

42. The 52 countries that are projected (based on reported data) to decrease malaria incidence by 75% by 2015 accounted for only 8 million (4%) of the total estimated cases of 226 million in 2000. This is partly because progress has been faster in countries with lower numbers of cases, but is also influenced by the poorer quality of surveillance data submitted by countries with larger numbers of cases. Improved surveillance and evaluation in countries with higher malaria burdens is essential for the impact of malaria investments to be properly assessed.

43. Because countries with higher numbers of cases are less likely to submit sufficiently consistent data for assessing trends, it is necessary to draw inferences about trends in these countries using estimated numbers of cases rather than surveillance data. There were an estimated 207 million cases of malaria worldwide in 2012 (uncertainty interval, 135–287 million). Most of the estimated cases (80%) occur in sub-Saharan Africa. About 9% of estimated cases globally are due to *P. vivax*, although the proportion outside the African continent is 50%. The estimated incidence of malaria fell by 25% globally between 2000 and 2012, and by 31% in the African Region. If the annual rate of decrease that has occurred over the past 12 years is maintained, then malaria case incidence is projected to decrease by 36% globally by 2015, and by 44% in the African Region.

44. There were an estimated 627 000 malaria deaths worldwide in 2012 (uncertainty interval, 473 000–789 000). Of the estimated deaths, most occur in sub-Saharan Africa (90%) and in children under 5 years of age (77%). Between 2000 and 2012, estimated malaria mortality rates decreased by 42% worldwide and by 49% in the African Region; they are estimated to have decreased by 48% in children under 5 years of age globally and by 54% in the African Region. If the annual rate of decrease that has occurred over the past 12 years is maintained, then malaria mortality rates are projected to decrease by 52% globally and by 62% in the African Region by 2015. In children under 5 years of age, they are projected to decrease by 60% globally and by 68% in the African Region by 2015.

45. The pace of decrease in estimated malaria mortality rates accelerated from 2005, but slowed between 2011 and 2012. This slowing is partly because the model that is used to estimate malaria deaths in children under 5 years of age in Africa uses ITN coverage to adjust the proportion of all deaths that are attributed to malaria, and ITN coverage flattened in 2011—2012 following decreases in funding for malaria control in 2011.

46. More than 80% of estimated malaria deaths in 2012 occur in just 17 countries, and 80% of cases occur in 18 countries, with the Democratic Republic of the Congo and Nigeria together accounting for 40% of the estimated global total. Targets for reduction of cases and deaths will not be attained unless substantial progress can be made in countries that account for the vast majority of the malaria burden.
47. Four countries account for more than 80% of estimated cases of *P. vivax* cases (Ethiopia, India, Indonesia and Pakistan). *P. vivax* infection has been associated with severe malaria and death, although the risks of severe disease and case fatality rates for *P. vivax* infection have not been firmly established. The presence of comorbidities – in particular, concomitant malnutrition – is suspected to increase the risk of severe disease in *P. vivax* infection, although this risk also remains poorly defined. Further study is required to refine existing knowledge of the spectrum of severe *P. vivax* malaria, and the risks of severe disease and death with this infection.
48. Progress in reducing malaria case incidence and mortality rates has been faster in countries with lower numbers of cases and deaths in 2000. However, the vast majority of *numbers* of cases and deaths averted between 2000 and 2012 have been in countries that had the highest malaria burdens in 2000. If the malaria incidence and mortality rates in 2000 had remained unchanged over the decade, 500 million more cases and 3.3 million deaths would have occurred between 2001 and 2012. Most of the malaria cases averted (67%) and lives saved (93%) have been in the African Region.
49. Of the 3.3 million deaths averted between 2001 and 2012, 3 million (90%) are estimated to be in children under 5 years of age in sub-Saharan Africa. They account for 20% of the 15 million child deaths that are estimated to have been averted in sub-Saharan Africa since 2000 through overall reductions in child mortality rates. Thus, decreases in malaria deaths have contributed substantially to progress towards achieving the target for MDG 4 of reducing, by two thirds, the under-five mortality rate between 1990 and 2015.

Avant-propos

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Cette année, le *Rapport sur le paludisme dans le monde* fait état de l'avancée remarquable de la lutte mondiale contre le paludisme, et présente les estimations du poids de la maladie mises à jour pour la période 2000-2012. Le rapport révèle que les engagements politiques accrus et l'augmentation des investissements mondiaux en faveur de la lutte antipaludique depuis 2000 ont conduit à des avancées majeures en la matière, à l'origine de 3,3 millions de vies sauvées selon les estimations.

Chaque année, nos connaissances sur les tendances du paludisme et sur le fardeau de la maladie dans le monde s'améliorent, comparativement à la situation qui prévalait en 2000. Selon les estimations les plus récentes, les taux de mortalité imputables au paludisme ont été réduits d'environ 42 % dans le monde et de 49 % dans la Région africaine de l'OMS entre 2000 et 2012. Au cours de la même période, les taux d'incidence du paludisme ont diminué de 25 % au niveau mondial et de 31 % dans la Région Afrique. Ces réductions importantes sont le résultat d'une intensification majeure des interventions de lutte antivectorielle, de l'utilisation des tests diagnostiques et des traitements par une combinaison thérapeutique à base d'artémisinine ou CTA.

Mais cette avancée ne permet pas de céder à l'autosatisfaction. Les chiffres absolus des cas de paludisme et de décès ne diminuent pas aussi rapidement qu'ils le pourraient. La maladie a encore emporté 627 000 vies en 2012 selon les estimations, principalement des enfants de moins de cinq ans en Afrique. Cela correspond à 1 300 vies de jeunes enfants perdues chaque jour à cause du paludisme, un rappel fort indiquant que la victoire sur cet ennemi de longue date n'est pas pour demain. Le fait que tant de personnes meurent de piqûres de moustiques est l'une des plus grandes tragédies du XXI^{e} siècle.

Si les engagements politiques s'essoufflent, les progrès majeurs qui ont été réalisés pourraient être anéantis en une seule saison de transmission dans certaines zones. Au cours de ces dernières années, nous avons commencé à constater les premiers signes d'un possible ralentissement. En 2011 et 2012, la livraison de moustiquaires imprégnées d'insecticide de longue durée aux pays d'endémie palustre s'est ralentie et les programmes de pulvérisations intradomiciliaires d'insecticides à effet rémanent ont stagné. Pendant cette même période, les taux de mortalité dus au paludisme ont continué à diminuer, mais à un rythme plus lent. En 2013, les livraisons de moustiquaires ont à nouveau augmenté, et celles prévues l'année prochaine sont encore supérieures. Toutefois, des efforts encore plus importants devront être consentis pour protéger toutes les personnes à risque.

Alors que la communauté internationale avance progressivement vers le programme de développement pour l'après-2015, nous ne devons par perdre de vue ce que les populations les plus vulnérables attendent de nous. Le concept de couverture sanitaire universelle représente à la fois une valeur sociale et une approche des soins qui génère une meilleure santé pour des populations entières, réduit les inégalités sociales et protège de la pauvreté induite par les dépenses de soins de santé. Il s'agit d'un concept clé qui occupe déjà le centre du débat mondial sur la santé, mais aussi le centre du débat sur le prochain ensemble d'objectifs pour le développement. Les progrès réalisés dans la lutte contre le paludisme sont une preuve satisfaisante des bénéfices tangibles de l'accès à des interventions vitales pour l'ensemble des populations.

La communauté internationale doit aussi continuer à se mobiliser pour combler l'écart dans les financements internationaux consacrés à la prévention et à la lutte antipaludiques. Les financements actuellement disponibles sont largement insuffisants pour établir l'accès universel aux interventions de lutte antipaludique. Pour atteindre notre objectif, nous devons intensifier les efforts visant à améliorer les outils de lutte antivectorielle. Nous devons aussi garantir que les groupes les plus vulnérables, c'est-à-dire les enfants de moins de cinq ans, les nourrissons et les femmes enceintes, ont accès aux traitements préventifs intermittents recommandés par l'OMS, lorsqu'ils sont adaptés. Si les progrès en matière d'élargissement de l'utilisation des tests diagnostiques et de traitements satisfaisants aux normes d'assurance qualité ont été considérables au cours de ces dernières années, nous sommes toutefois loin d'atteindre l'accès universel.

En outre, la résistance parasitaire à l'artémisinine – le composant principal des médicaments antipaludiques les plus efficaces au monde – et la résistance des moustiques aux insecticides restent des préoccupations majeures. Si elles ne sont pas prises en compte avec la diligence requise, ces dernières pourraient menacer les progrès remarquables accomplis depuis 2000. Si l'OMS a publié des stratégies mondiales pour surmonter ces difficultés, leur adoption par les pays est lente, principalement en raison de l'insuffisance des financements. En avril 2013, lors de la Journée mondiale du paludisme, l'OMS a publié l'ouvrage *Emergency response to artemisinin resistance in the Greater Mekong subregion* (*Riposte d'uregence à la résistance à l'artémisinine dans la sous-région du Grand Mékong*) pour orienter les pays dans l'intensification et la mise en œuvre des interventions visant l'élimination des parasites résistants. L'écart de financement pour cette intervention est aussi très important.

Le renforcement des infrastructures de santé, les systèmes de surveillance et de notifications vitales sont également indispensables pour obtenir de nouveaux progrès. Selon les données soumises, 59 pays ont atteint la cible de l'OMD d'inverser la tendance de l'incidence du paludisme, et 52 pays sont en bonne voie vers une réduction de leur taux d'incidence des cas de paludisme de 75 %, dans le droit fil des cibles fixées pour 2015 par l'Assemblée mondiale de la santé et le partenariat Roll Back Malaria. Toutefois, ces 52 pays représentent seulement 4 % ou huit millions des cas totaux estimés de paludisme dans le monde. Dans 41 pays d'endémie palustre, et notamment dans les pays où le fardeau du paludisme est le plus lourd, nous ne pouvons évaluer de manière fiable les tendances du paludisme. Un effort concerté visant à améliorer les systèmes de surveillance est requis pour combler cet écart entre nos connaissances et la situation du paludisme.

L'Organisation est reconnaissante pour l'engagement des ministres de la Santé des pays endémiques et de leurs nombreux partenaires du développement. Nous sommes convaincus que si nous restons déterminés et agissons avec diligence, nous pouvons vaincre ce vieil ennemi une fois pour toutes.

Résumé et points essentiels

Le *Rapport 2013 sur le paludisme dans le monde* récapitule les informations communiquées par des pays d'endémie palustre ainsi que des renseignements émanant d'autres sources. Il s'attache à mettre à jour les analyses figurant dans le Rapport 2012. Il souligne les progrès accomplis dans le but de contribuer au respect des objectifs internationaux fixés à l'horizon 2015 et décrit les défis actuels en ce qui concerne la lutte et l'élimination du paludisme dans le monde.

Les années écoulées depuis 2000 ont été marquées par une augmentation considérable du financement et de la couverture des programmes de lutte contre le paludisme. Cette situation a conduit à une réduction à grande échelle de l'incidence du paludisme et de la mortalité. Si l'on se fonde sur les données soumises, 59 pays sur 103 où la transmission du paludisme était active en 2000 atteignent l'Objectif du Millénaire pour le développement (OMD) d'inverser la tendance du paludisme. Parmi ceux-ci, 52 sont en bonne voie pour atteindre les cibles fixées par l'Assemblée mondiale de la santé et par le partenariat Roll Back Malaria (RBM « Faire reculer le paludisme ») : réduire de 75 % le nombre de cas de paludisme d'ici 2015, et notamment dans huit pays de la région Afrique. Dans 41 pays, il n'est pas possible d'évaluer les tendances à partir des données soumises en raison des incohérences dans l'exhaustivité des données dans le temps, des modifications dans les pratiques diagnostiques ou le recours aux services de santé. Pour ces pays, qui représentaient 80 % des cas en 2000, il est nécessaire d'extrapoler les tendances à partir des estimations des taux d'incidence des cas et de mortalité imputables au paludisme.

Dans le monde, entre 2000 et 2012, les taux de mortalité estimés dus au paludisme ont chuté de 42 % dans toutes les tranches d'âge et de 48 % chez les enfants de moins de cinq ans. Si le taux annuel de diminution observé au cours des 12 dernières années se confirme, alors les taux de mortalité imputables au paludisme pourraient diminuer de 52 % dans toutes les tranches d'âge, et de 60 % chez les enfants de moins de cinq ans, d'ici 2015. Ainsi, cela représente une avancée importante vers la cible de l'Assemblée mondiale de la santé visant à réduire les taux de mortalité du paludisme de 75 % d'ici 2015.

La modélisation suggère que 3,3 millions de décès imputables au paludisme ont été évités entre 2001 et 2012, et que 69 % de ces vies sauvées se situaient dans les dix pays où la charge du paludisme était la plus élevée en 2000. Des progrès sont donc accomplis là où ils comptent le plus. Il a été estimé qu'environ 3 millions (90 %) des décès évités entre 2001 et 2012 concernaient des enfants de moins de cinq ans en Afrique subsaharienne. Cela représente 20 % des 15 millions de décès d'enfants qui ont été évités en Afrique subsaharienne depuis 2000 selon les estimations, en raison des réductions globales des taux de mortalité infantile. Par conséquent, les diminutions du nombre de décès dus au paludisme ont considérablement contribué à progresser vers la réalisation de l'OMD 4, qui est de réduire de deux tiers, entre 1990 et 2015, le taux de mortalité des enfants de moins de cinq ans.

Cependant, entre 2011 et 2012, le rythme de diminution des taux de mortalité estimés imputables au paludisme a ralenti. Ce ralentissement s'explique en partie parce que la modélisation qui est appliquée pour estimer le taux de décès chez les enfants de moins de cinq ans en Afrique utilise les données de la couverture des moustiquaires imprégnées d'insecticides longue durée (MII), alors que cette couverture a stagné entre 2011 et 2012 suite aux baisses du financement de la lutte contre le paludisme en 2011. En 2012, le financement des programmes de lutte contre le paludisme a été estimé à moins de la moitié des US$ 5,1 milliards estimés nécessaires au niveau mondial. Des millions de personnes à risque de paludisme n'ont toujours pas accès aux interventions telles que les MII, les pulvérisations intradomiciliaires d'insecticides à effet rémanent (PII), les tests de diagnostic et les combinaisons thérapeutiques à base d'artémisinine (CTA). En conséquence, il a été estimé qu'en 2012, environ 207 millions de cas (intervalle d'incertitude : 135-287 millions) et 627 000 décès (intervalle d'incertitude : 473 000-789 000) étaient imputables au paludisme. Il est urgent d'augmenter le financement de la lutte contre le paludisme et d'élargir la couverture des interventions, pour atteindre les cibles de réduction des cas et de décès fixées à l'échelle internationale.

Élaboration de politiques

Des nouvelles politiques, des politiques actualisées, des manuels opérationnels, des plans et des initiatives sur la lutte contre le paludisme ont été publiés en 2013, suite aux réunions du Comité de pilotage de la politique de lutte antipaludique (MPAC).

1. Le MPAC, qui est devenu opérationnel en 2012, a poursuivi sa mission en 2013 consistant à fournir des conseils stratégiques et une contribution technique à l'Organisation mondiale de la Santé (OMS) sur tous les aspects de la lutte contre le paludisme et son élimination. Conformément aux recommandations du MPAC, l'OMS a publié des recommandations sur une vaste gamme de domaines politiques, notamment l'atteinte de la couverture universelle des MII, l'estimation de leur longévité, et le renforcement des capacités en matière d'entomologie du paludisme et de la lutte antivectorielle.
2. Parmi les autres recommandations publiées par l'OMS en 2013, on peut citer (i) un manuel pratique pour les PII ; (ii) un manuel pratique pour la gestion des gîtes larvaires ; (iii) des protocoles de test pour le suivi de la résistance aux insecticides chez les moustiques vecteurs du paludisme ; (iv) un guide pratique sur la chimioprévention du paludisme saisonnier (CPS) ; (v) un guide pratique sur la prise en charge du paludisme grave ; (vi) un cadre d'intervention pour la riposte à la résistance à l'artémisinine dans la sous-région du Grand Mékong ; (vii) un manuel pratique sur la lutte antipaludique dans les situations d'urgence complexes (élaboré avec le concours de plusieurs partenaires institutionnels) ; et (viii) trois manuels de formation.

Financement de la lutte antipaludique

Il est prévu que les fonds affectés à la lutte antipaludique en provenance de l'ensemble des sources de financements internationaux et nationaux atteignent US$ 2,5 milliards en 2012, c'est-à-dire un

montant sensiblement inférieur aux ressources nécessaires pour atteindre les cibles fixées au niveau mondial.

3. Les financements internationaux alloués aux pays d'endémie palustre ont nettement augmenté, passant d'un peu moins de US$ 100 millions en 2000 à US$ 1,6 milliard en 2011 et ont été estimés à US$ 1,94 milliard en 2012 et 1,97 milliards en 2013. Toutefois, l'augmentation des financements internationaux a ralenti au cours des dernières années, passant à une moyenne de 4 % par an entre 2009 et 2013, par rapport à une moyenne annuelle de 43 % entre 2005 et 2009.
4. Les données soumises suggèrent que le financement national de la lutte contre le paludisme a augmenté au cours de la période 2005-2012, passant de US$ 436 millions en 2005 à US$ 522 millions en 2012. L'augmentation des dépenses nationales consacrées au paludisme a été estimée à un taux annuel de 4 % entre 2005 et 2012.
5. Dans le Plan d'action mondial contre le paludisme (GMAP) du partenariat RBM en 2008, les besoins en ressources à l'échelle mondiale ont été estimés à plus de US$ 5,1 milliards par an entre 2011 et 2020. En combinant les fonds nationaux et internationaux, les ressources disponibles pour la lutte antipaludique dans le monde ont été estimées à US$ 2,5 milliards en 2012, laissant un écart de US$ 2,6 milliards. Les prévisions pour les ressources nationales et internationales disponibles entre 2013 et 2016 indiquent que le financement total de la lutte contre le paludisme atteindra environ US$ 2,85 milliards entre 2014 et 2016, un montant sensiblement inférieur aux besoins pour concrétiser l'accès universel aux interventions antipaludiques.
6. Les financements internationaux de la lutte antipaludique ont visé les pays où le revenu national brut par habitant était le plus faible et où les taux de mortalité étaient les plus élevés, notamment les pays d'Afrique. Toutefois, les financements nationaux sont plus élevés dans les pays les plus riches et plus faibles dans les pays où les taux de mortalité imputables au paludisme sont plus élevés. Les faibles niveaux de dépenses intérieures des pays où le fardeau de la maladie est le plus lourd s'expliquent principalement par un revenu intérieur par habitant plus faible dans ces pays.
7. Il existe des disparités entre les degrés de priorité accordés à la lutte contre le paludisme par les gouvernements nationaux ayant des niveaux de ressources disponibles similaires. Les pays qui font preuve d'un engagement plus important, mesuré par un indice de priorité des investissements nationaux, ont eu davantage de succès dans la réduction de l'incidence des cas de paludisme entre 2000 et 2012 que les autres pays.

Progrès réalisés dans la lutte antivectorielle

En Afrique subsaharienne, le pourcentage de la population ayant accès à une MII au sein de leur foyer a fortement augmenté entre 2005 et 2011, mais a plafonné ces deux dernières années pour repasser à 42 % en 2013. Des distributions plus importantes de MII au cours des deux prochaines années pourraient accroître la couverture.

Moustiquaires imprégnées d'insecticide

8. Dès 2012, 34 pays de la Région Afrique et 82 pays situés dans d'autres régions du monde avaient adopté les recommandations de l'OMS préconisant la fourniture de MII à toutes les personnes exposées au paludisme. Au total, 88 pays, dont 39 en Afrique, distribuent gratuitement des MII.
9. Chaque année, selon les estimations, au moins 150 millions de MII sont nécessaires pour maintenir un approvisionnement de 450 millions de MII dans les foyers pour une période de trois ans et protéger toutes les populations à risque de paludisme en Afrique subsaharienne. Le nombre annuel de MII livrées par les fabricants aux pays d'endémie palustre en Afrique subsaharienne a augmenté pour passer de 6 millions en 2004 à 145 millions en 2010. Toutefois, en 2011, seulement 92 millions de MII ont été livrés par les fabricants et leur nombre était de seulement 70 millions en 2012. Le nombre estimé de MII livrées en 2013 (136 millions) et le nombre de MII couvertes par des dons en 2014 (environ 200 millions) sont proches du nombre de MII nécessaire tous les ans pour protéger toutes les populations à risque. Pourtant, malgré l'augmentation des livraisons annuelles, le nombre total de MII sur trois ans (400 millions), cumulant les MII livrées en 2012, celles dont la livraison est estimée pour la fin de 2013 et celles pour lesquelles le financement a été réuni pour 2014, reste inférieur au nombre minimum requis pour protéger toutes les personnes exposées au paludisme. Les niveaux adaptés de livraison de MII requis doivent être assurés chaque année, pour garantir la disponibilité des MII dans les foyers et l'accès à une MII à toute personne à risque de paludisme.
10. Le pourcentage de ménages possédant au moins une MII en Afrique subsaharienne a augmenté selon les estimations, passant de 3 % en 2000 à 56 % en 2012, puis a légèrement diminué pour passer à 54 % en 2013. Le pourcentage de la population ayant accès à une MII au sein de son foyer a augmenté pendant la même période, pour atteindre 44 % en 2012 et 42 % en 2013. La proportion de la population dormant sous une MII, représentant la population directement protégée, a été estimée à 38 % en 2012 et 36 % en 2013.
11. La comparaison du pourcentage de la population ayant un accès à une MII et du pourcentage dormant sous cette moustiquaire laisse penser qu'une forte proportion (86 %) de la population ayant accès à cette protection l'utilise réellement, indiquant que les efforts visant à encourager son utilisation ont été efficaces. Le principal obstacle empêchant un plus grand nombre de personnes exposées au paludisme de dormir sous une MII se résume à la disponibilité insuffisante des moustiquaires.
12. L'utilisation de MII au sein des populations vulnérables, comme les femmes enceintes et les enfants de moins de cinq ans, est supérieure à la fréquence de son utilisation en population générale. Cela indique que ces groupes restent mieux protégés tandis que les pays intensifient leurs efforts vers une couverture universelle des MII, et souligne le besoin d'augmenter l'accès à cette moustiquaire pour toutes les personnes à risque.

Pulvérisations intradomiciliaires d'insecticides à effet rémanent (PII)

13. Les PII à l'aide d'insecticides à effet rémanent constituent encore un outil de lutte antivectorielle puissant destiné à réduire ou interrompre la transmission du paludisme. En 2012,

88 pays, dont 40 pays dans la Région Afrique, recommandaient les PII dans la lutte contre le paludisme.

14. En 2012, 135 millions de personnes (4 % de la population mondiale exposée) étaient protégés par des PII dans le monde. Dans la Région Afrique, la proportion de la population exposée qui a été protégée a augmenté, passant de moins de 5 % en 2005 à 11 % en 2010, puis est tombée à 8 % en 2012, avec 58 millions de bénéficiaires. La diminution du nombre de personnes protégées par des PII en Afrique semble en partie due à une augmentation du recours à des insecticides non-pyréthrinoïdes plus coûteux, en réaction à la menace de la résistance aux insecticides dans un contexte de budgets alloués aux PII limités. L'utilisation d'insecticides non pyréthrinoïdes pour les PII peut devenir de plus en plus importante en tant qu'outil de gestion de la résistance, car actuellement toutes les MII approuvées sont à base de pyréhrinoïde.

Résistance aux insecticides

15. Une résistance des moustiques à au moins un insecticide utilisé dans la lutte contre le paludisme a été constatée dans au moins 64 pays d'endémie palustre dans le monde. En mai 2012, l'OMS et le partenariat RBM ont publié le Plan mondial pour la gestion de la résistance aux insecticides chez les vecteurs du paludisme (GPIRM). Le GPIRM est une stratégie à cinq piliers de gestion de la menace de résistance aux insecticides. Les parties prenantes de la communauté mondiale de lutte contre le paludisme ont entamé des interventions liées à la mise en œuvre de la stratégie élaborée dans le Plan mondial pour la gestion de la résistance aux insecticides.

16. Le suivi de la résistance aux insecticides est une composante indispensable au déploiement des interventions de lutte antivectorielle fondées sur des insecticides. En 2012, 58 pays ont signalé avoir adopté une politique de suivi systématique de la résistance aux insecticides.

Progrès réalisés en matière de chimioprévention

Parmi les pays africains soumettant ces données à l'OMS en 2012, le pourcentage médian de femmes enceintes se présentant dans des établissements de soins prénatals et ayant reçu au moins une dose du traitement préventif intermittent (TPI) durant leur grossesse était de 64 % tandis que 38 % avaient reçu au moins deux doses et 23 % au moins trois doses, pointant vers une marge d'amélioration considérable dans le domaine de la protection des femmes enceintes.

17. En Afrique subsaharienne, il a été estimé que 35 millions de femmes enceintes et une grande partie des 26 millions de nourrissons nés chaque année tireraient avantage d'une TPI. En outre, environ 25 millions d'enfants dans la région sahélienne de l'Afrique subsaharienne pourraient être protégés contre le paludisme au moyen d'une chimioprévention saisonnière du paludisme (CSP).

18. Au total, en Afrique subsaharienne, 36 pays où l'intensité de la transmission du paludisme est comprise entre modérée et élevée ont adopté dès la fin 2012 le TPI pour femmes enceintes (TPIp) comme politique nationale. Dans la Région Pacifique occidental, la Papouasie-Nouvelle-Guinée a également adopté cette politique en 2009.

19. Dans 26 pays sur les 36 pays de la Région Afrique où la transmission du paludisme est de modérée à élevé, qui ont adopté le TPIp en tant que politique nationale et pour lesquels des données sont disponibles, 64 % (médiane) des femmes enceintes se présentant dans des établissements de soins prénatals ont reçu en 2012 au moins une dose du traitement préventif intermittent durant leur grossesse, 38 % ont reçu au moins deux doses et 23 % au moins trois doses. Dans les 13 pays de la Région Afrique disposant de données provenant d'enquêtes auprès des ménages sur la période 2010-2012, la moyenne pondérée de toutes les femmes ayant reçu une dose de TPIp pendant leur grossesse était de 37 % ; 23 % avaient reçu deux doses et 8 % trois doses.

20. Depuis octobre 2012, l'OMS recommande d'administrer une dose de TPIp à chaque visite prénatale programmée après le premier trimestre de grossesse. L'analyse des données issues d'enquêtes auprès des ménages indique que la proportion de femmes enceintes qui reçoit le TPIp est très inférieure à celle des femmes se présentant dans des établissements prénatals. Le pourcentage estimé de visites dans ces établissements au cours desquelles le TPIp pourrait être administré mais n'est pas administré est élevé, se montant à 72 %. La proportion de femmes bénéficiant du TPIp au cours de leurs visites prénatales est inférieure au pourcentage de femmes recevant l'anatoxine tétanique (une autre composante clé des soins prénatals). Cet écart indique que la capacité à fournir des services préventifs pendant les visites prénatales est très élevée, et que les obstacles au TPIp peuvent être franchis.

21. Tous les nourrissons exposés à un risque d'infection par *P. falciparum* dans des pays d'Afrique subsaharienne où l'intensité de la transmission est comprise entre modérée et élevée et où les niveaux de résistance des parasites aux agents recommandés (la sulfadoxine-pyriméthamine) sont faibles, devraient recevoir un traitement préventif contre le paludisme par les services de vaccination, selon des intervalles définis correspondant aux calendriers de vaccination systématique. Seul un pays, le Burkina Faso, a fait du TPI un élément de sa politique nationale dans le cas des nourrissons depuis sa recommandation par l'OMS en 2009.

22. En mars 2012, l'OMS a publié des recommandations sur la chimioprévention saisonnière du paludisme (CSP) chez les enfants âgés de 3 à 59 mois, et en août 2013, l'OMS a publié un manuel pratique pour une mise en œuvre de la CSP. Deux pays d'endémie ont adopté la CSP et plusieurs pays impliqués dans l'évaluation de la politique ont indiqué qu'ils prévoyaient d'adopter cette politique et d'élargir la couverture de la CSP à d'autres populations que celle de l'étude.

Progrès réalisés en matière de test de diagnostic et de traitement antipaludique

Les achats de tests de diagnostic rapide (TDR) et de combinaisons thérapeutiques à base d'artémisinine (CTA) sont en augmentation tout comme le taux notifié des tests de diagnostic dans le secteur public de la Région Afrique qui est passé de 37 % en 2010 à 61 % en 2012. En conséquence, une réduction du nombre de cas suspectés de paludisme traités présomptivement par des antipaludiques a été observée. Toutefois, des millions de personnes chez qui un paludisme

est suspecté ne reçoivent toujours pas de test de diagnostic, et de nombreuses personnes dont l'infection est confirmée ne bénéficient pas d'un traitement antipaludique approprié satisfaisant aux normes d'assurance qualité.

Tests de diagnostic

23. La mise en œuvre universelle des tests de diagnostic dans les secteurs publics et privés réduirait considérablement les besoins en traitements antipaludiques dans le monde. En 2012, 41 des 44 pays de la Région Afrique affichant encore des taux de transmission du paludisme et 48 sur 55 pays des autres Régions de l'OMS ont signalé avoir adopté une politique visant à fournir le diagnostic parasitologique à toutes les tranches d'âge, ce qui représente six pays de plus qu'en 2009 pour la Région Afrique.

24. Le test de diagnostic du paludisme est offert gratuitement dans le secteur public de 84 pays dans le monde. La proportion des cas suspects de paludisme soumis à un test de diagnostic dans le secteur public a augmenté, passant de 37 % en 2010 à 61 % en 2012 dans la Région Afrique et de 44 % à 64 % dans le monde. L'essentiel de cette augmentation dans la Région Afrique est imputable à une utilisation accrue des TDR, qui représente 40 % de tous les cas dépistés dans la Région en 2012.

25. Le nombre de patients soumis à un examen microscopique a augmenté, pour culminer à 188 millions en 2012, tandis que l'Inde représente plus de 120 millions d'examens de prélèvements sanguins sur lames. Le nombre de TDR fournis par les fabricants est passé de 88 millions en 2010 à 205 millions en 2012. Ce chiffre comprend les ventes accrues pour les tests spécifiques de *P. falciparum* et les tests combinés qui peuvent détecter plus d'une espèce de parasites.

26. Au total, 48 pays ont déclaré avoir déployé des TDR au niveau communautaire et 15 millions de patients ont été soumis à un test de diagnostic grâce à ces programmes en 2012, selon les notifications. D'après l'analyse des données issues des enquêtes auprès des ménages de 14 pays menées entre 2010 et 2012, il semblerait que les tests de diagnostic soient moins répandus dans le secteur privé que dans le secteur public.

27. Les TDR sont de plus en plus utilisés pour le dépistage des cas suspects de paludisme dans les établissements de santé, notamment pour le diagnostic de *P. vivax*. Sur les 42 pays précisant le type de TDR utilisé, 15 ont déclaré avoir déployé des TDR capables de dépister spécifiquement *P. vivax*. Dans ces pays, le pourcentage de cas infectés par *P. vivax* confirmés par TDR (plutôt que par microscopie) était similaire au pourcentage de cas infectés par *P. falciparum* confirmés par TDR.

Traitement

28. Une CTA est recommandée dans le traitement de première intention du paludisme à *P. falciparum*, le parasite *Plasmodium* le plus dangereux qui infecte les humains. En 2012, 79 pays et territoires ont adopté la CTA en traitement de première intention pour le paludisme à *P. falciparum*. Le paludisme à *P. vivax* doit être traité par la chloroquine partout où cet antipaludique reste efficace ou par une CTA dans les zones où *P. vivax* est résistant à la chloroquine. Le traitement du paludisme à *P. vivax* doit être complété par l'administration de primaquine pendant 14 jours afin d'éviter les rechutes.

29. Selon les rapports de fabricants et le Dispositif pour des médicaments abordables pour le paludisme (DMAp), le nombre de traitements par CTA livrés aux secteurs publics et privés dans le monde a augmenté, passant de 11 millions en 2005 à 76 millions en 2006, pour atteindre 331 millions en 2012. Cette hausse des achats de CTA en 2012 s'explique en grande partie par une augmentation d'environ 50 % des livraisons dans le secteur public entre 2011 et 2012. L'achat de médicaments pour le secteur public et le secteur privé par le DMAp – qui est actuellement dans une phase de transition vers une éventuelle intégration dans un processus d'octroi de subventions systématique pour le Fonds mondial de lutte contre le sida, la tuberculose et le paludisme (le Fonds mondial), s'est légèrement ralenti, passant de 156 millions de traitements en 2011 à 150 millions en 2012.

30. Il est difficile de savoir dans quelle mesure les patients dont le paludisme a été confirmé ont reçu des traitements antipaludiques car les informations reliant le test de diagnostic au traitement ont été limitées dans les deux enquêtes auprès des ménages et les systèmes d'information sanitaire courants. Il est possible d'estimer la proportion de patients dans le secteur public potentiellement traitée par CTA (plutôt que par un antipaludique moins efficace) en comparant le nombre de traitements par CTA distribués par les programmes nationaux au nombre de cas de paludisme présumés (traités sans test préalable) et de cas de paludisme à *P. falciparum* confirmés (par examen microscopique ou TDR) (corrigés pour l'exhaustivité des données soumises, ou estimés dans les situations où les données n'ont pas été soumises). Cette proportion varie en fonction des Régions de l'OMS, mais a augmenté au fil du temps dans la Région Afrique, où elle a atteint 60 % en 2012.

31. Dans neuf pays de la Région Afrique où plus d'une enquête auprès des ménages a été menée entre 2006 et 2012, la proportion d'enfants fébriles sous antipaludiques ayant reçu une CTA a augmenté au fil du temps, dans le secteur public comme le secteur privé. Dans les enquêtes les plus récentes, le pourcentage médian d'enfants sous antipaludiques ayant reçu une CTA était de 68 % ; toutefois, une part importante d'enfants n'étant pas présentée aux services de soins pour un motif de fièvre, et tous les enfants chez qui un paludisme est suspecté ne recevant pas un test diagnostique, le pourcentage de tous les enfants atteints de paludisme recevant une CTA est probablement très inférieur. Dans 26 enquêtes auprès des ménages menées entre 2010 et 2012 se fondant sur un résultat positif au TDR chez les enfants fébriles comme indicateur indirect pour confirmer le diagnostic de paludisme, le pourcentage moyen de tous les enfants dont l'infection a été confirmée et qui ont reçu une CTA était de 16 % (extrêmes : 1 %-42 %). Un accès accru aux soins en cas de fièvre, ainsi que des tests de diagnostic et une prise en charge thérapeutique adaptée dans tous les lieux de soins, sont indispensables pour garantir que tous les patients souffrant de paludisme reçoivent un traitement rapide et efficace.

32. Dans la Région Afrique en 2012, le nombre total de tests (examens microscopiques et TDR) était presque équivalent au nombre de CTA distribuées par les programmes nationaux de lutte contre le paludisme, ce qui signifie que le rapport a augmenté comparé aux années précédentes. Toutefois,

dans la plupart des zones d'endémie palustre, le rapport attendu devrait dépasser deux, car moins de la moitié des cas suspectés de paludisme seront confirmés et nécessiteront un traitement par une CTA.

Résistance aux médicaments antipaludiques

33. L'OMS recommande de retirer progressivement du marché les monothérapies à base d'artémisinine par voie orale et de les remplacer par des CTA, une politique adoptée par l'Assemblée mondiale de la santé en 2007. Le nombre de pays autorisant encore la commercialisation de ces produits a diminué, passant de 55 pays en 2008 à 9 pays en novembre 2013, dont 6 se trouvent dans la Région Afrique. Le nombre de compagnies pharmaceutiques commercialisant ces produits a chuté, passant de 38 en 2010 à 30 en 2013. La plupart des pays qui autorisent encore la commercialisation des monothérapies se trouvent dans la Région Afrique, alors que la majorité des fabricants sont implantés en Inde.

34. Les études relatives à l'efficacité thérapeutique restent la norme de référence pour orienter les politiques sur les médicaments. Elles doivent être réalisées tous les deux ans. En 2011 et 2012, des études d'efficacité au sujet des traitements antipaludiques de première ou de seconde intention ont été effectuées dans 48 des 67 pays (72 %) où étudier l'efficacité de ce type de médicaments face à *P. falciparum* est possible, ce qui représente une hausse par rapport aux 31 pays sur 75 (41 %) en 2008-2009. (Ces études sont impossibles dans 32 pays d'endémie, du fait de la faible incidence du paludisme ou du fait d'une endémie uniquement liée à *P. vivax*.)

35. Des cas possibles de résistance des parasites aux artémisinines ont été identifiés dans quatre pays de la sous-région du Grand Mékong : le Cambodge, le Myanmar, la Thaïlande et le Viet Nam. Malgré les changements observés dans la sensibilité des plasmodies aux artémisinines, les CTA continuent à guérir des patients lorsque le médicament partenaire reste efficace. Toutefois, dans la province de Pailin au Cambodge, on a observé une résistance aux deux composants des CTA multiples. Des dispositions spéciales ont donc été prises pour une thérapie sous surveillance directe par une association ne contenant pas d'artémisinine (atovaquone-proguanil).

    En avril 2013, l'OMS a publié *Emergency response to artemisinin resistance in the Greater Mekong subregion : Regional framework for action 2013 – 2015* (*Riposte d'urgence à la résistance à l'artémisinine dans la sous-région du Grand Mékong : un cadre d'intervention régional pour 2013-2015*). Le document décrit les domaines prioritaires où des actions sont requises dans les années à venir pour juguler la résistance à l'artémisinine.

Surveillance, suivi et évaluation du paludisme

Les rapports soumis en 2012 par 62 pays sur 103 où la transmission du paludisme persistait en 2000, ont été considérés comme suffisamment cohérents pour tirer des conclusions fiables sur les tendances en matière de paludisme entre 2000 et 2012. Dans les 41 autres pays représentant 80 % des cas estimés, il n'a pas été possible d'évaluer de manière fiable les tendances du paludisme à l'aide des données soumises à l'Organisation. Les systèmes d'information sont plus faibles et les difficultés pour les renforcer sont plus importantes là où le fardeau du paludisme est le plus lourd.

36. En 2012, les systèmes d'information sanitaires courants n'ont dépisté que 14 % des cas estimés dans le monde. Les taux de dépistage des cas sont les plus faibles dans les pays où le nombre de cas de paludisme est le plus élevé. De même, le pourcentage de décès notifiés est aussi le plus faible dans les pays où le nombre de décès dus au paludisme est le plus élevé. Les systèmes de surveillance ne doivent pas dépister tous les cas pour évaluer les tendances de manière fiable ; toutefois, les actions de dépistage doivent être raisonnablement uniformes dans le temps. Les pays où le nombre de cas estimés est moindre semblent plus à même d'estimer les tendances dans l'incidence du paludisme. Dans les 41 pays représentant 80 % des cas estimés en 2000, il n'est pas possible d'évaluer de manière fiable les tendances 2000-2012 du paludisme à l'aide des données soumises à l'Organisation. Ainsi, les systèmes d'information sont les plus faibles là où le fardeau du paludisme est le plus lourd.

37. Les enquêtes auprès des ménages sont plus fréquentes dans les pays où le nombre de cas de paludisme est le plus élevé tandis que la transmission de données systématique est moins fréquente. Cinquante pays, parmi lesquels 34 situés dans la Région Afrique, ont mené au moins une enquête auprès des ménages au cours de la période de trois ans de 2011 à 2013. Les indicateurs les plus fréquemment mesurés étaient ceux de la disponibilité des MII et de l'utilisation d'antipaludiques. Seules 25 % des enquêtes posaient des questions sur les cas de fièvre bénéficiant d'une piqûre au bout du doigt ou au talon, alors que 90 % interrogeaient sur les traitements antipaludiques. Cette caractéristique devra changer si les progrès vers le dépistage universel doivent être suivis. Le nombre d'enquêtes mesurant la prévalence parasitaire a augmenté depuis 2005, passant à 81 % de toutes les enquêtes menées en 2011 et 2013.

Impact de la lutte antipaludique

Depuis 2000, plus de la moitié des pays d'endémie palustre cette année-là ont enregistré des diminutions de l'incidence de cas de paludisme confirmés ou de la notification des admissions et des décès (ou les deux). Dans le monde, entre 2000 et 2012, les taux de mortalité estimés dus au paludisme ont chuté de 42 % dans toutes les tranches d'âge et de 48 % chez les enfants de moins de cinq ans. Si le taux annuel de diminution observé au cours des 12 dernières années se confirme, alors il est prévu que les taux de mortalité dus au paludisme diminuent de 52 % dans toutes les tranches d'âge et de 60 % chez les enfants de moins de cinq ans d'ici 2015.

38. En 2012, 3,4 milliards de personnes étaient exposées au paludisme selon les estimations. Sur ce total, 2,2 milliards couraient un faible risque (< un cas notifié pour 1 000 habitants), parmi lesquels 94 % ne vivaient pas dans la Région Afrique. Le 1,2 milliard de personnes à haut risque (> un cas pour 1 000 habitants) vivait principalement dans la Région Afrique (47 %) et la Région d'Asie du Sud-Est (37 %).

39. Si l'on se fonde sur les données soumises, 59 pays sur 103 où la transmission du paludisme était active en 2000 atteignent l'OMD d'inverser la tendance du paludisme. Parmi ceux-ci, 52 sont en bonne voie pour atteindre les cibles fixées par l'Assemblée mondiale de la santé et par le partenariat RBM : réduire de

75 % le nombre de cas de paludisme d'ici 2015, et notamment dans huit pays de la région Afrique.

40. La diminution de l'incidence de *P. falciparum* est, en moyenne, plus importante que celle de *P. vivax*, laissant penser que *P. vivax* réagit plus lentement aux interventions de lutte, probablement en raison de ses caractéristiques biologiques. En conséquence, de nombreux NMPC doivent mettre l'accent sur la lutte contre *P. vivax* tandis que l'élimination est proche, notamment dans les zones hors d'Afrique subsaharienne. Dans les pays où les deux espèces sont transmises, *P. vivax* prédomine dans les pays en phase de pré-élimination et d'élimination.

41. Sur les 97 pays où la transmission perdure en 2013, 12 sont classés dans la phase de pré-élimination dans la lutte antipaludique, et 7 dans la phase d'élimination. Sept autres pays sont en phase de prévention de la réintroduction de la maladie. En 2012, la Région Europe a notifié seulement 255 cas autochtones ; en conséquence, elle est sur le point de réaliser l'objectif d'élimination du paludisme de la Région d'ici 2015, conformément à l'objectif fixé dans la Déclaration de Tashkent (2005). Toutefois, des flambées récentes en Grèce et en Turquie soulignent la menace continue de réintroduction et la nécessité d'assurer une vigilance permanente afin de garantir que toute résurgence est rapidement jugulée.

42. Les 52 pays où une diminution de l'incidence du paludisme de 75 % est prévue d'ici 2015 (selon les données soumises) représentaient seulement 8 millions de cas (4 %) sur un nombre total estimé de 226 millions de cas en 2000. Cette situation s'explique en partie par les progrès plus rapides dans les pays où le nombre de cas est plus faible, mais la qualité insuffisante des données de surveillance soumises par les pays où le nombre de cas est plus élevé joue aussi un rôle. Une amélioration de la surveillance et de l'évaluation dans les pays les plus accablés par le fardeau du paludisme est essentielle pour évaluer correctement l'impact des investissements pour la lutte antipaludique.

43. Les pays ayant le nombre de cas le plus élevé étant moins susceptibles de soumettre des données suffisamment cohérentes, il est essentiel d'extrapoler les tendances dans ces pays à partir des estimations du nombre de cas, plutôt que des données de surveillance. Le nombre de cas de paludisme a été estimé à 207 millions dans le monde en 2012 (marge d'incertitude : 135-287 millions). La majorité des cas (80 %) sont situés en Afrique subsaharienne selon les estimations. Environ 9 % des cas estimés dans le monde sont dus à *P. vivax*, même si la proportion hors du continent africain est de 50 %. L'incidence du paludisme a chuté de 25 % dans le monde entre 2000 et 2012 et de 31 % dans la Région Afrique, selon les estimations. Si le taux annuel de diminution observé au cours des 12 dernières années perdure, alors l'incidence des cas de paludisme diminuera de 36 % dans le monde d'ici 2015 et de 44 % dans la Région Afrique selon les prévisions.

44. Il a été estimé que 627 000 décès étaient imputables au paludisme dans le monde en 2012 (marge d'incertitude : 473 000-789 000). La plupart des décès estimés (90 %) ont lieu en Afrique subsaharienne et chez les enfants de moins de cinq ans (77 %). Entre 2000 et 2012, les taux de mortalité estimés imputables au paludisme ont diminué de 42 % dans le monde et de 49 % dans la Région Afrique ; chez les enfants de moins de cinq ans, les décès ont diminué de 48 % dans le monde et de 54 % dans la Région Afrique, selon les estimations. Si le taux annuel de diminution observé au cours des 12 dernières années se confirme, alors les taux de mortalité imputables au paludisme diminueront de 52 % dans le monde d'ici 2015 et de 62 % dans la Région Afrique, selon les prévisions. Le pourcentage de décès prévu chez les enfants de moins de cinq ans devrait diminuer de 60 % dans le monde et de 68 % dans la Région Afrique d'ici 2015.

45. Le rythme de la diminution des taux de mortalité estimés imputables au paludisme s'est accéléré à partir de 2005, mais a ralenti entre 2011 et 2012. Ce ralentissement s'explique en partie parce que la modélisation qui est appliquée pour estimer les taux de décès chez les enfants de moins de cinq ans en Afrique utilise les données de la couverture des MII pour ajuster le pourcentage de tous les décès dus au paludisme, alors que cette couverture a stagné entre 2011 et 2012 suite à des baisses du financement de la lutte contre le paludisme en 2011.

46. Plus de 80 % des décès imputables au paludisme en 2012 ont eu lieu dans seulement 17 pays, et 80 % des cas de paludisme sont comptabilisés dans 18 pays, notamment la République démocratique du Congo et le Nigeria, représentant à eux deux 40 % du total mondial, selon les estimations. Les cibles de réduction des cas et des décès ne seront pas atteintes, à moins que des progrès importants soient réalisés dans les pays représentant la part du fardeau du paludisme la plus lourde.

47. Quatre pays représentent plus de 80 % des cas dus à *P. vivax* (Éthiopie, Inde, Indonésie et Pakistan) selon les estimations. Le paludisme à *P. vivax* a été associé à un paludisme sévère et au décès, même si le risque d'infection sévère et les taux de létalité dus à une infection à *P. vivax* n'ont pas été fermement établis. Les comorbidités, notamment un état de malnutrition concomitant, sont suspectées d'accroître le risque d'infection sévère à *P. vivax*, même si le risque reste mal défini. Des études plus approfondies sont nécessaires pour affiner les connaissances existantes sur la forme de paludisme à *P. vivax* sévère et les risques de maladie sévère et de décès imputables à cette infection.

48. Les progrès visant à réduire l'incidence des cas de paludisme et les taux de mortalité ont été plus rapides dans les pays où le nombre de cas et de décès était plus faible en 2000. Toutefois, la vaste majorité du nombre de cas et de décès évités entre 2000 et 2012 a été observée dans des pays où le fardeau du paludisme était le plus lourd en 2000. Si l'incidence du paludisme et les taux de mortalité en 2000 étaient restés stables au cours de la décennie, 500 millions de cas supplémentaires et 3,3 millions de décès en plus auraient été à déplorer entre 2001 et 2012. La majorité des cas de paludisme évités (67 %) et des vies sauvées (93 %) est située dans la Région Afrique.

49. Il a été estimé que sur les 3,3 millions de décès évités entre 2001 et 2012, 3 millions (90 %) concernaient des enfants de moins de cinq ans en Afrique subsaharienne. Ils représentent environ 20 % des 15 millions de décès qui ont été évités depuis 2000 parmi les moins de cinq ans en Afrique subsaharienne. Par conséquent, les diminutions du nombre de décès dus au paludisme ont considérablement contribué à progresser vers la réalisation de l'OMD 4, qui est de réduire de deux tiers, entre 1990 et 2015, le taux de mortalité des enfants de moins de cinq ans.

Prefacio

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Este año, el *Informe Mundial sobre el Paludismo* documenta un progreso notable en la lucha mundial contra la malaria, e incluye una actualización de la carga por malaria para el periodo 2000 a 2012. El reporte muestra que el aumento del compromiso político y la ampliación de las inversiones en malaria a nivel mundial desde el 2000 han dado lugar a grandes avances contra esta enfermedad prevenible, salvando un estimado de 3.3 millones de vidas.

Cada año entendemos mejor las tendencias de la malaria a nivel mundial y la carga de la enfermedad, medidos en relación a la situación en el 2000. De acuerdo a los últimos estimados las tasas de mortalidad por malaria se redujeron aproximadamente en 42% a nivel mundial y en 49% en la región africana entre 2000 y 2012. Durante el mismo periodo, las tasas de incidencia de malaria disminuyeron en 25% alrededor del mundo, y en 31% en la región de África. Estas reducciones tan sustanciales ocurrieron como resultado de un incremento en las intervenciones para el control del vector, realización de pruebas de diagnóstico y tratamiento con terapias combinadas con artemisinina o TCA.

Sin embargo, este progreso no es motivo de satisfacción. Los números absolutos de casos y muertes por malaria no están disminuyendo tan rápido como deberían. La enfermedad todavía cobró un estimado de 627 000 vidas en 2012, principalmente de niños de menos de cinco años de edad en África. Esto significa que se pierden 1300 vidas jóvenes por malaria cada día – un fuerte recordatorio que todavía queda un largo camino por recorrer para el triunfo sobre este enemigo tan antiguo. El hecho que tanta gente se esté muriendo por las picaduras de mosquitos es una de las mayores tragedias del siglo 21.

Si el compromiso político se desvanece, el gran progreso que se ha logrado podría perderse, en algunos lugares en una sola temporada de transmisión. En los últimos cuantos años, hemos comenzado a ver los primeros signos de una posible desaceleración. En 2011 y 2012, la distribución de mosquiteros insecticidas de larga duración en países endémicos se desaceleró y los programas de rociado residual intradomiciliario se estabilizaron. Durante este periodo, las tasas de mortalidad por malaria continuaron disminuyendo, pero a un ritmo más lento. En 2013, las distribuciones de mosquiteros volvieron a incrementarse, y los planes en curso para el próximo año son todavía más fuertes. No obstante, todavía se necesitarán mayores esfuerzos para proteger a todos los que están en riesgo.

A medida que la comunidad internacional se mueve gradualmente hacia una agenda de desarrollo post-2015, no debemos perder de vista lo que esperan de nosotros las poblaciones más vulnerables del mundo. El concepto de cobertura universal en salud representa tanto un valor social como un acercamiento a la atención en salud que genera una mejor salud para poblaciones completas, reduce las inequidades sociales, y protege a las personas de pobreza inducida por los costos de la atención en salud. Es un concepto clave que ya está en el centro del debate de la salud mundial, y también en el debate acerca de la próxima serie de objetivos del desarrollo. El progreso contra la malaria proporciona una buena evidencia de los beneficios tangibles de que la población tenga acceso a intervenciones que salvan vidas.

El mundo también necesita mantenerse enfocado en atender el déficit mundial de financiamiento para la prevención y control de la malaria. El financiamiento disponible en la actualidad está muy por debajo de lo requerido para alcanzar el acceso universal a las intervenciones en malaria. Para alcanzar nuestro objetivo, necesitamos redoblar esfuerzos en la expansión de las herramientas para el control vectorial. También necesitamos asegurar que los grupos más vulnerables – niños menores de cinco años y mujeres embarazadas – tengan acceso a las terapias preventivas intermitentes recomendadas por la OMS, cuando sea apropiado. Si bien en años recientes el avance en cuanto al aumento en la realización de pruebas de diagnóstico y el tratamiento de calidad asegurada ha sido inmenso, estamos muy lejos de alcanzar el acceso universal.

Además, la resistencia del parásito a la artemisinina – el componente central del medicamento antimalárico más efectivo en el mundo – y la resistencia del mosquito a los insecticidas siguen siendo motivo de gran preocupación. Si no se tratan con la urgencia del caso, podrían poner en riesgo el progreso tan grande que se ha realizado desde el 2000. Aunque la OMS ha emitido estrategias mundiales para hacer frente a estos desafíos, el avance en cuanto a su adopción por parte de los países ha sido lento, principalmente por falta de financiamiento. En abril de 2013, en el Día Mundial de la Malaria, la OMS lanzó una *Respuesta de emergencia a la resistencia a la artemisinina en la subregión del Gran Mekong* para guiar a los países en la ampliación e implementación de esfuerzos para eliminar los parásitos resistentes.

El déficit de financiamiento para este esfuerzo también es considerable.

El fortalecimiento de las infraestructuras de salud, registro de datos vitales y los sistemas de vigilancia también es crítico para un seguir avanzando. En base a los datos reportados, 59 países están en camino de alcanzar el objetivo de reducir la incidencia de malaria, y 52 países están en camino de reducir sus tasas de incidencia de casos de malaria en un 75%, en línea con los objetivos para el 2015 de la Asamblea Médica Mundial y de la Alianza para Hacer Retroceder la Malaria. Sin embargo, estos 52 países aportaron solo un 4%, u ocho millones, del total de casos estimados de malaria alrededor del mundo. En 41 países endémicos, incluyendo países con las cargas más altas por malaria, no se puede hacer una evaluación confiable respecto a las tendencias de la enfermedad. Se necesita un esfuerzo conjunto para mejorar los sistemas de vigilancia y eliminar esta brecha en el conocimiento sobre la situación de la malaria.

La OMS está muy agradecida por el compromiso de los ministerios de salud de países endémicos y sus múltiples socios para el desarrollo. Estamos confiados que si continuamos determinados y actuamos con prontitud, podremos derrotar a este antiguo enemigo de una vez por todas.

Resumen y Puntos Clave

El *Informe Mundial sobre el Paludismo 2013* resume la información recibida de países endémicos para malaria y otras fuentes, y actualiza los análisis presentados en el informe del 2012. Resalta el progreso que se ha alcanzado hacia los objetivos mundiales para el control de la malaria establecidos para 2015, y describe los retos actuales para el control y eliminación de la malaria a nivel mundial.

Desde el año 2000, la gran expansión en el financiamiento y cobertura de los programas de control de la malaria ha llevado a una reducción a gran escala de la incidencia y mortalidad por malaria. En base a los datos reportados, 59 de los 103 países que habían tenido una transmisión activa de malaria en el año 2000 están alcanzando la meta de los Objetivos de Desarrollo del Milenio (ODM) de revertir la incidencia de la malaria. De estos, 52 países están en vías de alcanzar las metas de la Alianza para Hacer Retroceder la Malaria (RBM, por sus siglas en inglés) y de la Asamblea Mundial de la Salud (AMS) de reducir las tasas de incidencia de casos de malaria en un 75% para 2015, incluyendo 8 países de la región africana de la OMS. En 41 países no es posible evaluar las tendencias utilizando los datos reportados, debido a inconsistencias en cuanto a la integridad de los reportes a lo largo del tiempo, a cambios en las prácticas de diagnóstico o en el uso de los servicios de salud. Para estos países, que aportaron el 80% de los casos en el año 2000, las tendencias sobre malaria se deben inferir en base a estimados de las tasas de incidencia y mortalidad.

Entre 2000 y 2012, las tasas estimadas de mortalidad por malaria a nivel mundial disminuyeron en un 42% en todos los grupos de edad, y en un 48% en niños menores de 5 años. Si se mantiene la tasa anual de disminución de los últimos 12 años, se anticipa que para 2015 las tasas de mortalidad por malaria disminuyan en 52% para todas las edades y en 60% en niños menores de 5 años; esto representa un progreso sustancial hacia la meta de la AMS de reducir las tasas de mortalidad por malaria en un 75% para 2015.

Los modelos de datos sugieren que se evitaron aproximadamente 3.3 millones de muertes por malaria entre 2001 y 2012, y que el 69% de vidas se salvaron en 10 de los países con las mayores cargas por malaria en el 2000; por lo tanto, el progreso se está realizando donde más interesa. Se estima que en Africa subsahariana se evitaron alrededor de 3 millones (90%) de muertes en niños menores de 5 años de edad entre 2001 y 2012. Esto representa el 20% de las 15 millones de muertes en niños que se estima que han sido evitadas en Africa subsahariana desde el 2000, a través de la reducción general de las tasas de mortalidad infantil. Por lo tanto, la disminución en las muertes por malaria han contribuido sustancialmente al progreso hacia alcanzar la meta del ODM 4, que es reducir en dos terceras partes la tasa de mortalidad de menores de 5 años entre 1990 y 2015.

Sin embargo, entre 2011 y 2012 disminuyó el ritmo de reducción de las tasas estimadas de mortalidad por malaria. Esta disminución se debe en parte a que el modelo que se utiliza para estimar las muertes por malaria en niños menores de 5 años de edad en África utiliza la cobertura de mosquiteros tratados con insecticida (MTI) como un dato, y la cobertura de MTI se estancó en 2011-2012, luego de una disminución en el financiamiento para el control de la malaria en el 2011. En 2012, se estimó que el financiamiento de los programas de malaria fue de menos de la mitad de los 5.1 mil millones que se requieren a nivel mundial. Así, millones de personas en riesgo de contraer malaria todavía no tienen acceso a intervenciones como los MTI, rociado residual intradomiciliario (RRI), pruebas de diagnóstico y terapias combinadas con artemisinina (TCA). Como resultado, se estima que en 2012 ocurrieron 207 millones de casos (intervalo de incertidumbre, 135-287 millones) y 627 000 muertes por malaria (intervalo de incertidumbre, 473 000–789 000). Existe una necesidad urgente de aumentar el financiamiento para el control de la malaria y ampliar la cobertura del programa de forma que puedan alcanzarse las metas internacionales para la reducción de los casos y muertes por malaria.

Desarrollo de políticas

En 2013, después de las reuniones del Comité Asesor en Políticas de Malaria (CAPM) de la OMS, se publicaron varias actualizaciones o nuevas políticas, manuales operacionales, planes e iniciativas para el control de la malaria.

1. El CAPM, que inició su funcionamiento en 2012, continuó con su trabajo en 2013; su mandato es proporcionar asesoramiento estratégico y aportes técnicos a la OMS en todos los aspectos del control y eliminación de la malaria. De acuerdo con las recomendaciones del CAPM, la OMS publicó guías sobre un rango de políticas, incluyendo el logro de una cobertura universal con mosquiteros insecticidas de larga duración (MILD), la estimación de la longevidad de los mosquiteros, y el desarrollo de capacidades en entomología de la malaria y control de vectores.
2. Otras guías publicadas por la OMS en 2013 incluyen (i) un manual operacional para el RRI; (ii) un manual operacional para el manejo de criaderos; (iii) procedimientos para el monitoreo de la resistencia a insecticidas en los mosquitos vectores de la malaria; (iv) una guía de campo sobre la quimioprevención de la malaria estacional (SMC, por sus siglas en inglés); (v) un manual para el manejo de la malaria severa; (vi) un marco de acción para responder a la resistencia a artemisinina en la subregión del Gran Mekong; (vii) un manual de campo sobre el control de la malaria en emergencias complejas (desarrollado en conjunto con varias organismos asociados); y (viii) tres manuales de capacitación.

Financiando el control de la malaria

Se estima que el total del financiamiento nacional e internacional comprometido para el control de la malaria fue de US$ 2.5 mil millones en 2012 – sustancialmente menor al monto que se necesitaría para alcanzar las metas mundiales.

3. Los desembolsos internacionales para los países endémicos para malaria han aumentado de forma marcada, de menos de US$ 100 millones en 2000 a US$1.6 mil millones en 2011, aproximadamente US$1.94 mil millones en 2012 y 1.97 mil millones en

2013. Sin embargo, los aumentos en el financiamiento internacional han disminuido en años recientes a un promedio de 4% por año entre 2009 y 2013, en comparación con el promedio de 43% por año entre 2005 y 2009.

4. Los datos reportados sugieren que a nivel mundial, el financiamiento nacional para malaria aumentó durante el periodo 2005-2012 de US$ 436 millones en 2005 a US$ 522 millones en 2012. Se estima que el gasto público interno para malaria se elevó a una tasa de 4% por año entre 2005 y 2012.
5. En el Plan de Acción Mundial contra la Malaria (GMAP, por sus siglas en inglés) de 2008, de la iniciativa RBM, se estimó que los recursos mundiales para el control de la malaria superarían los US$ 5.1 mil millones por año entre 2011 y 2020. En 2012 se estimó que combinando los fondos nacionales e internacionales disponibles a nivel mundial para el control de la malaria, los recursos fueron de US$ 2.5 mil millones, dejando una diferencia de US$ 2.6 mil millones. Las proyecciones de recursos nacionales e internacionales disponibles entre 2013 y 2016 indican que el total de financiamiento para el control de la malaria alcanzará aproximadamente US$ 2.85 mil millones entre 2014 y 2016, lo que es considerablemente menor a la cantidad requerida para alcanzar el acceso universal a las intervenciones en malaria.
6. Las inversiones internacionales para el control de la malaria se han dirigido a países con las tasas más altas de mortalidad y presupuestos nacionales más bajos, particularmente a países en África. Sin embargo, la inversión pública es más alta en países más ricos y más baja en países con las tasas más altas de mortalidad por malaria. Las bajas tasas de gasto nacional en países con la mayor carga de la enfermedad se deben principalmente a que estos países tienen menos ingresos per cápita.
7. Existe variación en la prioridad que se le da al control de la malaria por parte de los gobiernos que tienen similares niveles de disponibilidad de recursos. Los países que tienen un mayor compromiso – medido mediante el índice de prioridades de inversión nacional – mostraron más éxito en reducir la incidencia de casos de malaria entre 2000 y 2012 que lo que mostraron los otros países.

Avances en el control vectorial

En la región de África subsahariana, la proporción de la población con acceso a MTI en sus viviendas aumentó dramáticamente de 2005 a 2011 pero se estabilizó en los últimos 2 años, alcanzando un 42% en 2013. Un aumento en la entrega de MTI durante los próximos 2 años debería aumentar la cobertura de MTI.

Mosquiteros tratados con insecticida

8. Para 2012, 34 países en la región africana y 83 países de todo el mundo adoptaron la recomendación de la OMS de proveer de MTI a todas las personas en riesgo de contraer malaria. Un total de 88 países, incluyendo 39 en África, distribuyen MTI de forma gratuita.
9. Se necesitan al menos 150 millones de MTI al año para mantener el suministro de 450 millones de MTI en las viviendas por cada periodo de 3 años y proteger a todas las poblaciones que están en riesgo de malaria en la región de África subsahariana. Entre 2004 y 2010, el número de MTI que entregaron los fabricantes al año a países endémicos para malaria aumentó de 6 millones a 145 millones. Sin embargo, en 2011 los fabricantes entregaron solo 92 millones de MTI y en 2012 solo 70 millones. El número estimado de MTI entregados en 2013 (136 millones) y los financiados por donantes para el 2014 (aproximadamente 200 millones) están cerca del número de MTI que se requieren anualmente para proteger a todas las poblaciones en riesgo. Sin embargo, inclusive con el aumento en las entregas anuales, el total de MTI entregados en 2012-2014 (400 millones) para el periodo de 3 años, todavía estará por debajo del número mínimo que se necesita para proteger a todas las personas en riesgo de malaria. Es necesario mantener el número adecuado de entregas de MTI cada año para asegurar su disponibilidad en las viviendas y que cada persona en riesgo de malaria tenga acceso a un MTI.
10. Se estima que el porcentaje de viviendas que poseen al menos un MTI en la región de África subsahariana aumentó de 3% en 2000 a 56% en 2012, pero disminuyó ligeramente a 54% en 2013. La proporción de la población con acceso a MTI en sus viviendas aumentó durante el mismo periodo, alcanzando 42% en 2013. En 2013 se estimó que la proporción de la población que duerme bajo un MTI – que representa a la población protegida de forma directa- fue de 36%.
11. Una comparación entre la proporción de la población con acceso a un MTI y la proporción que duerme bajo un MTI sugiere que un gran porcentaje (86%) de la población con acceso a un MTI realmente lo utiliza, lo que indica que los esfuerzos por promover el uso de los MTI han tenido éxito. La principal limitación para aumentar el número de personas en riesgo que duermen bajo un MTI es la falta de disponibilidad de los mosquiteros.
12. El uso de MTI entre poblaciones vulnerables, mujeres embarazadas y niños menores de 5 años de edad es mayor que el uso entre la población total. Esto indica que estos grupos permanecen protegidos a medida que los países mejoran la cobertura universal con MTI, y pone en evidencia la necesidad de aumentar el acceso a los MTI entre todas las personas en riesgo.

Rociado residual intradomiciliario

13. El RRI continúa siendo una herramienta poderosa para el control vectorial, reduciendo e interrumpiendo la transmisión de la malaria. En 2012, 88 países recomendaron el RRI para el control de la malaria, incluyendo 40 países en la región africana.
14. En 2012, 135 millones de personas (4% de la población mundial en riesgo de contraer malaria) alrededor del mundo se protegieron mediante el RRI. En África, la proporción de la población en riesgo que se protegió se elevó de menos del 5% en 2005 al 11% en 2010, pero disminuyó a 8% en 2012, con 58 millones de personas beneficiándose con la intervención. La disminución en el número de personas protegidas mediante el RRI en África parece deberse a un aumento en el uso de insecticidas no piretroides, más costosos (en respuesta a la amenaza de la resistencia a insecticidas) en un contexto de presupuestos limitados para el RRI. El uso de insecticidas no piretroides para el RRI puede ir adquiriendo importancia como herramienta para el manejo de la resistencia, porque todos los MILD aprobados en la actualidad tienen como base los piretroides.

Resistencia a insecticidas

15. En 64 países endémicos alrededor del mundo se ha identificado resistencia de los mosquitos al menos a un insecticida utilizado para el control de la malaria. En mayo del 2012, la OMS y la alianza RBM publicaron el Plan Global para el Manejo de la Resistencia a Insecticidas (GPIRM, por sus siglas en inglés) en los vectores de la malaria; el GPIRM es una estrategia basada en cinco pilares para el manejo la amenaza de la resistencia a los insecticidas. Las partes interesadas de la comunidad mundial contra la malaria han iniciado actividades relacionadas con la implementación de la estrategia plasmada en el GPIRM.
16. El monitoreo de la resistencia a los insecticidas es un elemento necesario para la implementación de intervenciones basadas en insecticidas para el control vectorial. En 2012, 58 países reportaron haber adoptado una política de monitoreo rutinario de la resistencia a insecticidas.

Progreso en quimioprevención

Entre los países africanos que reportan esta información a la OMS, en 2012 el porcentaje promedio de mujeres que acuden a atención prenatal (APN) y que recibieron por lo menos una dosis de tratamiento preventivo intermitente (TPI) durante el embarazo fue de 64%, mientras que el 38% recibió por lo menos dos dosis y el 23% recibió por lo menos tres dosis, lo que indica que hay muchas posibilidades de mejorar la protección de las mujeres embarazadas.

17. En la región de África subsahariana, se estima que 35 millones de mujeres embarazadas y una gran parte de los 26 millones de niños que nacen cada año se podrían beneficiar del TPI. Además, alrededor de 25 millones de niños en la subregión africana de Sahel podría protegerse de contraer malaria a través de la SMC.
18. Un total de 36 países de África subsahariana con transmisión moderada a alta de malaria adoptaron el TPI para mujeres embarazadas (TPIe) como una política nacional para finales del 2012. Esta política también fue adoptada por Papúa Nueva Guinea (en la Región del Pacífico Occidental) en 2009.
19. En 26 de los 36 países con transmisión moderada a alta de malaria en la región africana que han adoptado el TPIe como una política nacional – y para los que hay datos disponibles - un promedio de 64% de las mujeres embarazadas que acuden a las APN recibieron al menos una dosis de TPIe en 2012, 38% recibieron al menos dos dosis y el 23% recibieron al menos tres dosis. En 13 países de la región africana para los cuales se contaba con datos de encuestas domiciliares para el período 2010-2012, el promedio ponderado de mujeres embarazadas que recibieron una dosis de TPIe durante el embarazo fue de 37%, mientras que el 23% recibió dos dosis y el 8% recibió tres dosis.
20. Desde octubre de 2012, la OMS ha recomendado que el TPIe se administre en cada una de las visitas prenatales calendarizadas después del primer trimestre. El análisis de los datos de encuestas domiciliares revela que la proporción de mujeres embarazadas que recibieron TPIe está muy por debajo de la proporción de las que asisten a APN. La proporción de visitas de APN en las que se podría dar TPI pero no se da es alta, en un 72%. Menos mujeres reciben TPIe durante las visitas de APN que las que reciben toxoide tetánico (otro componente clave de la APN). Esto indica que la capacidad de proveer servicios preventivos durante las visitas de APN es alta, y que es posible superar las barreras para el TPIe.
21. Todos los niños menores de un año en riesgo de infección por *Plasmodium falciparum* en los países de la región de África subsahariana con transmisión moderada a alta de malaria y con bajos niveles de resistencia parasitaria a sulfadoxina-pirimetamina (SP) deberían recibir tratamiento preventivo para malaria a través de los servicios de inmunización a intervalos definidos que correspondan con los esquemas de vacunación rutinaria. Solo un país, Burkina Faso, ha adoptado una política nacional de TPI para niños menores de un año (TPIn) desde que la OMS emitió la recomendación en 2009.
22. En marzo de 2012, la OMS emitió una recomendación para SMC para niños de edades entre 3 a 59 meses, y en agosto de 2013, publicó una guía de campo para la implementación de la SMC. Dos países endémicos han adoptado la SMC, y varios países que participan en la evaluación de la política han indicado que tienen planeado adoptarla y expandir la cobertura de SMC más allá de sus poblaciones de estudio.

Avances en la realización de pruebas diagnósticas y tratamiento de la malaria

El número de pruebas de diagnóstico rápido (PDR) y TCA distribuidos está aumentando, al igual que la tasa reportada de pruebas de diagnóstico en el sector público en la región africana, que aumentó de 37% en 2010 a 61% en 2012. Como resultado ha disminuido el número de casos sospechosos de malaria que se trataron presuntivamente con medicamentos antimaláricos. Sin embargo, a millones de personas con sospecha de malaria todavía no se les realiza una prueba de diagnóstico y mucha gente con infecciones confirmadas no recibe el tratamiento apropiado con un antimalárico de calidad garantizada.

Pruebas de diagnóstico

23. La implementación de la prueba diagnóstica universal en los sectores público y privado reduciría significativamente los requerimientos mundiales de tratamiento antimalárico. En 2012, 41 de 44 países con transmisión activa de malaria en la región africana, y 49 de 55 países en otras regiones de la OMS, reportaron haber adoptado una política para proporcionar diagnóstico parasitológico para todos los grupos de edad. Esto representa un aumento de 6 países en la región africana desde 2009.
24. Las pruebas de diagnóstico para malaria se suministran sin costo en el sector público en 84 países alrededor del mundo. En el periodo 2010 - 2012, la proporción de casos sospechosos de malaria a los que se les practicó una prueba de diagnóstico en el sector público aumentó de 37% a 61% en la región africana y de 44% a 64% a nivel mundial. La mayor parte del aumento en la realización de pruebas en la región africana se debe al aumento del uso de PDR, que representaron el 40% de todos los casos evaluados en la región en 2012.
25. El número de pacientes evaluados por medio de un examen microscópico se incrementó a hasta alcanzar un pico de 188 millones en 2012, de los cuales India contabilizó más

de 120 millones de exámenes en extendidos de sangre. El número de PDR suministradas por los fabricantes aumentaron de 88 millones en 2010 a 205 millones en 2012. Esto incluye el aumento en las ventas de pruebas específicas para *P. falciparum* y pruebas combinadas que pueden detectar parásitos de más de una especie.

26. Un total de 48 países reportaron la distribución de PDR a nivel comunitario y 15 millones de pacientes reportaron haber sido evaluados a través de esos programas en 2012. Los datos de encuestas domiciliares en 14 países, recolectados durante el período 2010 – 2012, sugieren que las pruebas diagnósticas no están ampliamente distribuidas en el sector privado como lo están en el sector público.

27. En los servicios de salud el uso de PDR para el diagnóstico de los casos sospechosos de malaria ha aumentado, incluyendo el diagnóstico de *P. vivax*. De los 42 países que reportaron el tipo de PDR utilizadas, 15 reportaron el uso de PDR que pueden detectar *P. vivax* en específico. En estos países, la proporción de casos de *P. vivax* confirmados mediante PDR (en vez de microscopía) fue similar a la proporción de casos de *P. falciparum* confirmados mediante PDR.

Tratamiento

28. Se recomienda las TCA como primera línea de tratamiento de la malaria por *P. falciparum*, el más peligroso de los parásitos de *Plasmodium* que infecta a seres humanos. Para 2012, 79 países y territorios habían adoptado la TCA como primera línea de tratamiento para la malaria por *P. falciparum*. La malaria por *P. vivax* debe ser tratada con cloroquina en los lugares donde el medicamento todavía es efectivo, o por una TCA apropiada en áreas donde *P. vivax* es resistente a cloroquina. El tratamiento de *P. vivax* se debe combinar con un régimen de 14 días de primaquina para evitar recaídas.

29. De los reportes de los fabricantes y de la iniciativa para Medicamentos Accesibles contra la Malaria (AMFm, por sus siglas en inglés), el número de tratamientos con TCA entregados en los sectores público y privado aumentó de 11 millones a nivel mundial en 2005 a 76 millones en 2006, y alcanzó los 331 millones en 2012. El aumento en la adquisición de TCA en 2012 se debió principalmente a un aumento de cerca del 50% en las entregas en el sector público entre 2011 y 2012. Los medicamentos adquiridos para el sector público y privado a través de la iniciativa AMFm – que se encuentra en estos momentos en una fase transitoria hacia una eventual integración al proceso de concesión de subvenciones del Fondo Mundial para la Lucha contra el SIDA, Tuberculosis y Malaria (Fondo Mundial) - disminuyeron ligeramente de 156 millones de tratamientos en 2001 a 150 millones en 2012.

30. Ha sido difícil determinar hasta qué punto los pacientes con malaria confirmada han recibido tratamiento antimalárico, debido a que la información que vincula las pruebas de diagnóstico con el tratamiento ha sido limitada tanto en encuestas domiciliares como en los sistemas regulares de información en salud. Si no se cuenta con datos reportados, se puede hacer un estimado de la proporción de pacientes en el sector público que posiblemente han sido tratados con TCA (en lugar de un antimalárico menos efectivo) comparando el número de TCA distribuidas por los programas nacionales de control de la malaria (PNCM) con el número total de casos sospechosos (o sea tratados sin que se les realice la prueba) y confirmados (por microscopia o por PDR) de malaria por *P. falciparum* (ajustados de acuerdo a la integridad del reporte o estimados en situaciones en las que no se cuente con datos reportados). Esta proporción varía en cada una de las regiones de la OMS, pero ha aumentado a lo largo del tiempo en la región africana, donde alcanzó el 60% en 2012.

31. En nueve países de la región Africana con más de una encuesta domiciliar entre 2006 y 2012, la proporción de niños con enfermedad febril a los que se les ha dado tratamiento antimalárico con TCA ha aumentado a lo largo del tiempo, tanto en el sector público como en el privado. En la mayoría de encuestas recientes, la proporción promedio de niños que recibieron una TCA entre los que recibieron tratamiento antimalárico, fue de 68%; sin embargo, debido a que una parte importante de niños no acuden a atención por fiebre, y no a todos los niños con sospecha de tener malaria se les realiza una prueba de diagnóstico, la proporción de niños con malaria que recibe una TCA posiblemente es mucho menor. En un análisis de 26 encuestas domiciliares que se realizaron entre 2010-2012, y que utilizaron una PDR positiva entre niños febriles como una aproximación a un diagnóstico confirmatorio de malaria, la media de la proporción de niños con malaria confirmada que recibieron TCA fue de 16% (rango, 1%-42%). Se necesita aumentar el acceso a la atención de febriles, así como a pruebas de diagnóstico apropiadas para asegurar que todos los pacientes con malaria reciban tratamiento rápido y efectivo.

32. En la región africana, en 2012, el número total de pruebas (tanto microscópicas como PDR) fue casi igual al número de TCA distribuidas por los PNCM – una mayor razón en comparación con años anteriores. Sin embargo, en la mayoría de áreas endémicas para malaria, se espera que la razón sobrepase los 2, debido a que menos de la mitad de los casos sospechosos de malaria tendrán malaria confirmada y requerirán tratamiento con una TCA.

Resistencia de los medicamentos antimaláricos

33. La OMS recomienda que el tratamiento oral con monoterapias basadas en artemisinina se vaya eliminando progresivamente del mercado y se reemplace con TCA – una política que fue aprobada por la Asamblea Mundial de la Salud en 2007. El número de países que todavía permiten la comercialización de estos productos disminuyó de 55 en 2008 a 9 para noviembre de 2013; 6 de esos 9 países están en la región africana. El número de compañías farmacéuticas que comercializan estos productos decayó de 38 en 2010 a 30 en 2013. Muchos de los países que permiten la comercialización de estos medicamentos están en la región africana, mientras que la mayoría de fabricantes están en la India.

34. Los estudios de eficacia terapéutica siguen siendo el método de referencia para guiar la política de medicamentos; ese tipo de estudios deben realizarse cada 2 años. En 2011 y 2012, se completaron estudios de antimaláricos de primera y segunda línea de tratamiento en 48 de 67 (72%) países donde fue posible realizar estudios de eficacia para *P. falciparum* – un aumento de 31 de 75 (41%) países durante el periodo 2008-2009. (En 32 países con transmisión activa de malaria es imposibles realizar estudios de eficacia actualmente, debido a la

baja incidencia de malaria, o porque los países son endémicos solamente para *P. vivax*).

35. Actualmente se ha detectado resistencia de los parásitos a las artemisininas en cuatro países de la subregión del Gran Mekong: Camboya, Myanmar, Tailandia y Vietnam. A pesar de los cambios observados en la sensibilidad de los parásitos a las artemisininas, las TCA continúan curando a los pacientes, toda vez que el medicamento combinado todavía sea eficaz. En la provincia de Pailin en Camboya, se ha encontrado resistencia a ambos componentes de múltiples TCA, por lo tanto, se han puesto en práctica disposiciones especiales para la terapia de observación directa usando una combinación que no se basa en la artemisinina (atovacuona-proguanil).

    En abril del 2013, la OMS publicó la *Respuesta de emergencia a la resistencia a la artemisinina en la subregión del Gran Mekong: Marco de trabajo regional para 2013-2015*. El documento describe las áreas prioritarias en las que se necesitan acciones en los próximos años para frenar la resistencia a las artemisininas.

Vigilancia, monitoreo y evaluación de la malaria

En 2012, en 62 de 103 países que tuvieron una transmisión activa de malaria en el 2000, el reporte de datos se consideró suficientemente consistente como para emitir juicios confiables acerca de las tendencias de la malaria para el periodo 2000-2012. En los 41 países restantes, que aportan el 80% de los casos estimados, no es posible evaluar de forma confiable las tendencias de la malaria utilizando los datos presentados a la OMS. Los sistemas de información son más débiles, y los retos para fortalecerlos son mayores, donde la carga de malaria es mayor.

36. En 2012, los sistemas rutinarios de información en salud detectaron solo el 14% de los casos que se estimó que ocurrirían a nivel mundial. Las tasas de detección de casos fueron menores en países con el número más alto de casos de malaria. De forma similar, la proporción de muertes que se reportan fue la más baja en países con el mayor número de muertes por malaria. No es necesario que los sistemas de vigilancia detecten todos los casos para poder evaluar tendencias de forma confiable; sin embargo, los esfuerzos para la detección de casos sí deben ser razonablemente uniformes a lo largo del tiempo. Los países con un menor número de casos estimados de malaria parecen ser los más capaces de evaluar las tendencias en la incidencia. En los 41 países que representaron el 80% de los casos estimados en el 2000, no se puede evaluar de forma confiable las tendencias de la malaria para el periodo 2000-2012 utilizando los datos presentados a la OMS. Por esto, los sistemas de información son más débiles donde la carga por malaria es mayor.

37. En contraste con los datos reportados de forma rutinaria, las encuestas domiciliares se realizan más comúnmente en países con el mayor número de casos de malaria. Cincuenta países, de los cuales 34 fueron en la región africana, realizaron al menos una encuesta domiciliar a lo largo del período de tres años entre 2011-2013. Los indicadores que se midieron más comúnmente fueron sobre la disponibilidad de MTI y el uso de medicamentos antimaláricos. Solo el 25% de las encuestas incluyó preguntas sobre casos de fiebre a los que se les practicó un pinchazo en el dedo o en el talón, mientras que el 90% indagó respecto al tratamiento de la malaria – un hallazgo que necesita cambiar si se quiere continuar progresando hacia la realización universal de pruebas de diagnóstico. El número de encuestas en las que se midió la prevalencia de parásitos ha aumentado desde 2005, elevándose a 81% de todas las encuestas realizadas entre 2011 y 2013.

Impacto en el control de la malaria

Desde el año 2000, más de la mitad de los países que tuvieron una transmisión activa de malaria ese año han registrado una disminución en la incidencia de casos confirmados de malaria, o en ingresos y muertes (o ambas) reportadas. Las tasas estimadas de mortalidad por malaria en el mundo decayeron en un 42% entre 2000 y 2012 en todos los grupos de edad y en un 48% en niños menores de 5 años de edad. Si se mantiene la tasa de disminución de los últimos 12 años, se proyecta que las tasas de mortalidad por malaria disminuirán en 52% en todas las edades y en 60% en niños menores de 5 años de edad para 2015.

38. En 2012 un estimado de 3.4 miles de millones de personas estuvieron en riesgo de contraer malaria. De este total, 2.2 mil millones en regiones de bajo riesgo (<1 caso reportado por 1000 habitantes), y de estos el 94% viviendo en otras regiones geográficas fuera de África. Los 1.2 mil millones de personas en regiones de mayor riesgo (>1 caso por cada 1000 habitantes) se encontraban principalmente en la región africana (47%) y en Asia suroriental (37%).

39. En base a los datos *reportados*, 59 de 103 países con transmisión activa de malaria en el 2000 están alcanzando el ODM de reducir la incidencia de malaria. De estos, 52 están en camino de alcanzar las metas de la iniciativa RBM y la Asamblea Mundial de la Salud de reducir la tasa de incidencia de casos de malaria en 75% para 2015, incluyendo 8 países de la región africana.

40. En promedio, las disminuciones en la incidencia de malaria por *P. falciparum* son mayores que las de *P. vivax*, lo cual sugiere que *P. vivax* responde más lentamente a las medidas de control, posiblemente por sus características biológicas. Como resultado, los PNCM necesitan dar mayor atención al control de *P. vivax* a medida que se van acercando a la eliminación, particularmente en áreas fuera de África subsahariana. En los países donde se transmiten ambas especies, *P. vivax* predomina en los países que están en fase de pre-eliminación y eliminación.

41. De los 97 países con transmisión activa de malaria en 2013, 12 se clasifican en la fase de pre-eliminación y otros 7 en fase de eliminación. Otros 6 países se clasifican en la fase de prevención de la introducción. En 2012, se reportaron solo 255 casos autóctonos en la región europea; por lo que está cerca de alcanzar la meta de eliminar la malaria de la región para 2015, como se plasmó en la Declaración de Tashkent del 2005. No obstante, los brotes recientes en Grecia y Turquía ponen de manifiesto el riesgo permanente de reintroducción y la necesidad de una vigilancia continua para asegurar que cualquier resurgimiento se controle rápidamente.

42. Los 52 países que se proyecta (en base a los datos reportados) que disminuyan la incidencia de malaria en un 75% para el año 2015, representan solamente 8 millones (4%) del total de 226 millones de casos estimados en el 2000. Esto se debe en

parte a que el progreso ha sido más rápido en los países con un menor número de casos, pero también a la baja calidad de los datos de vigilancia presentados por los países con mayor número de casos. Es esencial una mejor vigilancia y evaluación en los países con mayores cargas de malaria para poder evaluar adecuadamente el impacto de las inversiones en malaria.

43. Debido a que es menos probable que los países con el mayor número de casos envíen datos suficientemente consistentes como para evaluar las tendencias, es necesario sacar conclusiones en base a las tendencias en estos países utilizando números estimados de casos, en lugar de datos de vigilancia. En 2012 hubo un estimado de 207 millones de casos de malaria en el mundo (intervalo de incertidumbre 135-287). La mayoría de los casos estimados (80%) ocurrieron en África subsahariana. Alrededor de 9% de los casos estimados a nivel mundial se deben a P. vivax, a pesar que la proporción fuera del continente africano es del 50%. Entre 2000 y 2012, la incidencia estimada de malaria disminuyó en un 25% a nivel mundial y en un 31% en la región africana. Si se mantiene la tasa anual de reducción de los últimos 12 años, se espera que la incidencia de casos de malaria disminuya en un 36% a nivel mundial y en 44% en la región africana para 2015.

44. En 2012 hubo un estimado de 627 000 muertes por malaria en el mundo (intervalo de incertidumbre 473 000 - 789 000). De las muertes estimadas, la mayoría ocurrieron en África subsahariana (90%) en niños menores de 5 años de edad (77%). Entre 2000 y 2012, las tasas de mortalidad estimada por malaria disminuyeron en un 42% a nivel mundial y en 49% en la región africana; se estima que disminuyeron en 48% en niños menores de 5 años de edad a nivel mundial y en un 54% en la región africana. Si se mantiene la tasa anual de reducción de los últimos 12 años, se espera que las tasas de mortalidad por malaria disminuyan en un 52% a nivel mundial y en un 62% en la región africana para 2015. En niños menores de 5 años, se espera que para 2015 disminuyan en 60% a nivel mundial y en 68% en la región africana.

45. El ritmo de la disminución de las tasas estimadas de mortalidad por malaria se aceleró a partir del 2005, pero se desaceleró entre 2011 y 2012. Esta desaceleración se debe en parte a que el modelo que se utiliza para estimar las muertes por malaria en niños menores de 5 años de edad en África utiliza la cobertura de MTI para ajustar la proporción de muertes atribuidas a la malaria, y la cobertura de MTI se estancó en 2011-2012 luego de las disminuciones en el financiamiento para el control de la malaria en 2011.

46. Más del 80% de las muertes estimadas por malaria en 2012 ocurrieron en solo 17 países, y el 80% de los casos de malaria ocurrieron en 18 países, con la República Democrática del Congo y Nigeria aportando juntos el 40% del estimado total a nivel mundial. Las metas para la reducción de casos y muertes no podrán alcanzarse hasta que se realice un progreso significativo en los países que aportan la mayor carga por malaria.

47. Cuatro países aportan más del 80% de casos estimados de malaria por *P. vivax* (Etiopía, India, Indonesia y Paquistán). La infección por *P. vivax* se ha asociado con malaria severa y muerte, a pesar que los riesgos de enfermedad severa y las tasas de fatalidad por infecciones con *P. vivax* no se han establecido en definitiva. Se sospecha que la presencia de co-morbilidades, en particular la malnutrición concomitante, aumentan el riesgo de enfermedad severa en infecciones por *P. vivax*, aunque este riesgo también permanece mal definido. Se requieren más estudios para refinar los conocimientos existentes sobre la malaria severa por *P. vivax*, y de los riesgos de enfermedad severa y muerte con esta infección.

48. El avance en la reducción de las tasas de incidencia de casos y mortalidad por malaria ha sido más rápido en los países con el menor número de casos y muertes en 2000. Sin embargo, entre 2000 y 2012 la gran mayoría del *número* de casos y muertes se evitaron en países que tuvieron las mayores cargas por malaria en el año 2000. Si las tasas de incidencia y mortalidad por malaria del 2000 se mantuvieron sin cambio a lo largo de la década, debieron haber ocurrido 500 millones más de casos y 3.3 millones más de muertes entre 2001 y 2012. La mayoría de casos de malaria que se evitaron (67%) y vidas que se salvaron (93%) correspondieron a la región africana.

49. De los 3.3 millones de muertes que se previnieron entre 2001 y 2012, se estima que 3 millones (90%) fueron en niños menores de 5 años de edad en Africa subsahariana. Esto representa el 20% de las 15 millones de muertes en niños que se estima que han sido evitadas en Africa subsahariana desde el año 2000 a través de la reducción general de las tasas de mortalidad infantil. Por lo tanto, la disminución en las muertes por malaria ha contribuido sustancialmente al progreso hacia el logro de las metas del ODM 4 de reducir en dos terceras partes la tasa de mortalidad de menores de 5 años entre 1990 y 2015.

CHAPTER 1

Introduction

This edition of the *World Malaria Report* summarizes the current status of malaria control worldwide. It reviews progress towards internationally agreed goals and targets, and describes trends in funding, intervention coverage and malaria cases and deaths.

In 2013, there are 97 countries and territories with ongoing malaria transmission, and 7 countries in the prevention of reintroduction phase, making a total of 104 countries and territories in which malaria is presently considered endemic. Globally, an estimated 3.4 billion people are at risk of malaria. WHO estimates that 207 million cases of malaria occurred globally in 2012 (uncertainty range 135–287 million) and 627 000 deaths (uncertainty range 473 000–789 000) (**Chapter 8; Section 8.3**). Most cases (80%) and deaths (90%) occurred in Africa (Figure 1.1), and most deaths (77%) were in children under 5 years of age.

Malaria is caused by five species of parasite that affect humans, and all of these species belong to the genus *Plasmodium*: *P. falciparum*, *P. vivax*, *P. ovale*, *P. malariae* and *P. knowlesi*. Of these, *P. falciparum* and *P. vivax* are the most important. Malaria due to *P. falciparum* is the most deadly form, and it predominates in Africa. *P. vivax* has a wider distribution than *P. falciparum* because it is able to develop in the *Anopheles* mosquito vector at lower temperatures, and to survive at higher altitudes and in cooler climates. It also has a dormant liver stage (known as a hypnozoite) that enables it to survive during periods when Anopheles mosquitoes are not present to continue transmission, such as during winter months (**Table 1.1**). Although *P. vivax* can occur throughout Africa, the risk of *P. vivax* infection is considerably reduced in the region by the high frequency of the Duffy negativity trait among many African populations; in individuals without the Duffy antigen, red blood cells are resistant to infection with *P. vivax*. In many areas outside Africa, infections due to *P. vivax* are more common than those due to *P. falciparum*.

Malaria is spread from one person to another by female mosquitoes of the genus *Anopheles*. There are about 400 different species of *Anopheles* mosquitoes, but only 30 of these are vectors of major importance.

Malaria is an entirely preventable and treatable disease, provided the currently recommended interventions are properly implemented. These interventions include (i) vector control through the use of insecticide treated nets (ITNs), indoor residual spraying (IRS) and, in some specific settings, larval control; (ii) chemoprevention for the most vulnerable populations, particularly pregnant women and infants; (iii) confirmation of malaria diagnosis through microscopy or rapid diagnostic tests (RDTs) for every suspected case; and (iv) timely treatment with appropriate antimalarial medicines (according to the parasite species and any documented drug resistance).

The *World Malaria Report* is a key publication of the WHO Global Malaria Programme (GMP), and over the years it has provided a historical record of the global malaria situation and the progress made through national and international efforts to control the disease. The GMP has four essential roles: (i) to set, communicate and promote the adoption of evidence-based norms, standards, policies and guidelines; (ii) to ensure ongoing independent assessment of global progress; (iii) to develop strategies for capacity-building, systems strengthening and surveillance; and (iv) to identify threats to malaria control and elimination, and new opportunities for action.

The *World Malaria Report* presents a critical analysis and interpretation of data provided by national malaria control programmes

Table 1.1 Comparison of *P. falciparum* and *P. vivax* malaria

Life cycle	*P. falciparum*	*P. vivax*
Minimum temperature needed for maturation in the mosquito	Lowest temperature 16c	For cycle to be complete lowest temperature 15c, survival of parasite to 10c for two days
Dormant liver stage	No	Yes
Gametocytes	Appear after asexual blood stage is established	Appear at time of asexual blood stage often before clinical symptoms
Disease		
Severity	5% of cases develop into severe illness; responsible for majority of deaths	Risk of severe disease not firmly established
Relapse	No	Yes
Asymptomatic carriage	Common	Very common
Diagnosis		
	Blood film, rapid tests and PCR for blood stage	Blood film, rapid tests and PCR for blood stage
		No test for dormant liver stage
Treatment		
Blood stage	Artemisinin combination treatment (ACT) recommended	Chloroquine still efficacious in most areas
Gametocytes	Need single dose primaquine, artemesinins have some effect	Sensitive to blood stage treatment
Liver stage		14 days of primaquine

(NMCPs) in endemic countries. Standard reporting forms were sent in April 2013 to the 97 countries with ongoing malaria transmission, and to 5 of the countries that recently entered the prevention of reintroduction phase. Information was requested on (i) populations at risk; (ii) vector species; (iii) number of cases, admissions and deaths for each parasite species; (iv) completeness of outpatient reporting; (v) policy implementation; (vi) commodities distributed and interventions undertaken; (vii) results of household surveys; and (viii) malaria financing. Table 1.2 summarizes the percentage of countries responding by month and by WHO region in 2012.

Information from household surveys was used to complement data submitted by NMCPs, notably the demographic and health surveys (DHS), multiple indicator cluster surveys (MICS) and malaria indicator surveys (MIS). These surveys provide information on the percentage of the population that sleeps under a mosquito net, and the percentage of children with fever who are treated and the medication they receive. Information on malaria financing was obtained from the Organisation for Economic Co-operation and Development (OECD) database on foreign aid flows, and directly from the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) and the US President's Malaria Initiative (PMI).

Data were analysed by WHO staff at headquarters and regional offices, with extensive consultation with WHO country offices and NMCPs regarding the interpretation of country information. Assistance in data analysis and interpretation was also provided by the African Leaders Malaria Alliance (ALMA), the Child Health Epidemiology Reference Group (CHERG), the Institute of Health Metrics and Evaluation (IHME), the London School of Hygiene and Tropical Medicine, the Malaria Atlas Project (MAP), Tulane University School of Public Health and Tropical Medicine, the US Centers for Disease Control and Prevention (CDC) and the Global Fund.

The following chapters consider the policies and interventions recommended by WHO, the implementation of interventions, and the impact of these interventions on malaria cases and deaths, from a global and a regional perspective.

Chapter 2 summarizes the WHO policy-setting process and the policies and strategies recommended by WHO to achieve the internationally agreed goals for malaria control and elimination. It describes the goals and targets for malaria control and elimination, and recommended indicators of progress.

Chapter 3 reviews recent trends in international and domestic financing in relation to the resource requirements for meeting global malaria control targets. It examines the distribution of malaria funding by WHO region, by gross national income (GNI) per capita and by malaria mortality rate of a country. It also reviews endemic countries' willingness to pay for malaria control.

Chapter 4 reviews the commodity needs for malaria vector control. It considers the policies that national programmes have adopted for vector control implementation, and the progress made towards universal access to ITNs and IRS. An update is provided on the growing problem of insecticide resistance, and the appropriate monitoring and management of resistance.

Chapter 5 reviews progress in implementation of chemoprevention, particularly the intermittent preventive treatment of malaria in pregnancy and in infants, and the introduction of seasonal chemoprevention in older children. It also reports on the current status of malaria vaccine development.

Chapter 6 reviews the commodity needs for malaria diagnostic testing and treatment. It reports on the extent to which national programmes have adopted policies for universal diagnostic testing of suspected malaria cases, and examines trends in the availability of parasitological testing. It also reviews the adoption of policies and implementation of programmes for improving access to effective treatment for malaria. Finally, this chapter reports on progress in the withdrawal of oral artemisinin-based monotherapies from the market, the current status of drug efficacy monitoring, recent trends in antimalarial drug resistance and efforts to contain artemisinin resistance.

Chapter 7 examines the extent to which data are available for monitoring progress towards international targets, and how this has changed since 2000.

Chapter 8 reviews trends in *reported* malaria cases for 62 countries that have reported consistently between 2000 and 2012. For countries with low numbers of cases, it summarizes their progress towards elimination. This chapter also presents an analysis of the *estimated* numbers of cases and deaths for countries with ongoing transmission between 2000 and 2012.

Regional profiles are provided. These summarize the epidemiology of malaria in each WHO region, trends in malaria case incidence, and the links between malaria trends and malaria programme implementation.

Country profiles are also provided for countries with ongoing malaria transmission and those recently progressing to the prevention of reintroduction phase. These profiles are followed by Annexes, which give data by country for the malaria-related indicators.

Table 1.2 Percentage of reporting forms received by month and by WHO region, 2012

WHO region	June	July	August	September	October	November	December	Total countries/areas
African			91%	98%	98%	100%	100%	45
Eastern Mediterranean		10%	50%	90%	100%	100%	100%	10
European		83%	83%	83%	83%	83%	100%	6
Regions of the Americas				95%	100%	100%	100%	21
South-East Asia		20%	20%	80%	100%	100%	100%	10
Western Pacific	60%	90%	90%	100%	100%	100%	100%	10
TOTAL	**6%**	**17%**	**62%**	**94%**	**98%**	**99%**	**100%**	**102**

Source: : National malaria control programme reports

CHAPTER 2

Policies, strategies, goals and targets for malaria control and elimination

This chapter summarizes (i) the policy-setting process within WHO, (ii) the policies and strategies recommended by WHO to achieve the internationally agreed goals for malaria control and elimination, (iii) the need for malaria surveillance systems, and (iv) indicators of progress.

2.1 Policy development

Following a comprehensive review of its policy-setting process on malaria, WHO established an independent advisory committee in 2011, bringing together some of the world's foremost experts on malaria. Since its inaugural meeting in January 2012, the Malaria Policy Advisory Committee (MPAC) has provided strategic technical advice to WHO on the development of policy guidance on malaria control and elimination. The MPAC is supported by technical expert groups and evidence review groups, whose work focuses on specific thematic areas (see Box 2.2).

The MPAC advises WHO on:

- appropriate malaria policies and standards (based on data from malaria programme implementation by Member States and malaria control partners, and on reviews of the best available evidence);
- WHO's engagement in malaria-related initiatives;
- major issues and challenges in achieving global malaria goals;
- the identification of priority activities to address identified challenges.

The MPAC meets twice a year – in March and September – and its expert groups meet throughout the year, as necessary. To each MPAC meeting, WHO invites four standing observers (Global Fund to Fight AIDS, Tuberculosis and Malaria; Roll Back Malaria [RBM] Partnership; United Nations Children's Fund [UNICEF]; and the Office of the United Nations Secretary-General's Special Envoy for Financing the Health Millennium Development Goals and for Malaria). Also invited on a rotational basis are seven national malaria control programme (NMCP) managers, covering all WHO regions. In addition, the meetings are open to any member of the global malaria community who registers. Observers can make interventions at the invitation of the chair.

MPAC decisions are taken in closed session and are agreed by consensus. MPAC conclusions and meeting reports are published on the WHO website and in the Malaria Journal as part of the WHO global malaria recommendations series (*1*). Following MPAC deliberations, new and updated policy guidance documents are formally issued by WHO and are disseminated to Member States by three levels of the Organization – headquarters, regional offices and country offices. The documents are also made accessible through a single web portal.[1]

Box 2.1 New or updated WHO policies, operational manuals, guidelines and strategies for malaria control and elimination in 2013

Updated policies

- WHO recommendations for achieving universal coverage with long-lasting insecticidal nets in malaria control, September 2013

Operational manuals, handbooks and guidelines

- *Management of severe malaria – A practical handbook. Third edition*, April 2013 (*2*)
- *Indoor residual spraying: An operational manual for IRS for malaria transmission, control and elimination*, April 2013 (*3*)
- *Test procedures for insecticide resistance monitoring in malaria vector mosquitoes*, April 2013 (*4*)
- *Larval source management – a supplementary measure for malaria vector control. An operational manual*, July 2013 (*5*)
- *Seasonal malaria chemoprevention with sulfadoxine-pyrimethamine plus amodiaquine in children: A field guide*, August 2013 (*6*)
- *Malaria control in humanitarian emergencies – An inter-agency field handbook. Second edition*, October 2013 (*7*)

Strategies, Action Plans and Initiatives

- *Emergency response to artemisinin resistance in the Greater Mekong subregion. Regional Framework for Action 2013–2015*, April 2013 (*8*)

Guidance notes

- *WHO guidance note on estimating the longevity of long-lasting insecticidal nets in malaria control*, September 2013 (*9*)
- *WHO guidance note on capacity building in malaria entomology and vector control*, September 2013 (*10*)

Training manuals

- *Training module on malaria control: Case management*, August 2013 (*11*)
- *Training module on malaria control: Entomology and vector control*, August 2013 (*12*)
- *Training module on malaria control: Epidemiological approaches*, November 2013 (*13*)

1. http://www.who.int/malaria/publications/en/

Box 2.2 Malaria Policy Advisory Committee structure in 2013

The 15 members of the MPAC serve in an independent, personal and individual capacity, representing a broad range of disciplines, expertise and experience.[2] During 2013, MPAC received advice from five technical expert groups and two evidence review groups.

Technical expert groups

Technical expert groups are standing expert groups that meet regularly to review evidence on specific intervention areas and provide continuous technical support to MPAC. In 2013, the following groups operated under the MPAC umbrella:

- Technical Expert Group on Antimalarial Drug Resistance and Containment
- Technical Expert Group on Malaria Chemotherapy
- Technical Expert Group on Malaria Vector Control
- Vector Control Advisory Group (VCAG) on New Tools – jointly managed by the Global Malaria Programme and the Department of Neglected Tropical Diseases
- Joint Technical Expert Group (JTEG) on Malaria Vaccines Entering Pivotal Phase 3 Trials & Beyond – jointly managed by the Department for Immunization, Vaccines & Biologicals and the Global Malaria Programme

Evidence review groups

Evidence review groups are expert groups convened for a limited time to review a specific area of work, and to provide evidence-based options for recommendations. In 2013, the following groups operated under the MPAC umbrella:

- Evidence Review Group on Malaria Burden Estimation Methodology
- Evidence Review Group on Intermittent Preventive Treatment in Pregnancy

Hardcopies of documents are sent directly to NMCP and global malaria partners, and are available during the World Health Assembly and Regional Committee meetings, high-level scientific and intergovernmental conferences, and technical workshops. WHO also collaborates with the RBM Partnership in disseminating guidance documents to a broader audience. In addition, some key documents can be purchased through the WHO online bookshop.[3]

The two 2013 sessions of the MPAC focused on the following themes: artemisinin resistance containment in the Greater Mekong subregion; artemisinin efficacy in Guyana and Suriname; management of febrile illnesses in peripheral health settings; intermittent preventive treatment in pregnancy; the process for updating the malaria treatment guidelines; harmonization of methods for estimating the global malaria burden; elimination criteria and classification; surveillance, monitoring and evaluation; and a range of vector control issues including achieving universal coverage with long-lasting insecticidal nets (LLINs), estimating the durability of LLINs, and capacity building for entomologists.

In addition, the MPAC was briefed on the following topics: the vaccine candidate RTS,S/AS01; the malaria vaccine technology roadmap; the availability of financial resources for malaria control; the use of diagnostics in low-transmission settings; the use of glucose-6-phosphate dehydrogenase (G6PD) deficiency tests; the Global Strategic Plan for *P. vivax* Control and Elimination (see **Box 2.5**); the Global Technical Strategy for Malaria Control and Elimination 2016–2025 (see **Box 2.3**); and methods and channels for the global dissemination of WHO policy guidance.

2.2 Malaria control policies and strategies

WHO recommends a multi-pronged strategy to control and eliminate malaria, which includes vector control interventions, preventive therapies, diagnostic testing, treatment with quality-assured artemisinin-based combination therapies (ACTs), and strong malaria surveillance. Effective malaria control and elimination requires strong and well-funded NMCPs, tailored national and regional strategies, extensive applied and operational research, and a close collaboration among partners in the global malaria and development community. Achieving effective scale-up of malaria interventions also requires significant human resources at national, district and community levels, and the regular training of malaria programme staff.

2.2.1 Malaria prevention through vector control

The goals of malaria vector control are to:

- reduce human-vector contact and protect individuals from mosquitoes that carry malaria-causing parasites;
- lower the intensity of malaria transmission at community level by reducing the average lifespan of the local mosquito population.

Insecticide-treated mosquito nets (ITNs) – which include both LLINs and conventional nets treated with an insecticide – work both on the individual level (by protecting the person sleeping under the net) and the community level (by extending the effect to an entire area). WHO recommends universal coverage of at-risk populations with ITNs, and urges a switch-over to LLINs. Given that the vast majority of nets being procured and distributed today are LLINs, the remainder of this section focuses on LLINs.

IRS involves the application of residual insecticides to the inner surfaces of dwellings – targeting Anopheles mosquitoes that rest on walls after having taken a blood meal. IRS programmes can rapidly reduce local malaria incidence and mortality, provided that most houses and animal shelters in targeted communities are sprayed. WHO recommends the spraying of at least 80% (and ideally 100%) of houses, structures and units in the targeted area in any round of spraying (*3*).

Achieving universal coverage with effective vector control interventions requires timely and sustained programme-delivery operations. In turn, this requires specialized personnel at national, provincial, district and community levels. These teams

2. For more information about MPAC and its members, please visit the MPAC home page: http://www.who.int/malaria/mpac/en/
3. http://apps.who.int/bookorders/

Box 2.3 Global Technical Strategy for Malaria Control and Elimination 2016–2025

Following a request by the MPAC in 2012, WHO began coordinating the development of a Global Technical Strategy for Malaria Control and Elimination for the period 2016–2025. This global strategy will provide Member States with updated, comprehensive and evidence-based technical guidance for accelerated action to control and eliminate malaria (covering all intervention areas), and for setting strategic directions and targets beyond 2015.

This work is underpinned by a review of existing country and regional strategies, as well as broad-based technical consultations across all WHO regions. Oversight is provided by the MPAC, and the strategy development process is led by a steering committee that brings together leading scientists, technical experts and representatives of endemic countries.

The Global Technical Strategy is being developed in close collaboration with the RBM Partnership's Global Malaria Action Plan (GMAP) II, which will focus on global advocacy, resource mobilization, partner harmonization, the engagement of non-health sectors, and global, regional and country-level planning for the implementation of the Global Technical Strategy. The steering committee for the WHO process and the taskforce for the RBM process have overlapping membership, to ensure alignment and coordination. In the course of 2014, WHO and RBM will hold back-to-back regional consultations.

Timelines

During the 2013 World Health Assembly, Member States expressed support for the development of the Global Technical Strategy for Malaria Control and Elimination 2016–2025. Following endorsement by the MPAC in autumn 2014, the strategy will be submitted to the WHO Executive Board and presented to Member States for consideration during the 2015 World Health Assembly. The Global Technical Strategy for Malaria Control and Elimination 2016–2025 and GMAP II are scheduled to be formally launched, as companion documents, in the second half of 2015.

should have extensive practical experience, coupled with the capacity to monitor and evaluate vector-related and operational factors that may compromise intervention effectiveness. Hence, specialized entomological knowledge and skills are essential.

Detailed recommendations for malaria vector control are as follows:

Insecticide-treated nets

To meet the target of universal access, WHO recommends that one LLIN be distributed for every two people at risk of malaria. Since many households have an odd number of members, the calculation needs to be adjusted when quantifying at the population level. For procurement purposes, WHO recommends using an overall ratio of one LLIN for every 1.8 persons in the target population (*14*).

LLINs procured through public health funds should be provided free of charge to all populations at risk. Universal access to LLINs is best achieved through free mass distribution campaigns every 3 years or less. However, to ensure that coverage is maintained, it is essential to complement these campaigns with continuous distribution programmes (e.g. through antenatal and routine immunization services) before, during and after mass campaigns. Further details can be found in *WHO recommendations for achieving universal coverage with long-lasting insecticidal nets in malaria control*, issued in 2013 (*15*).

Given that most countries are far from achieving universal LLIN coverage, improving access to LLINs should be the most important priority of distribution programmes. Evidence suggests that about 90% of the population with access to a mosquito net actually uses it. In areas where LLIN use is identified as being lower, WHO recommends the roll-out of behaviour-change communication programmes, including information, education and communication (IEC) campaigns (*16*).

NMCPs and global malaria partners should only procure LLINs that have been recommended by the WHO Pesticide Evaluation Scheme (WHOPES). At present, 11 products are recommended by WHOPES (*17*). Independent quality control should be undertaken before shipment, and the cost of analysis should be borne by suppliers, including the cost of sending samples to an accredited or recognized laboratory for analysis on behalf of countries that do not have adequately equipped or staffed national quality-control laboratories (*18*). Detailed guidance on good practices in the handling and use of products containing insecticides, and on quality control in procurement, can be found on the WHOPES website.[4]

The lifespan of LLINs depends greatly on the product type and the setting in which the products are used. Therefore, all large-scale LLIN programmes (including those implemented by nongovernmental organizations, NGOs) should monitor LLIN durability locally, in line with the WHO guidelines for monitoring the durability of LLINs under operational conditions (*19*), and refer to the *WHO guidance note for estimating the longevity of long-lasting insecticidal nets in malaria control*, issued in 2013 (*9*). The collection of local data on the comparative durability of LLIN products, using rigorous and auditable methods, would allow procurement decisions to be made on the basis of *price per year of protection* rather than *unit price per net*. This, in turn, would lead to substantial cost savings (*20*). Such savings are critical because LLINs represent a large proportion of NMCP budgets.

Indoor residual spraying

IRS is applicable in many epidemiological settings, provided that its operational and resource feasibility is considered in policy and programming decisions. IRS requires specialized spray equipment and techniques, and given the difficulty of carrying out spray operations, it also requires scrupulous maintenance of the equipment, timing and quality of application, and monitoring and disposal capabilities.

Currently, WHOPES recommends 12 insecticide compounds and formulations, belonging to four chemical classes, for deployment in indoor spraying programmes (*21*). An insecticide for IRS should be selected for a given area on the basis of community acceptance, data on insecticide resistance, the residual efficacy

4. http://who.int/whopes/quality/en

of the insecticide, costs, safety and the type of surface to be sprayed. Detailed guidance on IRS is available in *Indoor residual spraying: An operational manual for IRS for malaria transmission, control and elimination*, released in 2013 (*3*).

Dichlorodiphenyltrichloroethane (DDT) has a comparatively long residual efficacy (≥6 months) as an insecticide for IRS. The use of DDT in agriculture is banned under the Stockholm Convention on Persistent Organic Pollutants (effective as of May 2004). Nevertheless, countries can use DDT for IRS for as long as necessary and in the quantities needed – provided that the guidelines and recommendations of WHO and the Stockholm Convention are all met – until locally appropriate, cost-effective alternatives are available for a sustainable transition from DDT. Further details can be found in the 2011 WHO position statement on DDT (*22*) and in the decision adopted by the Conference of the Parties to the Stockholm Convention (*23*).

Larval source management

In a few specific settings and circumstances, the core interventions of LLINs and IRS may be supplemented by larval source management, which includes four subcategories: vector habitat modification, habitat manipulation, larviciding and biological control. Currently, WHOPES recommends 10 compounds and formulations for mosquito larval control (*24*). Detailed guidance on larval source management is available in *Larval source management – a supplementary measure for malaria vector control. An operational manual*, released in 2013 (*5*).

Larviciding – the most widely used of larval source management approaches – involves the regular application of a biological or chemical insecticide to water bodies to reduce the number of mosquito larvae and pupae. These interventions can be useful in urban and periurban areas, but they are unlikely to be effective in most areas of rural Africa, where mosquito breeding sites are generally innumerable, shifting and widely dispersed. WHO recommends larviciding only in settings where mosquito breeding sites are *few, fixed and findable*, and where sites are easy to identify, map and treat. WHO and partners should continue to work with endemic countries that choose to use larviciding, to ensure that such programmes are implemented and monitored appropriately. Further details can be found in the WHO interim position statement on larviciding, issued in 2012 (*25*).

2.2.2 Insecticide resistance

Anopheles mosquito resistance to insecticides has been detected in 64 countries with on-going malaria transmission, affecting all major vector species and all classes of insecticides (*26*). Current vector control tools remain effective; however, if left unchecked, insecticide resistance could lead to a substantial increase in malaria incidence and mortality. The global malaria community needs to take coordinated action to prevent insecticide resistance from emerging at new sites, and to urgently address it at the sites where it has been identified.

In 2012, WHO issued the *Global plan for insecticide resistance management in malaria vectors* (GPIRM) (*26*), urging endemic countries to ensure timely entomological and resistance monitoring, and to develop and implement comprehensive insecticide resistance management (IRM) strategies. The GPIRM was developed through a broad-based consultation with over 130 stakeholders representing all constituencies, including malaria-endemic countries, multilateral agencies, development partners, academia and industry. The strategy is based on five pillars:

- plan and implement IRM strategies in malaria-endemic countries;
- ensure proper, timely entomological and resistance monitoring, and effective data management;
- develop new, innovative vector control tools;
- fill gaps in knowledge on mechanisms of insecticide resistance and the impact of current IRM strategies; and
- ensure that enabling mechanisms (advocacy, human and financial resources) are in place.

The GPIRM provides detailed technical recommendations on both monitoring and managing insecticide resistance in different settings, depending on the extent and mechanisms of insecticide resistance, and the type of vector control interventions used.

Insecticide resistance management

During the past 10 years, the main factor driving the emergence and spread of insecticide resistance has been the heavy reliance on a single class of insecticides: the pyrethroids. The pyrethroids are both highly effective and the least expensive of the four classes of insecticides available for public health vector control. Preserving the efficacy of pyrethroids is an urgent global priority, because pyrethroids are the only class of insecticide available for use on LLINs, and most new products and compounds are still years away from entering the market.

WHO urges endemic countries to draw up comprehensive national IRM strategies and deploy them in a pre-emptive manner. Through IRM, countries can delay the evolution of resistance, preserve the effectiveness of existing insecticides, and possibly even reverse resistance in some settings. When programmatic decisions are taken, insecticide resistance – or the potential for its development – should be considered as being just as important as the cost-effectiveness of vector control programmes.

For all settings, the GPIRM recommends that the operational impact of LLIN use be monitored closely, and that insecticide resistance be tested at sentinel sites at least once a year, and preferably every 6 months. The GPIRM's additional technical recommendations are divided into three main areas, according to the main vector control methods used in a specific geographical area where:

- IRS is the main form of vector control
- LLINS are the main form of vector control
- IRS and LLINs are used in combination.

Each of these is discussed below.

Where IRS is the main form of vector control

National vector control programmes should annually rotate the insecticides used for IRS in order to preserve the effectiveness of current compounds. In places where this recommendation can only be implemented in stages, the first priority should be to introduce rotations in areas of identified resistance and in those with the highest malaria transmission. The rotation systems may include the use of a pyrethroid.

Where LLINs are the main form of vector control

In areas where LLINs are the main form of vector control, IRM strategies should be aligned with the perceived level of threat from resistance. This will depend on the nature and strength of resistance in the vector population, and on whether the number of confirmed malaria cases is rising.

If countries do not have a surveillance system that can promptly detect an increase in malaria cases, this capacity must be established as a matter of urgency.

Even in areas where resistance has been identified, LLINs continue to provide some level of protection by acting as a physical barrier against disease vectors. Countries should therefore continue to promote the goal of universal LLIN coverage. In areas with high levels of LLIN coverage in which pyrethroid resistance is identified, WHO recommends the deployment of focal IRS with a non-pyrethroid insecticide. The presence of a non-pyrethroid on wall surfaces reduces the probability that pyrethroid resistance will spread.

The current product development pipeline indicates that combination LLINs (i.e. containing more than one insecticide) may become available in the short term (i.e. the next 2–4 years), and LLINs with new active ingredients may become available in the long term (i.e. the next 6–9 years). As soon as combination LLINs and non-pyrethroid LLINs become available and are recommended by WHO, control programmes should procure those for distribution. The WHO Vector Control Advisory Group (VCAG) on New Tools, established in 2013, is expected to shorten the process of getting new vector control tools and technologies approved and registered on a country level.

Where IRS and LLINs are used in combination

In areas where IRS and LLINs are used in combination, two pre-emptive actions are needed. First, in areas of high LLIN coverage, pyrethroids should not be used for IRS, because this will contribute to selection pressure. Instead, IRS should be conducted with alternative, non-pyrethroid insecticides. If possible, the alternative insecticides should be used in a rotation scheme to avoid the development of resistance to any one of them. Second, because continued use of LLINs is likely to contribute to selection pressure, countries should ensure frequent resistance monitoring, at least once a year and preferably every 6 months.

In areas where pyrethroid resistance has been confirmed, vector control programmes should continue to scale up LLINs, and closely monitor their effectiveness through a combination of entomological monitoring data and epidemiological data from routine malaria surveillance. In areas of high malaria transmission, evidence is emerging that the use of IRS and LLINs in combination could be more effective than either intervention alone. WHO guidance on this topic is expected to be updated in 2014 through the Technical Expert Group on Malaria Vector Control and the MPAC.

Resistance monitoring and testing

Resistance monitoring should be seen as a critical element of any medium or large-scale deployment of an insecticidal intervention, and should be overseen and coordinated by NMCPs. It is the responsibility of implementing agencies to ensure that testing is done properly and in collaboration with NMCPs. Donor organizations financing procurement of vector control products that contain insecticides should ensure that product decisions are supported by adequate and up-to-date information on vector resistance. In each country, it is imperative to establish a national mechanism through which all data collected on vector resistance is analysed, interpreted, reported and shared for local procurement and policy decisions. This includes the establishment and management of national databases on insecticide resistance.

In 2013, WHO released new guidance about recommended test procedures for insecticide resistance (*4*), including recommended equipment and supplies, and a detailed description of test conditions and protocols. The document contains recommendations on how susceptibility test results should be recorded and reported, including how mortality and knockdown rates should be calculated, how susceptibility test results should be interpreted, and how susceptibility testing results should be reported. Current testing procedures also include the bottle bioassay developed by the United States Centers for Disease Prevention and Control.

Capacity building in entomology and vector control

In the *WHO guidance note on capacity building in malaria entomology and vector control*, issued in 2013 (*10*), WHO urges endemic countries and global malaria partners to strengthen human capacities in entomology and vector control. The multifaceted challenges of vector control can only be tackled if countries possess a strong cadre of entomologists and offer the training, support structure and financing that is needed to effectively plan, monitor, evaluate and manage vector control efforts.

2.2.3 Preventive chemotherapy

Preventive chemotherapy is the use of complete treatment courses of effective antimalarial medicines for targeted population groups at risk of malaria, with the goal of preventing malaria infection and thereby reducing malaria-related morbidity and mortality. The three preventive therapies presently recommended by WHO are intermittent preventive treatment in pregnancy (IPTp), intermittent preventive treatment in infants (IPTi), and seasonal malaria chemoprevention (SMC), each of which is discussed below.

Intermittent preventive treatment in pregnancy (IPTp)

Following a 2012 review of the evidence (*27*) and an assessment by the MPAC, WHO recommends IPTp with sulfadoxine-pyrimethamine (SP) for all pregnant women at each scheduled antenatal care visit after the first trimester, in areas of moderate to high malaria transmission in sub-Saharan Africa. The first IPTp-SP dose should be administered as early as possible during the second trimester of pregnancy. Each SP dose should be given at least one month apart, and the last dose can be administered up to the time of delivery. Implementation guidance is provided through a WHO policy brief, released in 2013 (*28*). Recommended indicators for monitoring IPTp implementation have been updated (see **Section 2.6** and **Table 2.2**).

Intermittent preventive treatment in infants (IPTi)

All infants at risk of *Plasmodium falciparum* infection in countries in sub-Saharan Africa with moderate to high malaria transmis-

sion should receive a dose of SP along with the DPT2, DPT3 and measles vaccines (three doses in total) through the routine immunization programme (*29*). IPTi provides partial protection in the first year of life against clinical malaria and anaemia, and reduces hospital admissions associated with malaria parasitaemia. Implementation guidance is provided in *Intermittent preventive treatment for infants using sulfadoxine-pyrimethamine (IPTi-SP) for malaria control in Africa: Implementation field guide*, released in 2011 (*30*).

Seasonal malaria chemoprevention (SMC)

SMC is the intermittent administration of full treatment courses of an effective antimalarial medicine during the malaria season to prevent malarial illness in children aged between 3 and 59 months (*31*). WHO recommends the use of SMC in areas of highly seasonal malaria transmission[5] across Africa's Sahel subregion where amodiaquine plus SP are effective. SMC requires administration of a complete treatment course of amodiaquine plus SP at monthly intervals, with the first course given at the beginning of the transmission season. A maximum of four courses can be administered during the transmission season. Implementation guidance is provided in *Seasonal malaria chemoprevention with sulfadoxine-pyrimethamine plus amodiaquine in children: A field guide*, released in 2013 (*6*).

2.2.4 Diagnosis and treatment of malaria

The main objectives of an antimalarial treatment policy are to:

- reduce morbidity and mortality by ensuring rapid, complete cure of Plasmodium infection, thus preventing the progression of uncomplicated malaria to severe and potentially fatal disease, as well as preventing chronic infection that leads to malaria-related anaemia;
- curtail the transmission of malaria by reducing the human parasite reservoir; and
- prevent the emergence and spread of resistance to antimalarial medicines.

Current WHO recommendations for malaria diagnosis and treatment are described in the *Guidelines for the treatment of malaria. Second edition* (*32*), published in March 2010 and updated in April 2011. All updates since April 2011 can be found on the WHO website. The section below summarizes all valid guidance. The third edition of the WHO treatment guidelines is scheduled for release in 2014.

Prompt parasitological confirmation by light microscopy or rapid diagnostic tests (RDTs) is recommended in all patients with suspected malaria before treatment is started. Antimalarial treatment solely on the basis of clinical suspicion should only be considered when a parasitological diagnosis is not accessible.[6] Treatment based on diagnostic testing has the following advantages over presumptive treatment of all fever episodes:

- improved care of parasite-positive patients because of confirmation of infection;
- identification of parasite-negative patients, for whom another diagnosis must be sought, and appropriate treatment administered;
- avoidance of the use of antimalarial medicine in parasite-negative patients, thereby reducing side-effects, drug interactions and selection pressure for drug resistance;
- better public trust in the efficacy of ACT when it is used only to treat confirmed malaria cases;
- confirmation of malaria treatment failures;
- improved malaria case reporting and surveillance.

Uncomplicated *P. falciparum* malaria should be treated with an ACT. The five ACTs currently recommended for use by WHO are: artemether plus lumefantrine, artesunate plus amodiaquine, artesunate plus mefloquine, artesunate plus SP, and dihydroartemisinin plus piperaquine. The choice of the ACT should be based on the therapeutic efficacy of the combination in the country or area of intended use.

Artemisinin and its derivatives should not be used as oral monotherapies for the treatment of uncomplicated malaria because poor adherence to the required 7-day course of treatment results in only partial clearance of malaria parasites, contributing to the development of artemisinin resistance.

5. Areas where on average more than 60% of clinical malaria cases occur within a maximum of 4 months.

6. Within a short time (<2 hours) of the patient's presentation at the point of care.

Box 2.4 The T3: Test. Treat. Track Initiative

WHO urges endemic countries, donors and malaria partners to scale up diagnostic testing, treatment and surveillance for malaria. Endemic countries and stakeholders should ensure that every suspected malaria case is tested, that every *confirmed* case is treated with a quality-assured antimalarial medicine, and that every malaria case is tracked in a surveillance system. T3 is derived from, and builds on, the following core WHO documents:

- *Universal access to malaria diagnostic testing: An operational manual* (2011) (*33*)
- *Guidelines for the treatment of malaria, Second edition* (2010) (*32*)
- *Disease surveillance for malaria control: An operational manual* (2012) (*34*)
- *Disease surveillance for malaria elimination: An operational manual* (2012) (*35*).

Accurate diagnosis will significantly improve the quality of patient care, ensure that antimalarial medicines are used rationally and correctly, and serve as the basis for more accurate surveillance data. The scale-up of quality-assured antimalarial medicines in the public and private sectors will ensure that all patients with confirmed malaria receive prompt treatment. Improved surveillance for malaria cases and deaths will help ministries to determine which areas or population groups are most affected, and thus target resources to where they are most needed.

P. vivax malaria should be treated with chloroquine in areas where this drug is effective. An appropriate ACT (not artesunate plus SP) should be used in areas where *P. vivax* resistance to chloroquine has been documented. To prevent relapses, both chloroquine and ACTs should be combined with a 14-day course of primaquine for the radical cure of *P. vivax* malaria, subject to consideration of the risk of haemolysis in patients with G6PD deficiency.

Severe malaria should be treated with injectable artesunate, followed by a complete course of an effective ACT as soon as the patient can take oral medications. Where complete parenteral treatment of severe malaria is not possible (e.g. in peripheral health posts), patients should be given pre-referral treatment and referred immediately to an appropriate facility for further treatment. Options available for pre-referral treatment are: artesunate (rectal), quinine (intramuscular, IM), artesunate (IM) or artemether (IM). In 2013, WHO released the third edition of *Management of severe malaria: A practical handbook, which contains detailed guidance for clinicians* (*2*).

Box 2.5 Global Strategic Plan for *P. vivax* Control and Elimination

In 2013, WHO began developing a Global Strategic Plan for *P. vivax* Control and Elimination, to bring together all policy recommendations and programmatic guidance for *P. vivax* in one document for NMCPs. In addition to tailored recommendations for reducing the *P. vivax* burden, the plan will include guidance on possible new tools and the most urgent research priorities.

The *P. vivax* plan is being developed in consultation with malaria-endemic countries, technical experts and key stakeholders. WHO will hold a series of regional consultations in 2014, and is expected to issue the plan before the end of 2014. Key recommendations from the *P. vivax* plan will be integrated into the Global Technical Strategy for Malaria Control and Elimination 2016–2025, which will be presented to the World Health Assembly for consideration in 2015.

In settings with limited access to health facilities, diagnosis and treatment should be provided at community level through a programme of community case management of malaria. With the introduction of malaria RDTs, malaria can be distinguished from non-malaria febrile illnesses, notably pneumonia, which is a major cause of childhood mortality. The new strategy targeting the diagnosis and treatment of malaria, pneumonia and diarrhoea at community level is termed integrated community case management (iCCM) of childhood illness.[7]

Following a 2012 review of evidence (*36*) and an assessment by the MPAC, WHO recommends the following in areas where there is a threat of artemisinin resistance and in areas targeted for *P. falciparum* elimination, and where primaquine is not yet deployed as gametocytocide for *P. falciparum*: a single 0.25 mg base/kg primaquine dose given to all patients with confirmed *P. falciparum* malaria on the first day of their ACT treatment, without a need for G6PD testing. Pregnant women and infants under 1 year of age should *not* be given this treatment.

7. To read more, visit: http://www.who.int/malaria/areas/community_case_management/overview/en/index.html, accessed 10 September 2013

2.2.5 Management of antimalarial drug resistance

Antimalarial drug resistance is a major public health problem that hinders the control of malaria. Continuous monitoring of the efficacy of and resistance to antimalarial drugs is critical, in order to inform treatment policy and ensure early detection of changing patterns of resistance. Resistance is occurring as a consequence of several factors, including poor treatment practices, inadequate patient adherence to prescribed antimalarial regimens, and the widespread availability of artemisinin-based monotherapies and substandard forms of antimalarial medicines.

WHO recommends that countries routinely conduct therapeutic drug efficacy studies to allow for measurement of the clinical and parasitological efficacy of medicines, and the detection of small changes in treatment outcomes when monitored consistently over time. These studies are considered the "gold standard" for determining antimalarial drug efficacy, and their results are the primary data used by national programmes to revise their national malaria treatment policies for first- and second-line drugs, and to ensure appropriate management of clinical cases. Therapeutic drug efficacy studies are also used to detect suspected artemisinin resistance, which is defined as an increase in parasite clearance time, as evidenced by ≥10% of cases with parasites detectable on day 3 after treatment with an ACT.

To interpret and compare results within and between regions, and to follow trends over time, therapeutic efficacy monitoring must follow standardized procedures. WHO updated the protocol for assessing antimalarial drug efficacy in 2009 (*37*), and has made available a guideline on genotyping malaria parasites to distinguish between reinfection and recrudescence, which is necessary as part of therapeutic efficacy testing (*38*).

WHO recommendations for the monitoring and management of antimalarial drug resistance, published in the 2009 edition of *Methods for surveillance of antimalarial drug efficacy* (*37*), are as follows:

- NMCPs should establish sentinel sites for the surveillance of antimalarial drug efficacy. Experience suggests that four to eight sites per country will achieve a balance between representativeness and practicality. The sentinel sites should represent all the epidemiological strata in the country, but it is essential to select a "manageable" number of sites to ensure proper monitoring and supervision.
- Efficacy of first- and second-line medicines should be tested at least once every 24 months at all sites. For the purposes of comparability, assessments should always be conducted at the same time of year.
- A follow-up of 28 days is recommended as the minimum duration for medicines with elimination half-lives of less than 7 days (amodiaquine, artemisinin derivatives, atovaquone–proguanil, chloroquine, lumefantrine, quinine and SP). For medicines with longer elimination half-lives (mefloquine, piperaquine), a follow-up period of 42 days is necessary.
- The standard protocol to test the efficacy of medicines against *P. falciparum* needs to be adjusted for *P. vivax*. Since *P. vivax* infec-

tion has a dormant liver stage and therefore has the potential to relapse, many countries recommend primaquine therapy for radical cure. Administration of primaquine concurrently or soon after administration of chloroquine may conceal resistance to chloroquine alone, resulting in underestimation of the risk of therapeutic failure or resistance to chloroquine. Therefore, in certain cases, primaquine therapy should be postponed until after the 28-day follow-up. Nonetheless, if local health policy includes mandatory administration of primaquine with chloroquine, the failure rate should be considered to be that of the combination regimen.

- Countries should consider changing the first-line treatment for malaria if the total failure rate (defined as the sum of the patients presenting with early treatment failure, late clinical failure or late parasitological failure) exceeds 10%. The selection of a new antimalarial treatment for use at public health level in the context of national treatment guidelines should be based on an average cure rate of ≥95% as assessed in clinical trials (*32*).

Reliable data on the therapeutic efficacy of antimalarial medicines is critical both for effective case management and for early detection of changing patterns of resistance that enable timely revisions to national malaria treatment policies. Although routine therapeutic efficacy studies provide an adequate indication of drug efficacy, additional research studies are needed to confirm and characterize drug resistance. In addition, the emergence and rapid spread of antimalarial drug resistance over the past decades has heightened the urgency for a well-coordinated global monitoring system of antimalarial therapeutic efficacy.

Artemisinin resistance

Over the past decade, most countries endemic for *P. falciparum* malaria have shifted their national treatment policies to ACTs, although many of these countries still do not conduct routine therapeutic efficacy studies (*39*). The development of parasite resistance to artemisinins – the key compounds in ACTs – is a major public health concern. Resistance is occurring as a consequence of several factors, including poor treatment practices, inadequate patient adherence to prescribed antimalarial regimens, and the widespread availability of oral artemisinin-based monotherapies and substandard forms of the drug.

WHO's current working definition of artemisinin resistance is:

- an increase in parasite clearance time – detected through routine surveillance – as evidenced by ≥10% of cases with parasites detectable on day 3 after treatment with an ACT (suspected resistance);

or

- treatment failure after treatment – detected through research trials – with an oral artemisinin-based monotherapy with adequate antimalarial blood concentration, as evidenced by the persistence of parasites for 7 days, or the presence of parasites at day 3 and recrudescence within 28–42 days (confirmed resistance).[8]

In recent years, artemisinin resistance has been detected in four countries of the Greater Mekong subregion: Cambodia, Myanmar, Thailand and Viet Nam. If artemisinin resistance were to spread to India or sub-Saharan Africa, the global consequences could be dire, because no alternative antimalarial medicine is available at present with the same level of efficacy and tolerability as ACTs.

In May 2007, the World Health Assembly called on malaria-endemic countries to progressively cease the provision of oral artemisinin-based monotherapies (resolution WHA60.18), and in January 2011, WHO released the *Global plan for artemisinin resistance containment* (GPARC) (*39*) outlining the necessary actions to contain and prevent resistance to artemisinins. The GPARC outlines five areas of action for successful management of artemisinin resistance:

- *Stop the spread of resistant parasites*. In areas where there is evidence of artemisinin resistance, an immediate comprehensive response using a combination of malaria control

8. This definition is prone to confounding factors (known and unknown) such as splenectomy, haemoglobin abnormalities and reduced immunity.

Box 2.6 Emergency response to artemisinin resistance in the Greater Mekong subregion

On World Malaria Day 2013, WHO launched an *Emergency response to artemisinin resistance in the Greater Mekong subregion* (ERAR) – a regional framework for action to guide an emergency scale-up of containment efforts in affected countries. The ERAR identifies four priority areas where coordinated action is needed to contain artemisinin resistance and to move towards elimination of the disease:

- reach all at-risk groups with full coverage of malaria interventions in priority areas
- achieve tighter coordination and management of field operations
- obtain better information for artemisinin resistance containment
- strengthen regional oversight and support.

To coordinate the emergency response, WHO set up a new regional hub in Phnom Penh, Cambodia in 2013. WHO estimates that about US$ 400–450 million of funding is required for the 2013–2015 period, to fully scale up malaria control and containment activities in the affected countries. The Global Fund to Fight AIDS, Tuberculosis and Malaria has already pledged to allocate US$ 100 million to support countries over the next 3 years.

In parallel with WHO's launch of the emergency response, growing political momentum in the region led to the adoption of a consensus statement on malaria control and elimination in the Asia-Pacific at a high-level summit hosted by the Government of Australia in October 2012 in Sydney. This was followed by the adoption of the Declaration of the 7th East Asia Summit on *Regional Responses to Malaria Control and Addressing Resistance to Antimalarial Medicines* during the same month in Cambodia. In October 2013, leaders of the East Asia Summit endorsed the establishment of an Asia-Pacific Leaders Malaria Alliance, with a leadership group chaired by the prime ministers of Australia and Viet Nam. APLMA's work will be supported through two technical taskforces: the Taskforce on Regional Financing, and the Taskforce on Improving Access to Quality Medicines and Other Technologies.

and elimination measures is needed to stop the survival and spread of resistant parasites.

- *Increase monitoring and surveillance to evaluate the threat of artemisinin resistance*. Regular monitoring and surveillance is essential to rapidly identify new foci of resistant parasites, and to provide information for containment and prevention activities. Endemic countries should undertake routine monitoring of antimalarial drugs at sentinel sites every 24 months in order to detect changes in their therapeutic efficacy.
- *Improve access to diagnostics and appropriate treatment with ACTs*. Programmes should ensure the following: consistent and accurate diagnostic testing of suspected malaria cases; treatment with ACTs for confirmed cases; compliance with ACT treatment; and removal from the market of oral artemisinin-based monotherapies, as well as substandard and counterfeit antimalarial medicines.
- *Invest in research related to artemisinin resistance*. Research is important to improve understanding of resistance and the ability to manage it.
- *Motivate action and mobilize resources*. Successful implementation of the GPARC will depend on motivating stakeholders at global, regional and national levels to support or conduct the recommended activities.

2.3 Malaria surveillance

Strong malaria surveillance systems are fundamental to both programme design and implementation. They are needed to target resources to the populations most in need and to respond to unusual trends, such as outbreaks of cases or the absence of a decrease in the number of cases despite widespread implementation of interventions. The design of malaria surveillance systems depends on two factors: the level of malaria transmission and the resources available to conduct surveillance.

In countries that are in the malaria control phase, and in areas of moderate to high transmission, case incidence rates are often so high that it is not possible to examine and react to each confirmed case individually; rather, analysis must be based on aggregate numbers, and action taken at a population level. As transmission is progressively reduced, it becomes increasingly possible, and necessary, to track and respond to individual cases. In the elimination phase, malaria programmes need to detect each infection, whether or not it is symptomatic, and investigate each case to ascertain whether the infection was imported or locally acquired, and undertake appropriate control measures.

The principal features of surveillance systems in different stages of control are summarized below. Further details can be found in the operation manuals *Disease surveillance for malaria control* (*34*) and *Disease surveillance for malaria elimination* (*35*), which were launched by the WHO Director-General in 2012.

2.3.1. Malaria surveillance systems in the control phase: high and moderate transmission settings

Registers of individual cases are maintained at health facilities, and allow recording of diagnostic tests performed and test results. Given the high frequency of malaria cases and the limited resources for maintaining an extensive recording and reporting system, malaria surveillance systems rely on the reporting and use of aggregate data by district and higher administrative levels. Malaria surveillance is frequently integrated into a broader system of health information or communicable disease surveillance.

At the health-facility level, case-based surveillance of malaria inpatient cases and deaths is undertaken with the aim of responding to cases of severe disease and attaining a target of zero malaria deaths. Cases are graphed monthly to assess the extent to which control measures are reducing the incidence of malaria.

At district and national levels, cases and deaths are summarized monthly on five control charts, in order to assess the impact of malaria control interventions and identify trends that require an urgent response. The five areas covered by the control charts are malaria incidence and mortality rates, proportional malaria incidence and mortality rates, general patient attendance rates, diagnostic activity (annual blood examination rate), and quality of diagnosis and health-facility reporting. Analysis is also undertaken by health-facility catchment area and by district in order to set priorities for malaria control activities.

2.3.2. Malaria surveillance systems in the control phase: low-transmission settings

Registers of individual malaria cases are maintained at health facilities, with records of the diagnostic tests performed and test results obtained. As well as aggregate data being reported to district and higher administrative levels, line lists of inpatients and inpatient deaths are forwarded to district level; in addition, when case loads and district capacity permit (e.g. <150 patients per district per month), lists of all confirmed cases are submitted monthly.

At health-facility level, case-based surveillance of malaria cases and deaths is undertaken, with the aim of identifying population groups with the highest malaria incidence and probable sources of infection. Cases are graphed daily or weekly to identify trends that require attention, and are mapped by village to identify clusters of cases.

At the district level, malaria cases and deaths are summarized weekly or monthly on the same five control charts used in high-transmission settings, to assess the impact of malaria control interventions and identify trends that require urgent response. Analysis is undertaken by health-facility catchment area and by village, to set priorities for activities. A register of severe cases and deaths is maintained and investigations are undertaken to identify and address programme weaknesses.

At national level, cases and deaths are summarized monthly on the five control charts, to assess the impact of malaria control interventions. Analysis is undertaken by district, to set priorities for activities.

2.3.3. Malaria surveillance systems in the elimination phase

Case-based surveillance is carried out and each confirmed case is immediately notified to district, provincial and central levels. A full investigation of each case is undertaken to determine whether the infection was imported, acquired locally by mosquito-borne transmission (introduced, indigenous or relapsed) or induced. The national reference laboratory reconfirms all positive test results and a sample of negative test results, and organizes laboratory participation in a national quality-assurance (QA) network.

Each new focus of transmission is investigated, including an entomological investigation, to ascertain risk factors and devise the optimal strategies for control. The focus is classified and its status is updated continuously.

The malaria programme monitors the extent of surveillance, mainly by tracking blood examination rates by village and by month in high-risk foci, then comparing the number of diagnostic tests done with the number expected. Depending on the situation, other response measures (e.g. active case detection) may be initiated.

Programme managers at district level keep the following:

- malaria case investigation forms, patient records, focus investigation forms and a register of foci with changes in status;
- maps showing the distribution of cases by household, vector breeding places, possible sites of transmission and geographical features, such as hills, rivers and roads; and
- data on integrated vector control interventions.

Full documentation of programme activities and surveillance results is kept securely at national level in preparation for certification of malaria elimination.

2.4 Malaria elimination

Box 2.7 Definitions of control, elimination, certification and eradication (*40*)

Malaria control: the reduction of the malaria disease burden to a level at which it is no longer a public health problem.

Malaria elimination: the reduction to zero of the incidence of infection caused by human malaria parasites in a defined geographical area as a result of deliberate efforts. Continued measures to prevent re-establishment of transmission are required.

Certification of malaria-free status: the official recognition of malaria-free status granted by WHO after it has been proven beyond reasonable doubt that the chain of local human malaria transmission by *Anopheles* mosquitoes has been fully interrupted in an entire country for at least 3 consecutive years.

Malaria eradication: permanent reduction to zero of the worldwide incidence of infection caused by a particular malaria parasite species. Intervention measures are no longer needed once eradication has been achieved.

From a country perspective, interruption of local mosquito-borne malaria transmission (i.e. elimination of malaria) is the ultimate goal of malaria control. The WHO recommendations regarding malaria elimination are summarized below (*40, 41*):

- In areas of high, stable transmission, where a marked reduction in malaria transmission has been achieved, a "consolidation period" should be introduced, in which achievements are sustained, even in the face of limited disease; control strategies are reviewed; health services adapt to the new clinical and epidemiological situation, including reduced levels of immunity; and surveillance systems are strengthened to allow rapid response to new cases. This transformation phase precedes a decision to reorient programmes towards elimination.
- Countries with low, unstable transmission should be encouraged to proceed to malaria elimination. Before making this decision, however, countries should take account of the overall feasibility of elimination, including the entomologic situation, programmatic capacity, political and fiscal commitment, and potential threats to success, including the malaria situation in neighbouring countries. Malaria elimination may also require regional initiatives, cross-border collaboration, and strong political commitment.
- Countries with an absence of locally acquired malaria cases for 3 consecutive years, and with sufficiently robust surveillance and reporting systems in place to demonstrate this achievement, are eligible to ask WHO to initiate procedures for certification that they are malaria free.

Failure to sustain malaria control will result in a resurgence of malaria. Therefore, public and government commitment to intensified malaria control and elimination needs to be sustained even after the malaria burden has been greatly reduced.

2.5 Goals and targets for malaria control and elimination

Malaria control forms part of Millennium Development Goal (MDG 6) – to halt by 2015 and begin to reverse the incidence of malaria and other major diseases. Given that malaria accounted for 12% of post-neonatal child deaths globally in 2010 and 21.7% of post-neonatal child deaths in Africa (*42*), it is also central to MDG 4 (to achieve a two thirds reduction in the mortality rate among children under 5 years of age between 1990 and 2015). Malaria control is additionally expected to contribute to achievement of MDG 1 (eradicate extreme poverty and hunger), MDG 2 (achieve universal primary education) MDG 3 (promote gender equality and empower women), MDG 5 (improve maternal health) and MDG 8 (develop a global partnership for development).

In 2005, the World Health Assembly set as a target the reduction of malaria cases and deaths by 75% by 2015 (*43*). In 2011, the RBM Partnership updated the objectives, targets and milestones that had been set out in the Global Malaria Action Plan in 2008 (*44*). The update retained the objective of reducing malaria cases by 75% from 2000 levels by 2015, but also had a more ambitious target: the reduction of malaria deaths to near zero by 2015[9] (see Table 2.1). The objectives of mortality and morbidity reduction are linked to targets for malaria prevention and case management, and to the milestones for individual years before 2015. Another objective is to eliminate malaria by the end of 2015 in 8–10 new countries (since 2008) and in the WHO European Region.

2.6 Indicators of progress

The updated objectives, targets and milestones provide direction for the implementation of NMCPs; they also provide a

9. Near zero malaria deaths is defined as no more than 1 confirmed malaria death per 100 000 population at risk, in areas where public health facilities are able to provide a parasitological test to all suspected malaria cases.

framework for monitoring and evaluation. A list of recommended indicators against each target is shown in Table 2.2. The selection of indicators is the same as those outlined previously in the *World malaria report 2012* (*45*), except for indicators used to monitor the uptake of IPTp, which have been revised in light of the updated IPTp recommendation. WHO now recommends IPTp with SP for all pregnant women at *each scheduled antenatal care visit after the first trimester*, in areas of moderate to high malaria transmission in sub-Saharan Africa. The first IPTp-SP dose should be administered as early as possible during the second trimester of pregnancy. (See section 2.2.3)

Considering that WHO recommends four scheduled ANC visits, and the first visit may occur in the first trimester, IPTp indicators now emphasize the proportion of pregnant women who receive three or more doses of IPTp-SP during their pregnancy. Supportive indicators include the proportion of pregnant women who receive one, two, three and four doses in relation to the number of ANC visits made.

Indicators that can be generated from household surveys are shown in bold. In some cases, the indicators generated by household surveys (e.g. parasite prevalence) do not measure a target directly, but the indicator is in widespread use and is therefore placed by the most appropriate RBM target.

Table 2.1 Updated Global Malaria Action Plan (GMAP) objectives, targets, and milestones beyond 2011

Objective	Targets	Milestones
Objective 1 Reduce global malaria deaths to near zero by end 2015	**Target 1.1 Achieve universal access to case management in the public sector.** By end 2013, 100% of suspected malaria cases receive a malaria diagnostic test and 100% of confirmed cases receive treatment with appropriate and effective antimalarial drugs.	None, as the target is set for 2013.
	Target 1.2 Achieve universal access to case management, or appropriate referral, in the private sector. By end 2015, 100% of suspected malaria cases receive a malaria diagnostic test and 100% of confirmed cases receive treatment with appropriate and effective antimalarial drugs.	By end 2013, in endemic countries, 50% of persons seeking treatment for malaria-like symptoms in the private sector report having received a malaria diagnostic test and 100% of confirmed cases having received treatment with appropriate and effective antimalarial drugs.
	Target 1.3 Achieve universal access to community case management (CCM) of malaria. By end 2015, in countries where CCM of malaria is an appropriate strategy, 100% of fever (suspected) cases receive a malaria diagnostic test and 100% of confirmed uncomplicated cases receive treatment with appropriate and effective antimalarial drugs, and 100% of suspected and confirmed severe cases receive appropriate referral.	1. By end 2012, all countries where CCM of malaria is an appropriate strategy have adopted policies to support CCM of malaria (including use of diagnostic testing and effective treatment). 2. By end 2013, in all countries where CCM of malaria is an appropriate strategy, 80% of fever cases receive a malaria diagnostic test and 80% of confirmed cases receive treatment with effective antimalarial drugs.
Objective 2 Reduce global malaria cases by 75% by end 2015 (from 2000 levels)	**Target 2.1 Achieve universal access to and utilization of prevention measures.** By end 2013, in countries where universal access and utilization have not yet been achieved, achieve 100% access to and utilization of prevention measures for all populations at risk with locally appropriate interventions.	None, as the target is set for 2013.
	Target 2.2 Sustain universal access to and utilization of prevention measures. By 2015 and beyond, all countries sustain universal access to and utilization of an appropriate package of preventive interventions.	From 2013 through 2015, universal access to and utilization of appropriate preventive interventions are maintained in all countries.
	Target 2.3 Accelerate development of surveillance systems. By end 2015, all districts are capable of reporting monthly numbers of suspected malaria cases, number of cases receiving a diagnostic test and number of confirmed malaria cases from all public health facilities, or a consistent sample of them.	By end 2013, 50% of malaria endemic countries have met the 2015 target.
Objective 3 Eliminate malaria by end 2015 in 10 new countries (since 2008) and in the WHO European Region		By end 2013, malaria is eliminated in 3 new countries.

Table 2.2 Indicators for measuring progress towards GMAP objectives and targets

GMAP Objective or Target	Key Indicator	Further Analysis	Supporting Indicator
Objective 1 Reduce global malaria deaths to near zero* by end 2015	Inpatient malaria deaths per 1000 persons per year	Has health facility reporting completeness changed over time?	Completeness of monthly health facility reports
	All-cause under 5 mortality rate	What factors are responsible?	**Programme coverage indicators in this table (detailed below)**
Target 1.1 Achieve universal access to case management in the public sector **Target 1.2** Achieve universal access to case management, or appropriate referral, in the private sector	Proportion of suspected malaria cases that receive a parasitological test		
	Proportion of children under 5 years old with fever in the last two weeks who had a finger or heel stick	Are people seeking advice or treatment for fever and from where?	**Proportion of children under 5 years old with fever in the last two weeks for whom advice or treatment was sought**
	Proportion of confirmed malaria cases that receive first-line antimalarial treatment according to national policy	Are adequate quantities of antimalarial medicines available?	Proportion of health facilities without stock-outs of key commodities by month
Target 1.3 Achieve universal access to community case management (CCM) of malaria	**Proportion receiving first-line treatment among children under 5 years old with fever in the last two weeks who received any antimalarial drugs**		
Objective 2 Reduce global malaria cases by 75% by end 2015 (from 2000 levels)	Confirmed malaria cases (microscopy or RDT) per 1000 persons per year	Has diagnostic effort changed over time?	Annual blood examination rate
		Has health facility reporting completeness changed over time?	Completeness of monthly health facility reports
		Have test positivity rates changed over time?	Malaria test positivity rate
	Parasite prevalence: proportion of children aged 6–59 months with malaria infection	Is there other evidence of morbidity change?	**Proportion of children aged 6–59 months with a hemoglobin measurement of <8 g/dL**
Target 2.1 Achieve universal access to and utilization of prevention measures**	**Proportion of population with access to an ITN within their household**	How many households have at least one ITN?	**Proportion of households with at least one ITN**
		How many households have enough ITNs for each occupant?	**Proportion of households with at least one ITN for every two people**
		Were enough ITNs delivered to ensure at least one ITN per two people at risk?	Proportion of population at risk potentially covered by ITNs distributed
		Are specific risk groups receiving ITNs?	Proportion of targeted risk group receiving ITNs
	Proportion of population that slept under an ITN the previous night	Are specific population groups using ITNs?	**Proportion of children under 5 years old who slept under an ITN the previous night**
			Proportion of pregnant women who slept under an ITN the previous night
Target 2.2 Sustain universal access to and utilization of prevention measures**		Are available ITNs being used?	**Proportion of existing ITNs used the previous night**
	Proportion of population protected by IRS within the last 12 months		
	Proportion of households with at least one ITN for every two people and/or sprayed by IRS within the last 12 months	How many households have been reached with at least one vector control method?	**Proportion of households with at least one ITN and/or sprayed by IRS within the last 12 months**
	Proportion of women who received at least three or more doses of IPTp during ANC visits during their last pregnancy	Is IPTp received by all pregnant women at each scheduled ANC visit?	**Proportion of women who received at least one, two or four doses of IPTp during ANC visits during their last pregnancy**
			Proportion of women attending ANC who received at least one, two, three or four doses of IPTp
Target 2.3 Accelerate development of surveillance systems	Percent of districts reporting monthly numbers of suspected malaria cases, number of cases receiving a diagnostic test and number of confirmed malaria cases		
Objective 3 Eliminate malaria by end 2015 in 10 new countries (since 2008) and in the WHO European Region	Number of new countries in which malaria has been eliminated	What are the trends in malaria cases?	Number of active foci reported per year
			Number of cases by classification (indigenous, introduced, imported, induced)
		How strong are surveillance systems?	Proportion of private facilities reporting to national malaria surveillance system

Indicators derived from household surveys are in bold.

* In areas where public health facilities are able to provide a parasitological test for all suspected malaria cases, near zero malaria deaths is defined as no more than 1 confirmed malaria death per 100 000 population at risk.

** Universal access to and utilization is defined as every person at risk sleeping under a quality insecticide-treated net or in a space protected by indoor residual spraying and every pregnant woman at risk receiving a dose of IPTp at each ANC visit after the first trimester (in settings where IPTp is appropriate).

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CHAPTER 3

Financing malaria control

This chapter reviews (i) recent trends in international and domestic financing for malaria control in relation to resource requirements; (ii) the distribution of funds by WHO region, disease burden and national income; and (iii) the willingness of endemic countries to pay for malaria control.

3.1 International financing of malaria control

International disbursements to malaria-endemic countries increased from less than US$ 100 million in 2000 to US$ 1.60 billion in 2011; they were estimated to be US$ 1.94 billion in 2012 and US$ 1.97 billion in 2013 (Figure 3.1, Box 3.1). Increases in international funding have slowed in recent years, falling to an average of 4% per year between 2009 and 2013, compared to average increase of 43% per year between 2005 and 2009. A lower level of funding in 2011 was mainly due to lower levels of disbursements from the Global Fund.

The Global Fund is the largest source of funding for malaria control globally; it accounted for 40% of the estimated total disbursed funds in 2011 and 50% in 2013. In 2011, the Global Fund announced the cancellation of Round 11 of grant awards. A transitional-funding mechanism was established to ensure continuity of programmes in countries due for grant renewal in Round 11; however, this mechanism did not allow for further scale-up of programmes, and it covered only the continuation of previously funded services. In 2012, the Global Fund launched an interim new funding modality that included US$ 519 million for malaria, with a particular focus on replacement of long-lasting insecticidal nets (LLINs). In 2012, the Global Fund Board approved a new funding model that will be fully launched by March 2014, and will provide funding for the years 2014–2016. To make financing more predictable, countries will be assigned an indicative amount of funding according to their malaria burden and ability to pay for malaria control. At a global level, it is expected that malaria programmes will, in aggregate, be allocated 32% of the total amount of funds disbursed by the Global Fund initially. However, the final amounts allocated for malaria control may vary from this proportion, and they are subject to change according to priorities set by a country. Thus, propor-

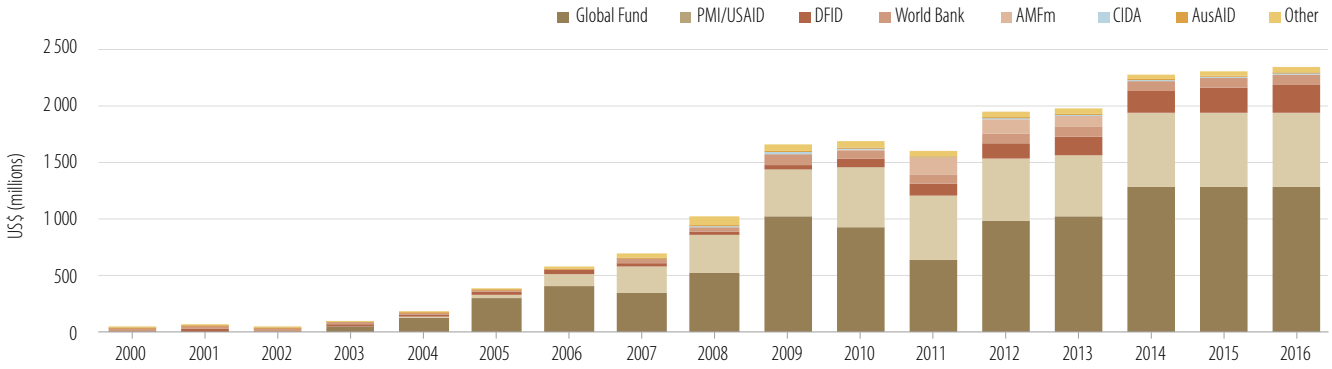
Box 3.1 Sources of information on international and domestic funding for malaria control

The Global Fund supplied information on disbursements for malaria control to WHO up to October 2013. Disbursements for 2013 were annualized by multiplying by 1.2 (i.e. 12/10). At the time of publication of this report, the results of the Global Fund Fourth Replenishment were unknown. It is assumed that, of the US$ 12 billion pledged by donors at the Fourth Replenishment, 32% will be allocated to malaria and that funds will be dispersed evenly over 2014–2016.

Information on funding from PMI is based on the commitments in the PMI's operational plans (1, 2). For the calendar year 2012, PMI funding is recorded as US$ 555 million, and is assumed to remain at that level until 2015. For other development agencies, information on disbursements is available up to and including 2011, through the Organisation for Economic Co-operation and Development (OECD) Development Co-operation Directorate database on official development assistance (*3*). DFID funding to endemic countries for malaria control, excluding the funds it provides to the Affordable Medicines Facility – malaria (AMFm), is projected to increase from US$ 103 million in 2011 to US$ 226 million in 2015, in line with previous funding trends. Funding from the PMI and DFID are subject to annual legislative review. For the World Bank, future funding is assumed to remain at 2011 levels – the latest year for which data are available – at US$ 82 million. This assumption is also made for agencies falling into the "other" category of Figure 3.1. AMFm disbursements between 2010 and 2013 totalled US$ 384 million. Support for private sector case management has now been rolled into general Global Fund grant applications; hence, it is not shown separately beyond 2013 (*4*). Projected disbursements from the Australian Agency for International Development (AusAID) – now absorbed into the Australian Government Department of Foreign Affairs and Trade (DFAT) – include US$ 100 million (AUD 100 million) pledged in November 2012 over the course of 4 years, starting in 2013 (*5*).

WHO obtains information on domestic financing from data submitted by national malaria control programmes (NMCPs) for the *World malaria report*. Such reports include malaria-specific expenditures incurred by NMCPs for commodities, programme supervision and management, training, and behavioural change interventions. However, they exclude general health systems spending such as the cost of health workers, hospitals, clinics and other infrastructure for the treatment of malaria, which are typically provided by the national governments or supported by nongovernmental organizations (NGOs). Where data from NMCP were unavailable for a specific year, data from neighbouring years were used to impute a value (in cases where this was not possible, information on domestic spending contained in Global Fund grant applications was used) (*6*).

Figure 3.1 Past and projected international funding for malaria control, 2000-2016



AMFm, Affordable Medicines Facility – malaria; AusAID, Australian Agency for International Development; CIDA, Canadian International Development Agency; DFID, Department for International Development; GF, Global Fund; PMI, President's Malaria Initiative; USAID, United States Agency for International Development; WB, World Bank

For the GF and PMI/USAID, funds from the last quarter of 2013 onwards are projected; for other agencies, funds from 2012 onwards are projected.

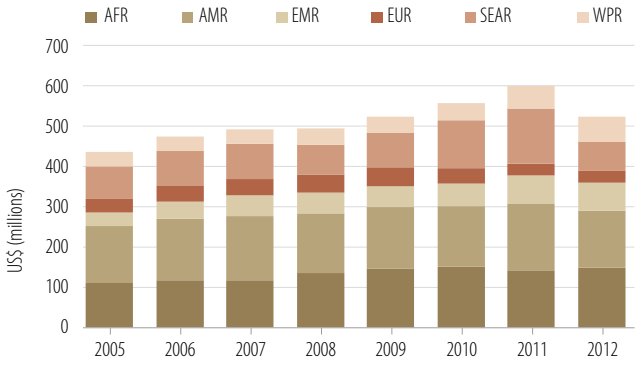
Source: *See Box 3.1*

tions allocated to malaria control may be reduced if countries do not articulate a strong case for investment in malaria control.

Funding from the United States (US) President's Malaria Initiative (PMI)/US Agency for International Development (USAID) showed increases year on year between 2004 and 2011, but levelled off in 2012, when PMI/USAID funding accounted for 29% of international funding. Disbursements from the United Kingdom of Great Britain and Northern Ireland's Department for International Development (DFID) increased by more than threefold between 2008 and 2011, when it accounted for 7% of global international funding. The Canadian Government also markedly increased its spending on malaria control from 2008 onwards, through the Canadian International Development Agency (CIDA), which is now incorporated into Foreign Affairs, Trade and Development Canada.

Estimates of the funds available for malaria control between 2012 and 2015 are projected from formal commitments made by funding agencies or, if data are not available, from previous trends in financing (**Box 3.1**). If the funding assumptions given in Box 3.1 are accurate, then international funds available for malaria control can be expected to increase to US$ 2.3 billion per year between 2014 and 2016. However, to avoid disruptions in malaria control programmes and resurgences in disease, the Global Fund's new funding model needs to become fully operational early in 2014, and countries need to be able to access funds promptly.

Figure 3.2 Domestic funding for malaria control, 2005-2012



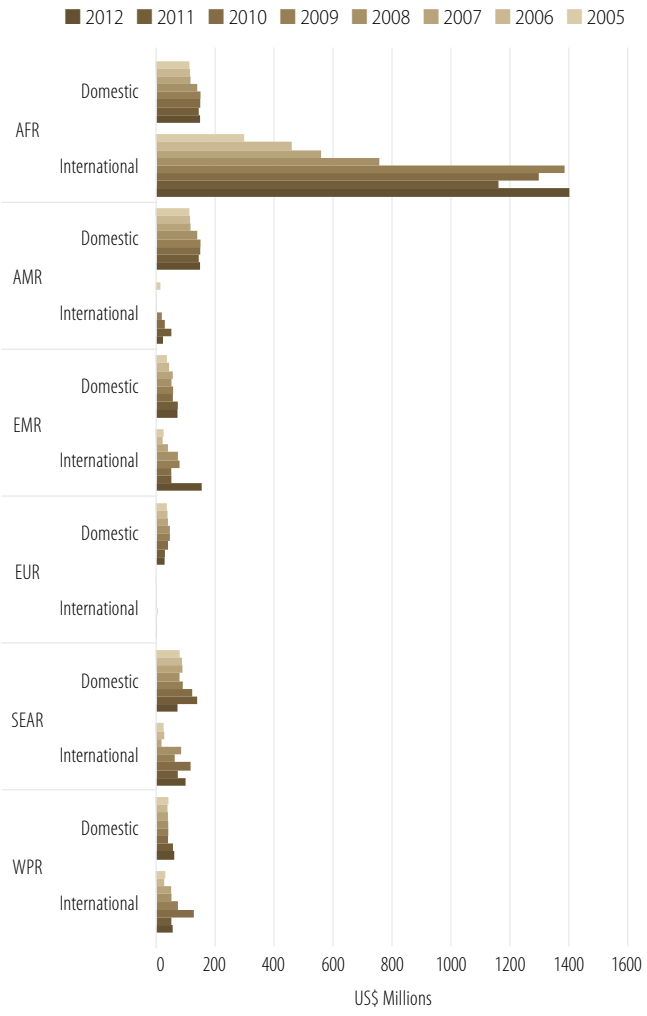
AFR, African Region; AMR, Region of the Americas; EMR, Eastern Mediterranean Region; EUR, European Region; SEAR, South-East Asia Region; WPR, Western Pacific Region

Source: *National Malaria Control Programme reports*

3.2 Domestic financing of malaria control

Reported data suggest that global domestic financing for malaria increased over the period 2005–2012, from US$ 436 million in 2005 to US$ 522 million in 2012 (**Figure 3.2**). A decrease between 2011 and 2012 was mainly due to lower reported expenditures

Figure 3.3 Domestic and external disbursements by WHO region, 2005-2012



Source: *See Box 3.1.*

in India – down from $US 99 million in 2011 to $US 47 million in 2012 – which appears to be due to differences in the way in which data are reported rather than necessarily a real decrease in malaria funding. If India is excluded from global totals, then domestic government malaria spending rose at a rate of 3% per year between 2005 and 2012. However, the increase in absolute totals does not consider population growth and inflation, which generally exceeds 3% for malaria endemic countries.

3.3 Comparison of resources available and resource requirements

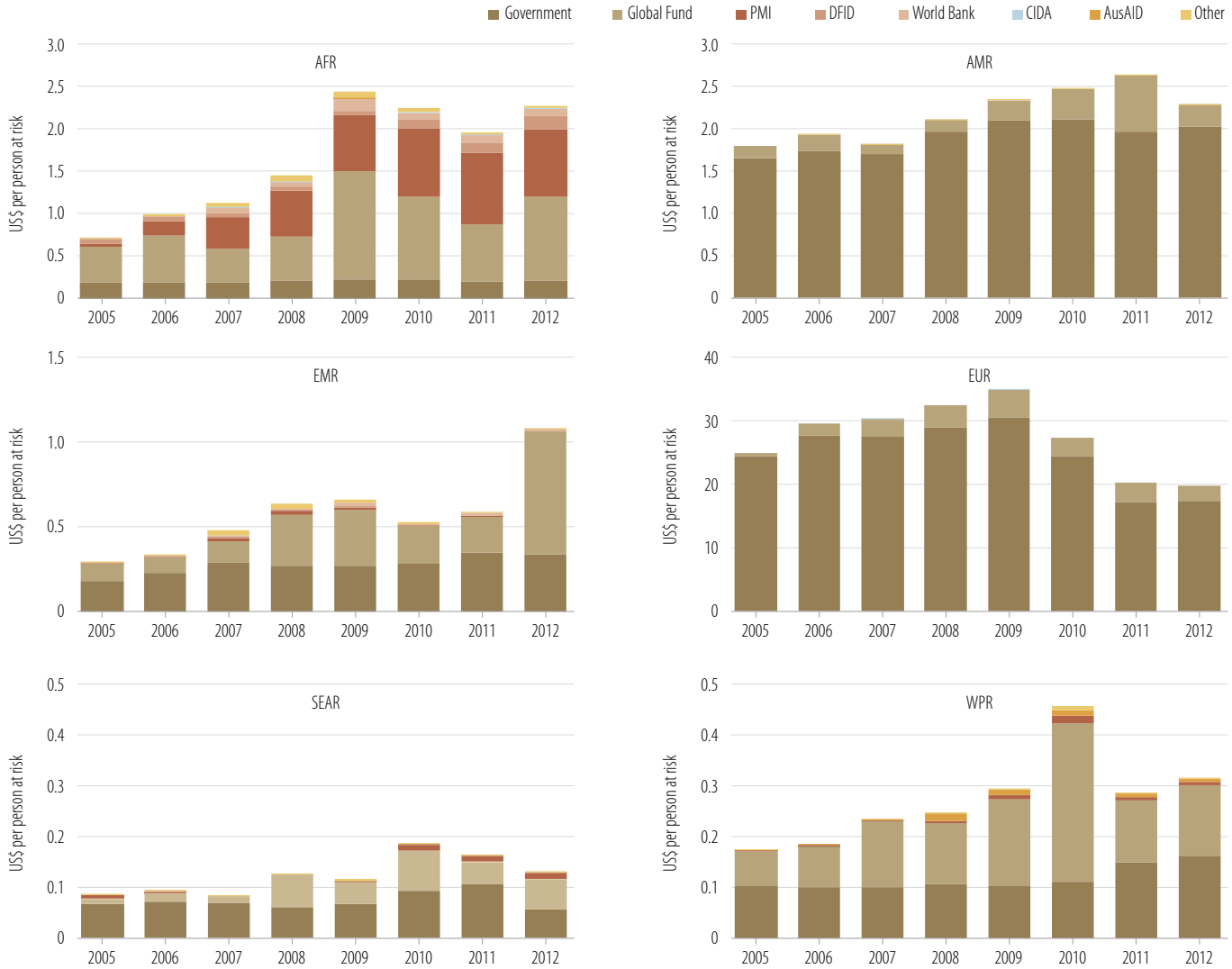
Global resource requirements for malaria control were estimated in the 2008 Roll Back Malaria (RBM) Global Malaria Action Plan (GMAP) to exceed US$ 5.1 billion per year between 2011 and 2020. In Africa alone, the resource requirements estimated by GMAP were, on average, US$ 2.3 billion per year during the same period (*7*). Combining both domestic and international funds, the resources available for malaria control globally were estimated to be US$ 2.5 billion in 2012, leaving a gap of US$ 2.6 billion. Available projections of both domestic and international resources indicate that total funding for malaria control will reach about $US 2.85 billion between 2014 and 2016.

3.4 Distribution of available funding by WHO region

Figure 3.3 shows domestic and external disbursements in 2005–2012 according to WHO region. Funding trends are dominated by the large increases in international disbursements to the African Region between 2005 and 2012, with that region accounting for 38% of total malaria funding in 2005, and 62% in 2012. However, the African Region experienced successive decreases in international funding in 2010 and 2011. Funding levels recovered in 2012, although the effects of this increase on programme implementation may not be realized until 2013.

Although *total* funding for malaria control is highest in the African Region (**Figure 3.3**), the highest rates of funding *per person at risk* are seen in the European Region (**Figure 3.4**). Funding in this region has decreased in recent years – from more than US$ 40 million per year in 2008 and 2009, to US$

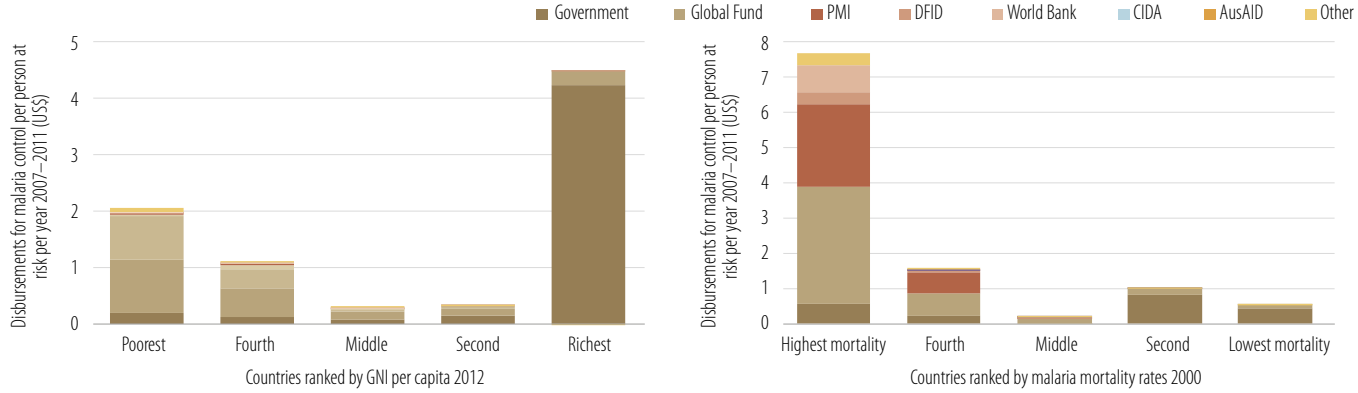
Figure 3.4 Malaria financing per person at risk, by WHO region and funding source, 2005–2012



AFR, African Region; AMR, Region of the Americas; AusAID, Australian Agency for International Development; CIDA, Canadian International Development Agency; DFID, Department for International Development; EMR, Eastern Mediterranean Region; EUR, European Region; GF, Global Fund; PMI, President's Malaria Initiative; SEAR, South-East Asia Region; WB, World Bank; WPR, Western Pacific Region

Source: *See Box 3.1*

Figure 3.5 Domestic and international disbursements per person at risk for malaria, 2007–2011, according to: (a) GNI per capita, and (b) estimated malaria mortality rates, 2000



AusAID, Australian Agency for International Development; CIDA, Canadian International Development Agency; DFID, Department for International Development; GF, Global Fund; GNI, gross national income; PMI, President's Malaria Initiative; WB, World Bank

Data on international disbursements by country are available only up to 2011 for most agencies (See Box 3.1)

Source: *See Box 3.1*

GNI per capita: World Development Indicators 2013, (http://wdi.worldbank.org/tables)

Malaria mortality rates: WHO calculations.

22 million in 2012 – mainly because of reductions in spending in Turkey, although Turkey's spending remains the highest per person at risk for malaria in the world. The lowest rates of spending per person at risk are seen in the South-East Asia Region and the Western Pacific Region, potentially because these regions contain countries with large populations at risk that may be over-estimated. In particular, if populations at risk are defined at a comparatively high administrative level (e.g. at the province level), all of the population may be classified as being at high risk, even if the risk is actually confined to a limited part of the administrative area.

Funding sources vary among WHO regions. In the European Region and the Region of the Americas most malaria funding (88%) in 2012 was from domestic governments. In other regions, domestic funding represents a less significant source of funds (ranging from 10% of total funds available for malaria control in the African Region to 52% in the Western Pacific Region). In the African Region PMI and other donors contribute significant shares of malaria funding in addition to the Global Fund, whereas in other WHO regions the Global Fund is the principal source of international financing.

3.5 Distribution of available funding by disease burden and national income

Figure 3.5 shows domestic and external disbursements in 2005–2012 according to: (i) gross national income (GNI) per capita, and (ii) estimated malaria mortality rates. Countries in the highest quintile of GNI per capita invest a great deal more of their own money per capita on malaria control than countries in other quintiles. These wealthier countries have lower malaria burdens (accounting for just 0.6% of estimated cases in 2012 and 0.3% of deaths), and they include seven countries that spend more than US$ 5.00 per capita per year on malaria programmes (Argentina, Azerbaijan, Costa Rica, Malaysia, Mexico, Suriname and Turkey). The high expenditures are partly related to the drive towards elimination of malaria in some countries.

International assistance is focused on countries that are in the lowest two quintiles of GNI per capita and that generally have the highest malaria mortality rates. Countries in the middle-income quintiles appear to have fewer resources for malaria control because domestic investments in malaria control are low and these countries are receiving little international assistance.

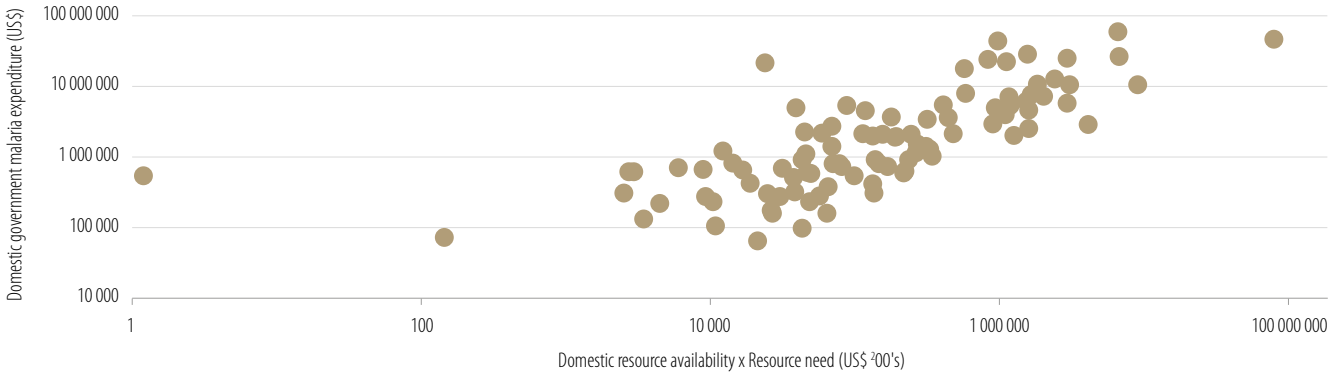
3.6 Endemic country's willingness to pay for malaria control

International assistance is critical if reductions in malaria cases and deaths are to be achieved. Nonetheless, domestic governments of malaria endemic countries have a significant role to play in financing malaria control. Domestic government expenditure on malaria might be expected to increase in line with the total government budget or the total revenue available. In other words, bigger or richer countries are likely to spend more. The expenditure on malaria might also be expected to be more in populous countries where the disease burden is higher. More specifically, the level of government spending should reflect the amount of resources required to provide preventive interventions to populations at risk, diagnostic testing and treatment to those who have malaria, and the management systems necessary to run a malaria control programme. These two assumptions imply that malaria expenditure should rise with the total government budget, and with the resource need or, in practice, with the product of the two. Indeed, the product of resource availability and resource need appears to be largely correlated with actual government expenditures (Figure 3.6).

By comparing this product with actual government expenditure, it is possible to construct an index of a country's willingness to pay for malaria control; that is, it is possible to construct a domestic investment priority index (DIPI) (*8*). The DIPI scales the level of domestic spending, to reflect the available revenue in the government budget and for the degree of burden repre-

Figure 3.6 Government malaria expenditures 2012 in comparison with the product of resource availability and resource need

Resource availability is assumed to be proportional to total domestic government expenditures. Resource need is assumed to be proportional to the cost of providing all persons at risk with protection with an ITN or IRS and providing patients with suspected malaria attending public health facilities with a diagnostic test and appropriate treatment.



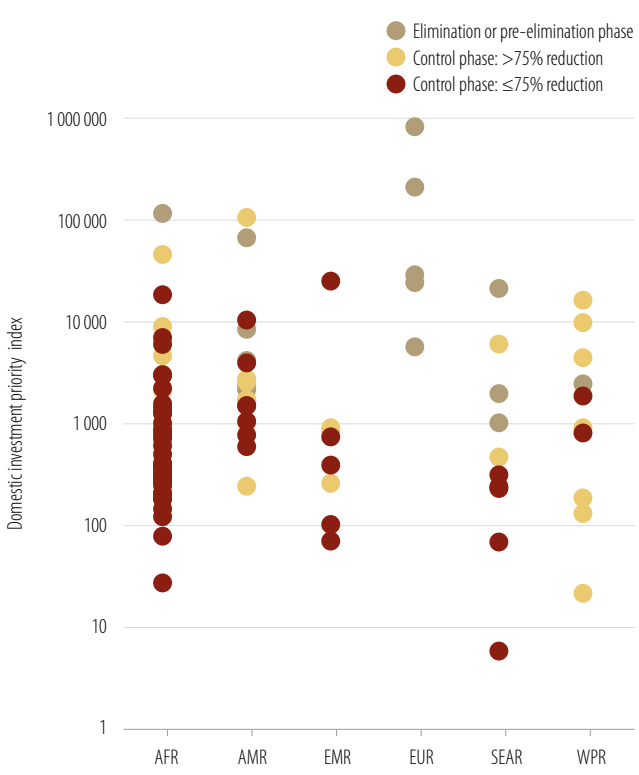
Source: *Malaria financing: national malaria control programmes*

Total domestic government expenditures: International Monetary Fund World Economic Outlook Database, September 2013, (http://www.imf.org/external/pubs/ft/weo/2013/02/weodata/index.aspx)

Resource needs: WHO calculations based on estimated populations at risk, estimates of number of malaria cases and treatment seeking behaviour.

Figure 3.7 Malaria programme progress by DIPI within WHO regions, 2012

Resource availability is assumed to be proportional to total domestic government expenditures. Resource need is assumed to be proportional to the cost of providing all persons at risk with protection with an ITN or IRS and providing patients with suspected malaria attending public health facilities with a diagnostic test and appropriate treatment.



Source: *Malaria financing: national malaria control programmes*

Total domestic government expenditures: International Monetary Fund World Economic Outlook Database, September 2013 (http://www.imf.org/external/pubs/ft/weo/2013/02/weodata/index.aspx)

Resource needs: WHO calculations based on estimated populations at risk, estimates of number of malaria cases and treatment seeking behaviour.

sented by malaria. Countries with a low value for the DIPI index might be thought of as showing a low priority for malaria control, whereas countries with a high value are demonstrating a high priority.

Figure 3.7 shows the DIPI by WHO region, first by phase of programme and then – for those countries in the control phase – by whether or not the countries achieved a >75% reduction in malaria case incidence rates between 2000 and 2012 (see Chapter 8; Section 8.1). In general, countries in the pre-elimination or elimination phase show higher values of the DIPI (median 7400, interquartile range [IQR] 2400–41 000). Countries that are on track to achieve a 75% decrease in malaria case incidence by 2015 have also given higher priority to domestic investment in malaria control (median 1800, IQR 680–5600) than other countries in the control phase (median 470, IQR 260–1400). In the African Region, this partly reflects a lack of data on disease trends (see Chapter 7; Section 7.2); governments that show a greater investment priority for malaria also tend to have stronger data systems.

3.7 Conclusions

International disbursements to malaria-endemic countries have increased markedly, from less than US$ 100 million in 2000 to US$ 1.60 billion in 2011, and an estimated US$ 1.94 billion in 2012. Increases in international funding have slowed in recent years, to an average 4% per year between 2009 and 2013, compared to average of 43% per year between 2005 and 2009. Domestic financing for malaria was estimated to be US$ 522 million in 2012. Combining both domestic and international funds, the resources available for malaria control globally were US$ 2.5 billion in 2012. Global resource requirements for malaria control were estimated to exceed US$ 5.1 billion per year between 2011 and 2020 in the GMAP of 2008, leaving an annual funding gap of US$ 2.6 billion.

Projections of available domestic and international resources indicate that total funding for malaria control will reach about

US$ 2.85 billion between 2014 and 2016, which is still substantially below the amount required to achieve universal access to malaria interventions.

The Global Fund will implement a new funding model for the years 2014–2016. Countries will be assigned an indicative amount of funds according to their malaria burden and ability to pay for malaria control. At a global level, it is expected that malaria programmes will be allocated approximately 32% of the total amount of funds disbursed by the Global Fund. The amounts allocated for malaria control at country level may vary from this proportion, and they are subject to change according to priorities set by a country. To secure appropriate levels of financing, countries will need to present a strong case for investment in malaria control.

International investments in malaria control are targeted to countries with higher mortality rates and lower national incomes, particularly those in Africa. Domestic government investments are highest in wealthier countries and lowest in countries with the highest malaria mortality rates; the low rates of domestic spending seen in countries with higher disease burdens is mainly because these countries have lower national incomes per capita. Nonetheless, domestic governments with similar levels of resource availability vary in the priority they give to malaria control. Countries that display greater commitment, as measured by a domestic investment priority index (DIPI), have shown greater success in reducing malaria case incidence between 2000 and 2012 than countries with a lower DIPI.

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CHAPTER 4

Vector control for malaria

This chapter reviews: (i) the need for malaria-vector control; (ii) adoption of national policies for malaria vector control; (iii) progress towards the goal of universal insecticide treated net (ITN) access and use; (iv) the extent to which indoor residual spraying (IRS) is used by programmes, and (iv) monitoring and management of insecticide resistance in malaria vectors.

4.1 Need for vector control

WHO recommends that, in areas targeted for malaria vector control, all persons at risk should be protected by ITNs or IRS – vector control interventions with demonstrated impact in reducing malaria (*1, 2*). The choice of ITNs or IRS depends on a number of entomological, epidemiological and operational factors, including seasonality of transmission, housing density and distribution, and insecticide susceptibility of anopheline vectors. Malaria-endemic countries report to the WHO using the classifications of high risk (annual parasite index [API] of >1 malaria case/1000 persons), low risk (API <1 malaria case/1000 persons), or no risk of malaria for the population. Areas of high malaria risk are considered most in need of vector control interventions. The need is most obvious for sub-Saharan Africa, where the characteristics of the predominant malaria vectors and the widespread presence of malaria risk indicate that almost all of the 800 million people at risk would benefit from vector control with ITNs or IRS. To protect everyone at risk of malaria in sub-Saharan Africa, at least 150 million ITNs would be required each year (assuming that they are long-lasting insecticide treated nets [LLINs],[1] that the typical LLIN lifespan is 3 years, and that 1 LLIN is distributed per 1.8 persons). If the average LLIN lifespan is actually less than 3 years, as suggested by some data (*3*), then true replacement needs could be greater. However, increased coverage with IRS could decrease these estimated requirements for LLINs.

Given the heterogeneity of malaria transmission in most malaria-endemic areas outside Africa, it is challenging to estimate the population at risk of malaria and vector control needs, including ITNs. Among the 2.6 billion people at risk of malaria outside Africa, 568 million are considered by national malaria control programmes (NMCPs) to be at high risk, and may therefore benefit from vector control measures. Nearly half (273 million) of the high-risk population outside Africa resides in India. However, the heterogeneity of transmission means that these numbers may be overestimates, because high malaria rates measured in one area may not be applicable to the entire administrative region. As definitions of malaria risk become more precise through improvements in entomologic monitoring and malaria surveillance, the estimated needs for vector control both inside and outside Africa may also become more precise.

1. While nearly all ITNs distributed in Africa are LLINs, this chapter refers to all treated nets as ITNs.

4.2 ITN/LLIN policy and implementation

4.2.1 Policy adoption and ITN/LLIN distribution

Adoption and implementation of policies for ITN/LLIN programmes in 2012, by WHO region, is shown in **Table 4.1**; adoption of policies by country is shown in Annex 2A.

A total of 88 countries distribute ITNs free of charge, including 39 of 44 countries in the African Region with ongoing malaria transmission. In 83 countries, ITNs are distributed to all age groups; in 64 of those countries, the ITNs are distributed to all age groups through mass campaigns. Of 39 countries in the African Region that distibute ITNs free of charge 34 distribute them through, antenatal clinics (reflecting policies directed at reducing the

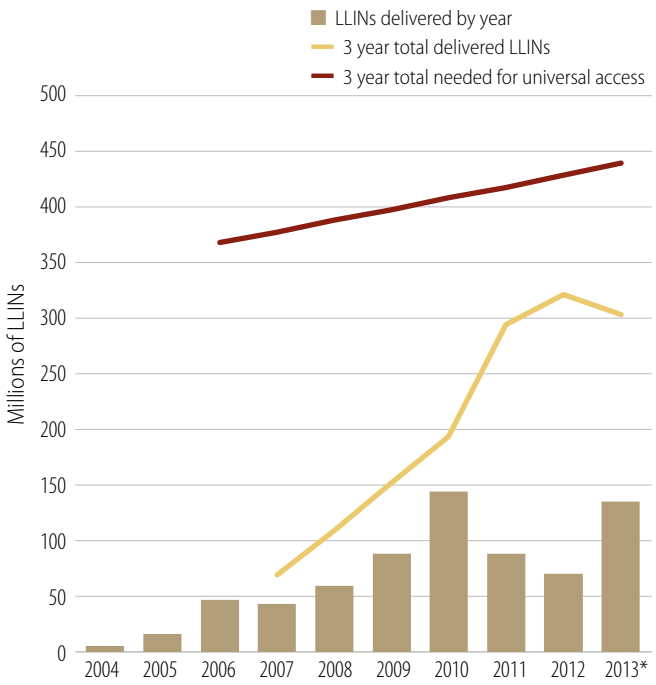
Table 4.1 Adoption of policies for ITN programmes by WHO Region, 2012

Policy	AFR	AMR	EMR	EUR	SEAR	WPR	Total
ITNs/ LLINs distributed free of charge	39	16	9	4	10	10	88
ITNs/ LLINs sold at subsidized prices	14	1				2	16
ITNs/ LLINs distributed to all age groups	34	17	9	3	10	10	83
ITNs/ LLINs distributed through mass campaigns to all age groups	31	13	6		8	6	64
ITNs/ LLINs distributed through antenatal clinics	34	3	3		4	5	49
ITNs/ LLINs distributed through EPI clinics	26		1		1	1	29
Number of countries/areas with ongoing transmission	**44**	**21**	**9**	**5**	**10**	**10**	**99**
Number of countries/areas with ongoing *Plasmodium falciparum* transmission	**43**	**18**	**9**	**0**	**9**	**9**	**88**

AFR, African Region; AMR, Region of the Americas; EMR, Eastern Mediterranean Region; EPI, Expanded Programmes on Immmunizations; EUR, European Region; ITN, insecticide treated net; LLIN, long-lasting indecticidal net; SEAR, South-East Asia Region; WPR, Western Pacific Region

Source: *National Malaria Control Programme reports*

Figure 4.1 Number of LLINs delivered by manufacturers to countries in sub-Saharan Africa, 2004–2013

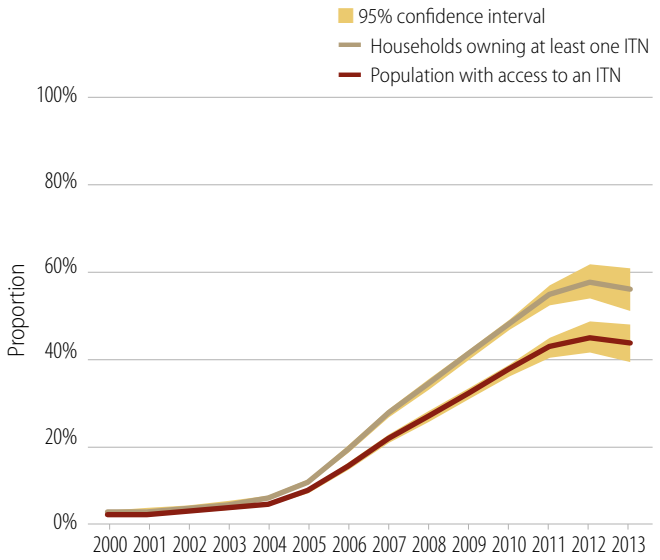


LLIN, long-lasting insecticidal net

* The total number delivered for the first three quarters of 2013 has been multiplied by 4/3 to provide an annual estimate.

Source: *Data from 7 WHOPES-approved manufacturers, collated by Milliner Global Associates.*

Figure 4.2 Estimated trend in proportion of households with at least one ITN and population with access to an ITN in sub-Saharan Africa, 2000–2013.



ITN, insecticide-treated net

Source: *ITN coverage model from the Institute for Health Metrics and Evaluation, which takes into account ITNs supplied by manufacturers, ITNs delivered by National Malaria Control Programmes and household survey results (1). Includes Djibouti, Somalia, South Sudan and Sudan which are in the WHO Eastern Mediterranean Region.*

Proportion population with access to an ITN derived from relationship with household ownership of at least one ITN analyzed by linear regression in 48 household surveys 2001-2012, y= 0.77x

burden of malaria in pregnancy) and 26 distribute ITNs through Expanded Programme on Immunization (EPI) clinics.

Information is provided to WHO on the number of LLINs delivered by the seven World Health Organization Pesticide Evaluation Scheme (WHOPES)-approved manufacturers that supply nearly all of the LLINs for public sector distribution in Africa.[2] The number of nets delivered by manufacturers increased dramatically, from 6 million in 2004 to 145 million in 2010 (**Figure 4.1**); it then decreased in 2011 (92 million) and 2012 (70 million). However, based on information to the end of the third quarter of the year, the number of LLINs projected to be delivered by the end of 2013 will again increase, to 136 million.

Assuming each net lasts 3 years, the 3-year running total of LLINs – delayed by 1 year to account for the time from delivery to the country to distribution to households – is a crude approximation of the number of LLINs available to households in a given year. The 3-year total of LLINs peaked in 2012 at 321 million nets, and the3-year total decreased in 2013 to 303 million. These totals are below the approximately 450 million LLINs required for all persons at risk to have access to a treated net in their household during the 3-year period. However, information on projected LLIN deliveries beyond 2013 suggests that the increase in deliveries in 2013 may continue and the 3-year total of available LLINs may increase. Countries conduct commodity-gap analysis, supported by the Roll Back Malaria (RBM) Partnership, as part of the strategic planning process.[3] Through such analysis, country programmes reported that about 200 million LLINs have been financed by donors for 2014, which would bring the 3-year total of nets available in 2015 to more than 400 million, closer, though still below, to the number required for universal access..

NMCPs in the African Region reported using mass campaigns as the main ITN distribution channel during 2012, accounting for 89% of nets distributed, followed by antenatal care clinics (7%), immunization clinics (3%) and other channels (2%). Although more than 25 million ITNs were distributed through ANCs in Africa during the last three years, for many countries, the number of ITNs reportedly distributed through ANCs are lower than the number of first ANC visits reported by national programmes. Comparing first ANC visits and the number of ITNs distributed through ANCs for countries with consistent reporting for three years, national programmes distributed enough ITNs through ANCs to provide an ITN for 55% of women attending first ANC visit; conversely, 45% of ANC visits were missed opportunities for distribution of an ITN. Similarly, comparing the number of ITNs reportedly distributed through EPI clinics with the number of EPI visits for first dose of diphtheria-tetanus-pertussis (DTP1) vaccine[4], national programmes distributed enough ITNs through EPI to provide an ITN at 34% of visits during which DTP1 was administered; therefore 66% of DTP1 visits were missed opportunities for delivery of an ITN. Further investigation is needed to understand how distribution of ITNs through ANC and EPI clinics could be improved.

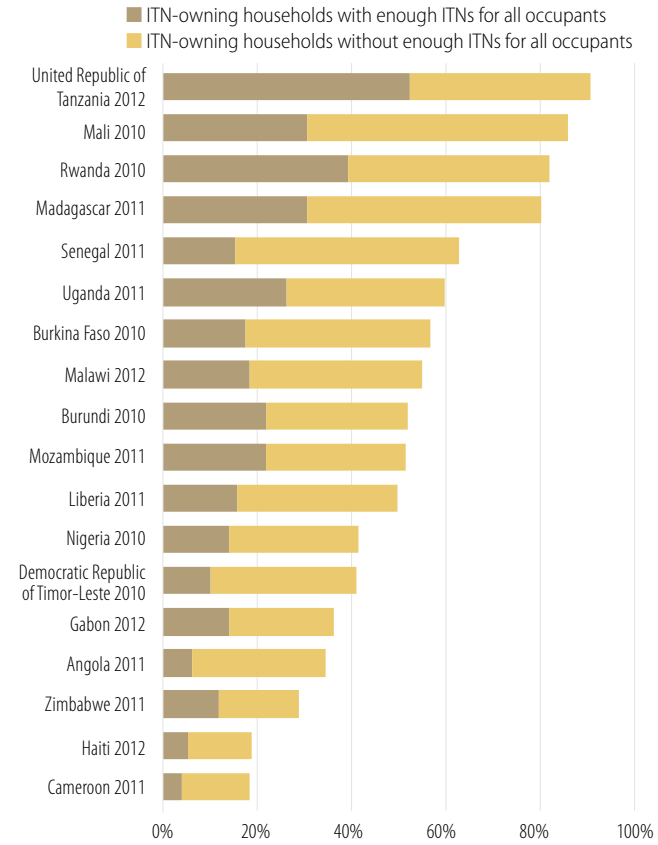
Outside Africa, NMCP reports indicate that 60 million ITNs were distributed during 2010–2012, with 10 countries accounting for 75% of the total (India 9.2 million, Indonesia 6.1 million, Myanmar 5.4 million, Bangladesh 4.7 million, Afghanistan 4.3 million, Cambodia 3.6 million, Papua New Guinea 3.2 million, Haiti 3.0

2. Manufacturers' delivery information is for LLINs; therefore, delivered nets are referred to as LLINs.

3. Gap analysis as of September 2013 is available at http://www.rollbackmalaria.org/mechanisms/hwg.html

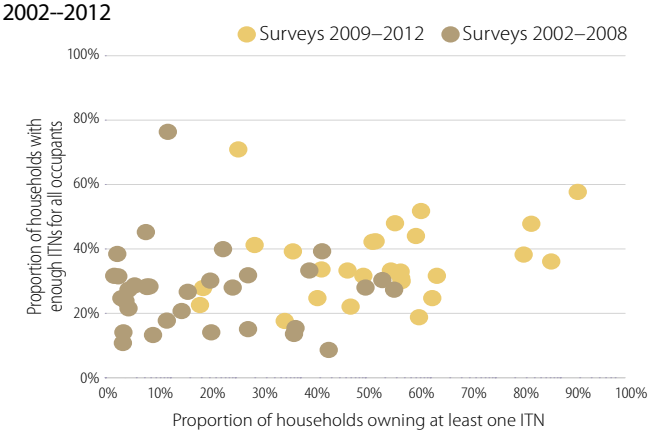
4. http://apps.who.int/immunization_monitoring/globalsummary/timeseries/tswucoveragedtp1.html

Figure 4.3 Proportion of ITN-owning households with and without enough ITNs for all occupants, 2010-2012



Source: *Household surveys*

Figure 4.4 Proportion of ITN-owning housholds with enough ITNs for all occupants by proportion of households with at least one ITN, 2002–2012



Source: *Household surveys, 60 conducted 2002-2012*

million and Philippines 3.0 million). About 87% of ITNs outside Africa were reportedly distributed through mass campaigns, 6% through immunization clinics, 1% through antenatal clinics and 6% through other channels. Because the estimates of the need for vector control interventions outside Africa remain imprecise, in particular for areas with *P. vivax* transmission, it remains unclear what percentage of need is being covered by these 60 million ITNs distributed by NMCPs.

4.2.2 Trends in ITN ownership, access, and use

For populations at risk of malaria, the extent of household ownership of ITNs and population access and use of ITNs can best be measured through household surveys. However, such surveys are not conducted frequently enough to provide annual estimates of ITN coverage. To obtain more up-to-date estimates of ITN coverage, it is possible to combine information from previous household surveys with data provided by manufacturers on the number of LLINs delivered to countries, and with data from NMCPs on the number of ITNs distributed within countries (*4*). Estimates modelled in this way, produced in collaboration with the Institute for Health Metrics and Evaluation for the *World malaria report*, show that the proportion of households in sub-Saharan Africa owning at least one ITN increased steadily, from 3% in 2000 to 56% (range 53%–60%) in 2012, with the most dramatic increase occurring during 2005–2010 (**Figure 4.2**). The rate of increase in the estimated proportion of households owning at least one ITN has slowed recently; it decreased slightly, to 54% (range 49%–60%), in 2013. The decrease is probably related to the lower number of ITNs delivered to countries during 2011 and 2012, coupled with attrition of ITNs (due to loss and physical degradation), which reduces the supply of available nets. However, the change in the point estimates from 2012 to 2013 is within the confidence limits of the model estimates, and this most likely represents a plateau of ITN coverage. Increased LLIN deliveries in 2013 and an even higher number of nets financed in 2014 hold promise that ITN ownership will increase further in the next two years.

The proportion of the population with access to an ITN and the proportion sleeping under an ITN can be estimated from household ownership of at least one ITN, by comparing the relationship between these measures within individual household surveys.[5] In 2013, the estimated proportion of the population with access to an ITN reached 42% (range 38%–47%) and the proportion sleeping under an ITN reached 36% (range 33%-41%) (**Figure 4.2**). These levels of population access and proportion sleeping under an ITN imply that about 86% of people who have access to an ITN use the ITNs that are available to them. Estimates of ITN household ownership, population access to an ITN, and population sleeping under and ITN for each country in sub-Saharan Africa for 2014 are given in Annex 4.

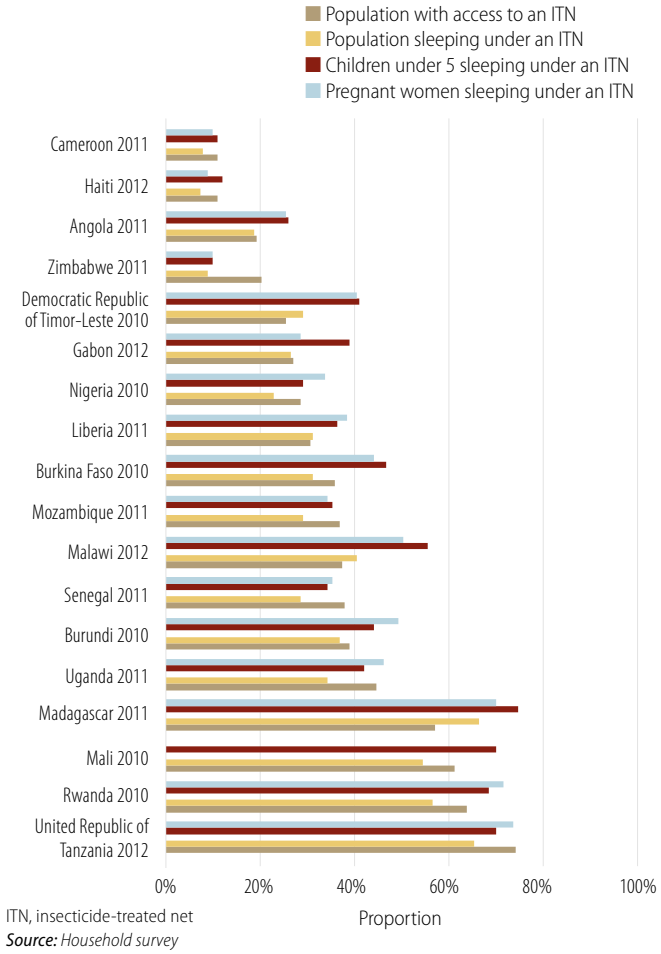
Further information on ownership and use of ITNs can be derived from countries for which recent household surveys are available. Among 18 countries with household surveys conducted during 2010–2012 (**Figure 4.3**), the proportion of households owning at least one ITN ranged from 18% to 91%, and the proportion of households with enough ITNs for all occupants ranged from 4% to 52%. In countries surveyed during 2010–2012, a median of 34% (interquartile range [IQR] 28%–42%) of ITN-owning households had enough ITNs for all occupants.

From 2003 to 2012, the proportion of ITN-owning household with enough ITNs for all occupants was slightly higher among surveys conducted during 2009–2012 (33%) than among those conducted during 2003–2008 (28%), and also higher among surveys in which household ITN ownership was >50% (similarly 33%–28%), although neither of these differences were statistically significant (**Figure 4.4**). For universal access to ITNs to be achieved, an increase is needed in household ownership of ITNs and in the proportion of ITN-owning households with enough ITNs for all inhabitants.

5. Based on 48 household surveys conducted in Africa during 2003–2012: population access to an ITN regression line y=0.77x; population sleeping under an ITN y=0.67x–0.03.

The proportion of the population with access to an ITN has risen as ownership of ITNs by households has increased, although the level of ITN access varies among countries. In surveys conducted during 2010–2012, the proportion of the population with access to an ITN in the household raged from 11% to 74% (**Figure 4.5**). The proportion of the population sleeping under an ITN generally paralleled the proportion with access to an ITN, and ranged from 7% to 65%, indicating that ITN use among the population who have access to one ITN is consistently high across countries. In these recent surveys, the median proportion of people who have access to an ITN and actually use it was 88%, similar to the proportion of use among population with access to an ITN derived from the ITN model discussed above. Use of ITNs is even higher in certain populations: in every country surveyed, the proportion of children under 5 years and of pregnant women sleeping under an ITN are both higher than the proportion of the population as a whole sleeping under an ITN. In summary, people in malaria-endemic countries make use of the nets that are available to them, and usage is particularly high among key vulnerable populations. Therefore, the main challenge is still to increase distribution of ITNs so that all those at risk have access to an ITN, while continuing to ensure high usage of ITNs in all populations, including key vulnerable groups. Key ITN coverage indicators for countries with recent household surveys are available in Annex 5.

Figure 4.5 Proportion of the population with access to an ITN, and proportion of population, children under 5 years old, and pregnant women sleeping under an ITN, 2010-2012



Source: *Household survey*

4.3 IRS policy adoption and implementation

4.3.1 IRS policy adoption

Adoption and implementation of policies for IRS programmes by WHO region are shown in **Table 4.2**, and adoption of policies by country is shown in Annex 2A. IRS is recommended for control of malaria in 88 countries, 40 of which are in Africa; in 15 of these African countries, IRS may be used for control of epidemics. IRS is used in combination with ITNs in 57 countries, 31 of which are in Africa. A total of 58 countries reported that monitoring of insecticide resistance is undertaken – a figure that is lower than the number of countries implementing IRS. Insecticide resistance monitoring should be carried out in all countries in which malaria vector control activities with insecticides are conducted (e.g. including distribution of ITNs).

4.3.2 IRS coverage achieved

National programmes reported that 135 million people – representing 4% of the global population at risk – were protected by IRS in 2012. The proportion of the population protected by IRS increased substantially in the African Region during 2006–2008, and the increased coverage was maintained during 2009–2011, at 10%–12% of the population at risk. In 2012, a total of 58 million people, or 8% of the population at risk, were protected (**Figure 4.6**). The overall decrease in IRS coverage in Africa from 2011 to 2012 may be accounted for by decreased numbers of people protected

Table 4.2 Adoption of policies for IRS programmes by WHO region, 2012

Policy	AFR	AMR	EMR	EUR	SEAR	WPR	Total
IRS is recommended by malaria control programme	40	18	9	5	10	6	88
IRS is used for the prevention and control of epidemics	15	9	4		4	6	38
IRS and ITNs used together for malaria control in at least some areas	31	11	4		5	6	57
DDT can be used for IRS	9	0			1		10
Insecticide resistance monitoring is undertaken	37	5	6	5	3	2	58
Number of countries/areas with ongoing malaria transmission	**44**	**21**	**9**	**5**	**10**	**10**	**97**
Number of countries/areas with ongoing *Plasmodium falciparum* transmission	**43**	**18**	**9**	**0**	**9**	**9**	**88**

AFR, African Region; AMR, Region of the Americas; DDT, dichlorodiphenyltrichloroethane; EMR, Eastern Mediterranean Region; EUR, European Region; IRS, indoor residual spraying; SEAR, South-East Asia Region; WPR, Western Pacific Region

Source: *National Malaria Control Programme reports*

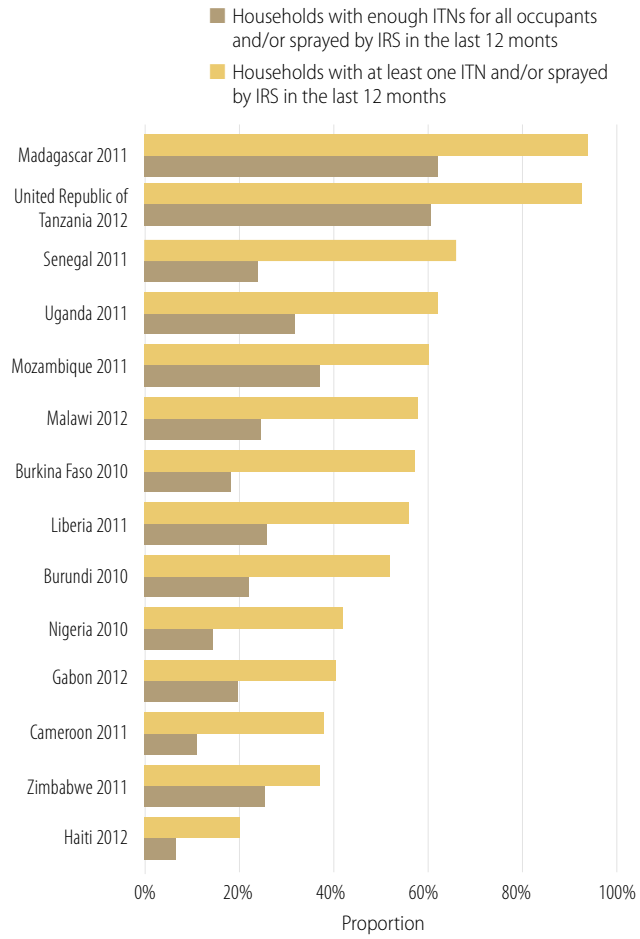
by IRS in Ethiopia, Madagascar and Mozambique, although this decrease appears to have been partially offset by expanded IRS coverage in Ghana, Malawi and Nigeria. The coverage of IRS programmes in the Region of the Americas decreased during the same period, protecting 5 million people (representing 4% of the population at risk) in 2012, down from a peak of 9% of the population protected in 2009. The proportion of the population protected by IRS increased in the Eastern Mediterranean Region, due in large part to an increased number of people protected reported from Pakistan, reaching 14 million people (4% of the population at risk) in 2012. In the Western Pacific Region, nearly 5 million people (1%) were protected in 2012. IRS coverage by national programmes in the South-East Asia Region is largely driven by IRS coverage in India. Such coverage has varied little during the past 10 years, with 53 million people (4% of the population at risk) protected in 2012. As several countries in the European Region move towards elimination of malaria, IRS programmes are focused on much smaller populations at risk than in other regions, and the proportion of the population at risk protected by IRS is substantially higher, reaching 46% in 2012 (not shown in **Figure 4.6**).

Information on the insecticide classes used for IRS in 2012 was provided by 58 of the 79 malaria-endemic countries that reported the use of IRS – double the number of countries that reported on insecticide classes in 2011. Pyrethroids were the primary insecticides used, as reported by 46 of the 58 countries; carbamates were used by 13 of reporting countries, organophosphate compounds by eight countries, and the organochlorine dichlorodiphenyltrichloroethane (DDT) by six countries.[6] A total of 29 countries in the African Region reported information for 2011 and 2012 on insecticides used in IRS: in 15 countries a pyrethroid was the primary insecticide reported in 2011; three of these countries reported a non-pyrethroid as primary insecticide in 2012. A decreased number of countries using pyrethroids in 2012 compared to 2011 was also noted in IRS programmes supported by the PMI.[7]

Information on the extent to which households have been protected by at least one vector control method can be ascertained from household surveys. In surveys conducted in 14 countries (12 in Africa) during 2010–2012, the proportion of households fully protected by vector control (i.e. with enough ITNs for all occupants or sprayed by IRS in the past 12 months) ranged from 6% to 62% (**Figure 4.7**). An even higher proportion of households in these surveyed countries (range 20%–94%) had been reached with at least one ITN or sprayed by IRS.

Information from household surveys on household coverage of any vector control method is useful for programmes, although surveys are not available from every country for every year. To obtain more timely estimates on the proportion of the population at risk in each country protected by vector control interven-

Figure 4.7 Proportion of households with at least one ITN or enough ITNs for all occupants and/or protected by IRS in the last 12 months, surveys from 14 countries, 2010-2012

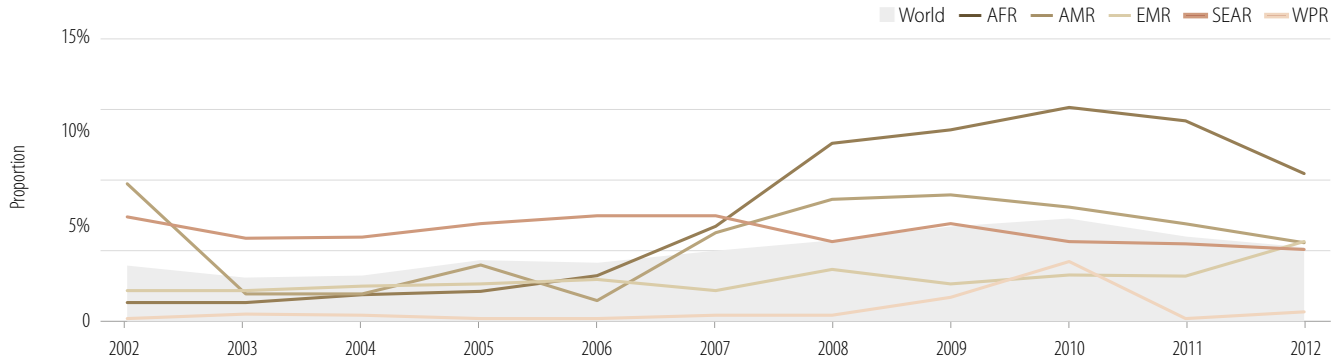


ITNs, insecticide-treated nets; IRS, indoor residual spraying

Source: *Household surveys*

6. The total number of countries reporting specific chemical agents is greater than the number of countries reporting, because countries could report up to three chemical agents used.
7. http://fightingmalaria.gov/technical/irs/PMI_IRS_Insecticide_Trends_080112.xlsx

Figure 4.6 Proportion of population at malaria risk protected by IRS, by WHO Region, 2002–2012



AFR, African region; AMR, Region of the Americas; EMR, Eastern Mediterranean Region; IRS, indoor residual spraying; SEAR, South-East Asia Region; WPR, Western Pacific Region

Source: *National Malaria Control Programme reports*

tions, the proportion of the population protected by IRS reported by NMCPs can be combined with the estimated proportion of the population sleeping under an ITN as derived from household surveys and from reports from manufacturers and national programmes (see Section 4.2.2). Analysis of household-survey data reveals that about half of the people in IRS-sprayed households are also protected by ITNs (see **Box 4.1**); therefore, to estimate the proportion of the population protected by either ITNs or IRS, it is reasonable to add half the proportion of the population protected by IRS to the proportion sleeping under an ITN.

Deriving an estimate for the proportion of the population protected by any vector control in this way for Africa in 2012, it is clear that the estimated coverage of vector control interventions varies among countries (**Figure 4.8**). More than 80% of the population was protected by vector control measures in Cabo Verde, Sao Tome and Principe, South Africa and Swaziland, whereas more than 60% was protected in Ethiopia, Madagascar, Namibia, Sierra Leone, Tanzania and Zimbabwe. In Cabo Verde, Liberia, Namibia, Sao Tome and Principe, South Africa, Zambia and Zimbabwe, more than half of the population protected by vector control was covered by IRS.

4.4 Larval control strategies

In a few specific settings and circumstances, WHO recommends that the core vector control interventions of IRS and ITNs may be complemented by other methods (e.g. mosquito larval source control, including environmental management). Larval control is appropriate and advisable only in settings where mosquito breeding sites are few, fixed and findable (i.e. easy to identify, map and treat) (*5*).

In 2012, national programmes in 31 malaria-endemic countries worldwide reported information on the use of larval control in certain specific foci of malaria transmission, including six countries in the African Region, nine in the Region of the Americas, four in the Eastern Mediterranean Region, four in the European Region, five in the South-East Asia Region and three in the Western Pacific Region. Various larval control strategies were reported, and many countries engaged in more than one type of larval control activity. Among countries reporting on larval control, 15 countries reported activities involving habitat manipulation (temporary changes to vector habitats), and six reported some form of habitat modification (long-lasting physical transformations to reduce vector larval habitats). Larval control through chemical larviciding was reported by 18 countries, and through biological larviciding by 13 countries. Reports from malaria-endemic countries give an indication of the range of larval control methods employed, although the scale of efforts was not quantified and the impact on the malaria burden in individual countries is not easily measured.

4.5 Malaria vector insecticide resistance and the Global Plan for Insecticide Resistance Management

4.5.1 Implementation of the Global Plan for Insecticide Resistance Management

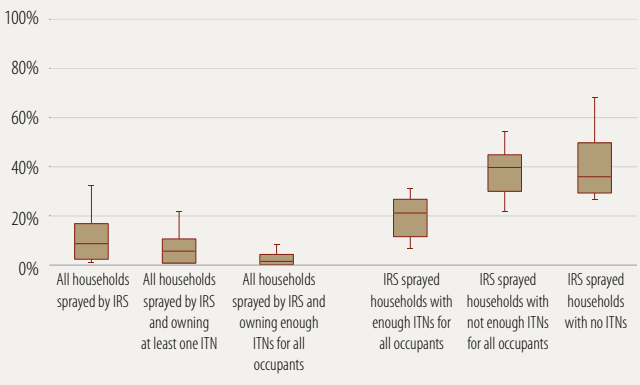
Vector control through ITNs and IRS is a core component of NMCPs today, and the success of these interventions depends on the continued effectiveness of the insecticides used. Currently, global malaria-control efforts rely heavily on a single class of insecticide: the pyrethroids. This class of insecticide is used in most IRS programmes, and it is the only insecticide used in WHO-recommended LLINs. However, increasing resis-

Box 4.1 Estimating the extent of overlap in coverage with vector control interventions

An upper limit for a combined coverage estimate can be obtained by assuming there is no overlap in the populations protected by IRS or by ITNs (i.e. the combined coverage for a particular country is obtained by adding the proportion protected by IRS and that protected by ITNs). A lower limit can be obtained by assuming that there is complete overlap in the population protected by IRS and the population protected by ITNs (i.e. the combined coverage would be equal to the higher of the two population proportions protected by ITNs or IRS). For a reasonable estimate on where in this range the population protected by both vector control method lies, it is necessary to know, in countries employing both methods, the extent to which the populations targeted for ITNs and IRS overlap. Information on the extent these interventions overlap is limited but can be obtained from household surveys.

In 14 household surveys conducted between 2010 and 2012 that included information on ITN and IRS, 9% of households were sprayed with IRS and about 60% of those households owned at least one ITN (Figure Box 4.3). In one third of these IRS households with an ITN, there were enough ITNs for all occupants, whereas the remaining two thirds did not have enough ITNs for all occupants. Considering that population access to an ITN is 77% in all ITN-owning households and 100% in households with enough ITNs for all, in ITN-owning households without enough ITNs for all, about 65% of household members have access to an ITN. Combining this information, 20% of IRS-sprayed households have all members protected by ITNs and 40% have two thirds protected; consequently, about half of the people in these IRS-sprayed households are protected by ITNs and IRS and half are protected by IRS alone..

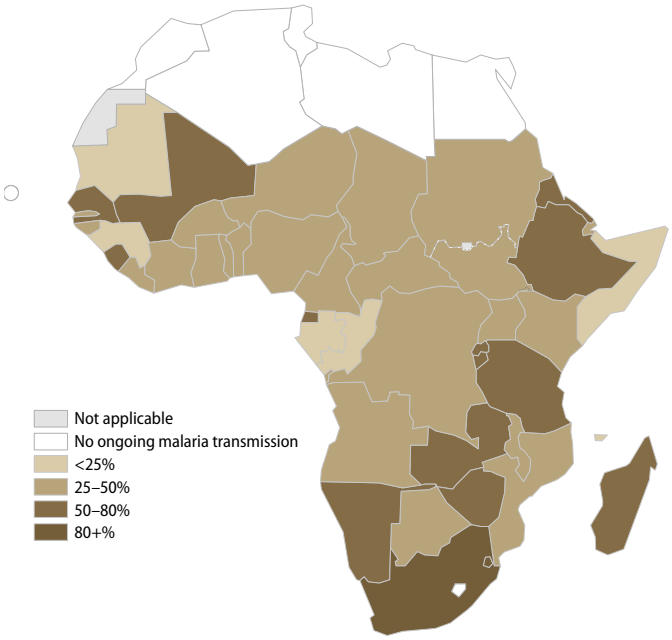
Figure Box 4.1 Proportion of households sprayed with IRS, owning at least 1 ITN, owning enough ITNs for all, surveys from 14 countries, 2010-2012



IRS, indoor residual spraying; ITN, insecticide-treated net

Source: *Household survey*

Figure 4.8 Proportion of population at malaria risk protected by ITNs or IRS, sub-Saharan Africa, 2012



IRS, indoor residual spraying; ITN, insecticide-treated net

Source: *ITN coverage model from the Institute for Health Metrics and Evaluation, which takes in account ITNs supplied by manufacturers, ITNs delivered by NMCPs and household survey results Proportion population sleeping under an ITN derived from relationship with household ownersh of at least one ITN analyzed by linear regression in 50 household surveys 2001-2012, y= 0.67x - (Proportion population protected by IRS from National Malaria Control Programme reports. Coverage estimate as of June 30, 2012.*
Map production: Global Malaria Programme (GMP), World Health Organization

tance of malaria vectors to pyrethroids and to other insecticides jeopardizes global malaria control efforts. Recognizing the threat posed by insecticide resistance, WHO released the Global Plan for Insecticide Resistance Management in malaria vectors (GPIRM) in May 2012 (6). The GPIRM summarizes the current status of insecticide resistance, the potential effect of resistance on the burden of malaria, and the available approaches to managing resistance; it also outlines a global strategy and action plan for insecticide resistance management for the global malaria community. The global strategy described in the GPIRM is based on five pillars that relate to activities among different stakeholders in the global malaria community; recent developments in these activity areas are described below:

i) Planning and implementing insecticide resistance management strategies

Establishment of a national intersectoral committee is a key step in developing a robust national resistance management plan that includes more judicious use of insecticides, rotations and combinations of vector control interventions. In many countries, this is done through a previously established integrated vector management committee. In 2013, workshops were held in the African Region and the Eastern Mediterranean Region to support Member States in the development and roll out of these plans.

ii) Ensuring proper, timely entomological and resistance monitoring and effective data management

Timely resistance monitoring is still limited in many parts of malaria-endemic countries, but progress is being made. In 2013, WHO published a revision of the insecticide resistance testing guidelines (*7*), and numerous national-level training sessions were held by WHO and by partners, including several in the African Region.

Information collected during 2011–2012 by WHO regional offices from Member States (as part of development of the GPIRM) showed that resistance to at least one insecticide in one malaria vector in one study site has been identified in 64 countries worldwide. Most of these reports concerned resistance to pyrethroids. In follow-up to the efforts to collect information on insecticide resistance management to inform the GPIRM, the Global Malaria Programme (GMP) of the WHO is implementing a database for insecticide resistance monitoring reports from Member States. A preliminary report on data collected in 2013 will be available in 2014.

iii) Developing new and innovative vector control tools

Several promising new insecticide formulations, new active ingredients and new vector control paradigms are in the pipeline, facilitated by product development partnerships (e.g. the Innovative Vector Control Consortium) and other research institutes, and commercial sector partners. To facilitate and guide the development of these new products and approaches, WHO established the Vector Control Advisory Group in 2013; this group is jointly managed by the GMP and the Neglected Tropical Disease unit of the WHO.

iv) Filling in knowledge gaps on mechanisms of insecticide resistance and the impact of current insecticide resistance management approaches

The Africa Network for Vector Resistance (ANVR) – established by the WHO African Regional Office in 2000 – is a consortium of universities, research institutes and national programmes throughout the region. In January 2013, WHO convened the 12th annual meeting of the ANVR to update activities and research findings, and to develop "A roadmap for GPIRM implementation". WHO is managing implementation of a five-country project, "Implications of Insecticide Resistance", which is due to be completed at the end of 2014.

v) Ensuring that key enabling mechanisms (advocacy as well as human and financial resources) are in place

In 2013, WHO issued guidance on capacity-building for entomology and vector control to address the human-resource crisis in these areas faced by many NMCPs. WHO is also working with partners – including the Global Fund, RBM, foundations and donors – to urgently build and finance country-level capacities to adequately respond to the threat of insecticide resistance.

4.5.2 Management of insecticide resistance in relation to IRS coverage

Overall protection of at risk populations with IRS decreased globally from 5% in 2011 to 4% in 2012; in the African Region the proportion protected by IRS decreased from 11% to 8% during the same time period (see section 4.3.2). The reasons for the decrease in IRS implementation are not clear. Some countries appear to have decreased use of pyrethroids and increased their use of non-pyrethroid insecticides, either in direct response to insecticide resistance monitoring data or as part of a plan to use insecticides in rotation to minimize the development of resistance. Since most of the non-pyrethroid insecticides used in

rotation are more costly than pyrethroids, control programmes with funding constraints may have reduced the target population to be protected by IRS, and provided vector control coverage through ITNs in areas previously covered with IRS.

The decrease in the number of persons protected by IRS can be interpreted as a sign that country programmes are actively managing their insecticide use. Active management of insecticide use in response to insecticide resistance monitoring data or planned rotational use of insecticides to minimize the development of resistance are recommended in the GPIRM. Indeed, a key objective of GPIRM was the preservation of the effectiveness of pyrethroids and other classes of insecticides until new tools become available. Since all currently available insecticide-treated mosquito nets are treated with pyrethroids, it is only through IRS that all classes of insecticides (including pyrethroids) can be used in rotation; consequently, the use of non-pyrethroids in IRS will continue to be an important insecticide resistance management tool for malaria control programmes. Rotational use of insecticides, guided by intensive insecticide resistance monitoring and analysis of resistance monitoring data, may allow for renewed use of pyrethroids in areas where they had been previously been deemed ineffective (*8*).

4.6 Conclusions

Access to ITNs has increased, use of available ITNs remains high, but progress towards universal coverage targets stalled in 2012

Tremendous progress had been made in the past 10 years in the distribution of ITNs, especially in Africa, where it is estimated that more than half of all households in malaria-endemic areas had at least one ITN in 2013. Estimated access to an ITN and the proportion of the population sleeping under an ITN have also increased. However, ITN access remains well below the targets of universal coverage, and has not appreciably progressed in the past two years.

There is high usage of nets among the population with access to them. In the most recent household surveys, about 88% of people with access to a net in their household reported sleeping under it the night before. Levels of use are even higher for certain vulnerable groups, including children under 5 years of age and pregnant women. Current efforts to encourage the use of nets should be maintained, as should efforts to increase the number of available nets within households.

Progress towards achieving universal coverage stalled due to decreased numbers of ITNs delivered to countries during 2011 and 2012; however, the larger number of projected deliveries of nets in 2013 and the large number of nets currently financed for delivery during 2014 suggest that ITN coverage should again increase over the next two years. Delivery of nets need to be sustained at or above current levels in order to achieve and maintain universal coverage targets.

IRS coverage decreased globally in 2012

Several countries expanded their IRS programmes and others achieved high levels of vector control coverage through the distribution of ITNs and deployment of IRS. Nevertheless, overall protection of at-risk populations with IRS decreased globally from 2011 (5%) to 2012 (4%). The reasons for the decrease in IRS implementation are not clear for most programmes. One factor may be the relatively high cost (per person per year of protection) of IRS compared to ITNs (*9, 10*). Also, IRS costs may increase due to the change to a more expensive insecticide in response to insecticide resistance. Targeted use of IRS with non-pyrethroids may become increasingly important as an insecticide-resistant management tool, especially given that currently approved LLINs all use pyrethroids.

Monitoring and management of insecticide resistance

The effectiveness of both IRS and ITNs is threatened by the development of insecticide resistance. Monitoring and management of insecticide resistance for malaria control is set out in the recently released GPIRM. Activities recommended in the GPIRM are under way; however, more needs to be done to manage resistance by more active strategies using existing tools. Addressing insecticide resistance will be helped by the development of new insecticides (especially those appropriate for ITNs), and by the use of vector control and other interventions to reduce transmission that do not rely on insecticides.

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CHAPTER 5

Preventive therapies for malaria

This chapter reviews: (i) the adoption of policies and implementation of programmes for intermittent preventive treatment of malaria in pregnancy and in infants, and for seasonal malaria chemoprevention in children; and (ii) progress in the development of a malaria vaccine.

5.1 Need for preventive chemotherapy

WHO currently recommends three highly cost-effective strategies for the use of antimalarial medicines for the prevention of morbidity, targeting groups at high risk of *Plasmodium falciparum* malaria, in areas of moderate to high malaria transmission in sub-Saharan Africa (see Chapter 2):

- intermittent preventive treatment in pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP) (IPTp-SP), delivered at each scheduled antenatal care (ANC) visit after the first trimester;
- intermittent preventive treatment in infants (IPTi) with SP (IPTi-SP), delivered at the time of the second and third diphtheria–tetanus–pertussis (DTP) and measles vaccination;[1] and
- seasonal malaria chemoprevention (SMC) with amodiaquine plus SP (AQ+SP) for children aged 3–59 months in areas of highly seasonal malaria transmission across the Sahel subregion.[2]

For example, in 2012 it was estimated that, each year in malaria-endemic areas of Africa, 35 million women who become pregnant[3] could benefit from IPTp and a large proportion of the approximately 26 million infants born[4] could benefit from IPTi; in addition, an estimated 25 million children aged 3–59 months living in the Sahel subregion could benefit from SMC (*2*). Considering the substantial burden of malaria in groups targeted for preventive treatments, important reductions in infant and childhood morbidity and mortality could be achieved through expanded implementation of IPTp, IPTi and SMC. IPTp reduces low birth weight arising from malaria in pregnancy, which is estimated to result in as many as 100 000 infant deaths each year in sub-Saharan Africa (*3*). IPTi has been shown to reduce clinical malaria cases by 30% in the first year of life. Implementation of SMC could reduce the approximately 108 000 deaths in children under 5 years of age with malaria estimated to occur during one year in areas of the Sahel targeted for this intervention (*2*).

1. IPTi is recommended in areas where SP resistance is not high (defined as a prevalence of the pfdhps 540 mutation of < 50% in *P. falciparum*).
2. Countries in which SMC may be appropriate include Benin, Burkina Faso, Cameroon, Chad, Gambia, Ghana, Guinea, Guinea-Bissau, Mali, Mauritania, Senegal, Sierra Leone, Sudan, and Togo.
3. Projected using crude birth rates of endemic countries and pregnancy-to-birth ratios from Dellicour et al. (2010) (*1*).
4. Projected using crude birth rates of endemic countries.

5.2 Malaria chemoprevention policies and implementation

5.2.1 Intermittent preventive treatment of pregnant women

National adoption and implementation of policies for the use of antimalarial agents for malaria prevention are shown by WHO region in **Table 5.1** and by country in **Annex 2A**.

The countries that had adopted IPTp-SP as national policy by the end of 2012 include 36 high-burden countries in sub-Saharan Africa. In addition, IPTp-SP had been adopted and implemented in Papua New Guinea, in the WHO Western Pacific Region.

Recommended indicators for monitoring implementation of IPTp have recently been updated to be in line with the revised policy that IPTp be given at every scheduled ANC visit after the first trimester (see **Table 2.2** in Chapter 2). The proportion of all pregnant women who receive one, two, three or four doses of IPTp can be derived from household surveys, and the proportion of pregnant women attending ANC who receive one, two, three or four doses can be obtained from health-facility reports. The revised WHO IPTp policy was not issued until late in 2012, and national malaria control programmes (NMCPs) are in the process of updating their national policies and data collection systems

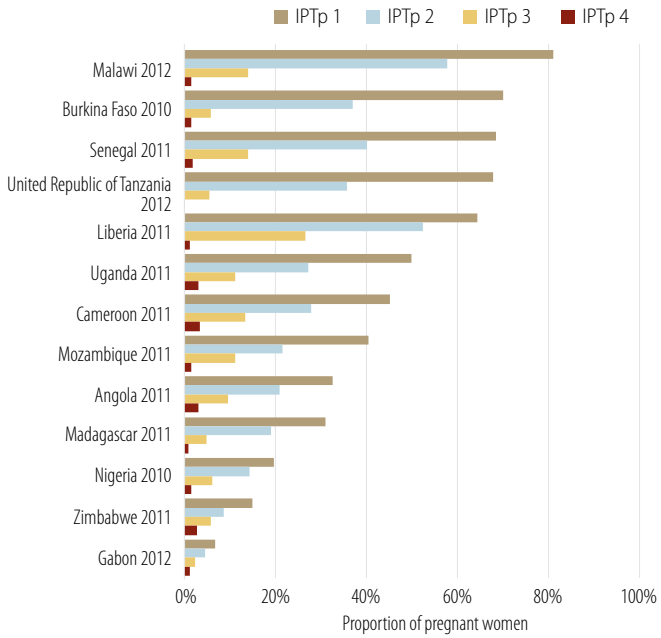
Table 5.1 Adoption of policies for preventive treatments (IPTp, IPTi, SMC), by WHO Region, 2012

Policy	AFR	AMR	EMR	EUR	SEAR	WPR	Total
IPTp used to prevent malaria during pregnancy	34	N/A	2	N/A	N/A	1	37
IPTi to prevent malaria in infants	1	N/A	N/A	N/A	N/A	N/A	1
Seasonal malaria chemoprevention	2	N/A	N/A	N/A	N/A	N/A	2
Number of countries/areas with ongoing transmission	**44**	**21**	**9**	**5**	**10**	**10**	**99**
Number of endemic countries/areas with ongoing transmission of *P. falciparum*	**43**	**18**	**9**	**0**	**9**	**9**	**88**

AFR, African Region; AMR, Region of the Americas; DDT, dichlorodiphenyltrichloroethane; EMR, Eastern Mediterranean Region; EUR, European Region;IPTi, intermittent preventative treatment in infants; IPTp, intermittent preventative treatment in pregnancy; SEAR, South-East Asia Region; WPR, Western Pacific Region

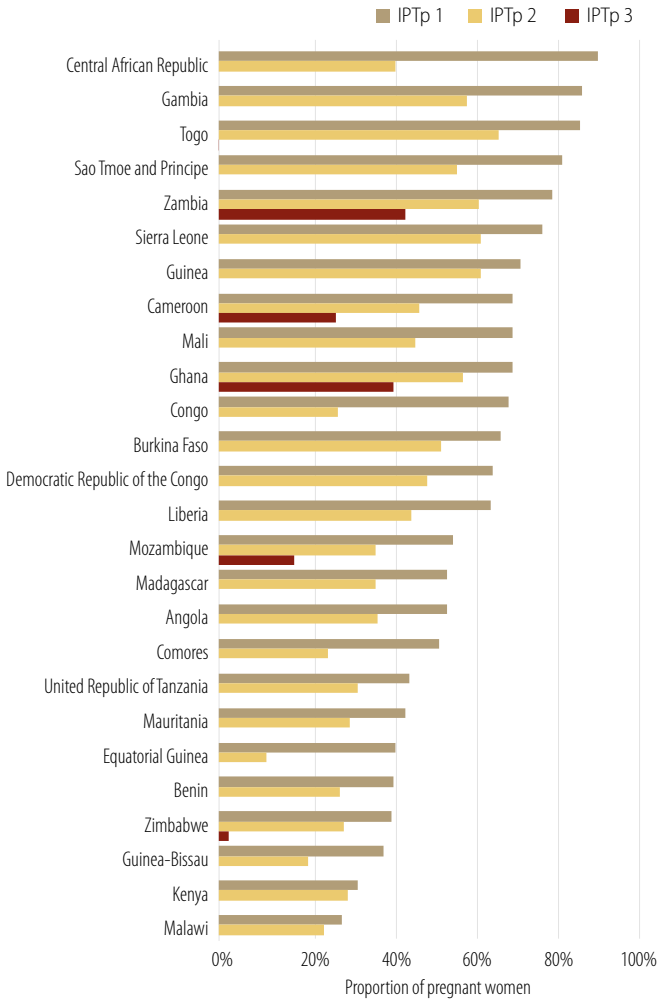
Source: *National Malaria Control Programme reports*

Figure 5.1 Proportion of all pregnant women receiving IPTp, by number of doses received, 2010–2012



IPTp, intermittent preventive treatment in pregnancy
Source: *Household surveys*

Figure 5.2 Proportion of women attending antenatal care receiving IPTp, by number of doses received, 2012



IPTp, intermittent preventive treatment in pregnancy
Source: *National Malaria Control Programme reports*

for IPTp; hence, information on IPTp implementation through 2012 described in this chapter reflects experience with the previous IPTp policy, which recommended at least two doses of SP for IPTp during the second and third trimesters of pregnancy.

Information on the proportion of all pregnant women receiving IPTp can be derived from household surveys. In most standard household surveys, respondents are asked about each dose of SP for IPTp received, making it possible to calculate the proportion of pregnant women who received one, two, three or four doses. Data were available on IPTp from 67 surveys in 31 countries between 1999 and 2012. In surveys conducted during 2010–2012, a higher proportion of pregnant women received one dose of SP for IPTp than received two, three or more doses (**Figure 5.1**). The proportion of pregnant women who received three or more doses of IPTp ranged from 1% to 22%. The population-weighted average of the proportion of pregnant women who received three doses of IPTp across surveyed countries was low (8%), which is not surprising given that these data represent implementation before the IPTp policy was revised. Twenty-three per cent of women received two doses, and 37% received at least one dose; these proportions are low, considering that IPTp with at least two doses has been recommended in most sub-Saharan African countries for many years. A recent review of interventions for malaria in pregnancy used available survey data from 2009–2011, weighted by the estimated number of pregnancies per country (*4*). The review estimated, for 2010, similar levels of IPTp delivery: 22% of all pregnant women and 26% of women who had attended ANC at least twice had received two doses of IPTp.

Data collected and reported by NMCPs provide information on the receipt of IPTp among pregnant women who attend ANC in the public sector. Of the 36 NMCPs that had IPTp as national policy in 2012, 26 programmes reported data on both the dose of IPTp (numerator) and the number of women who had attended ANC at least once (denominator). In these reporting countries, a median of 64% of women attending ANC in 2012 received one dose of IPTp, and 38% received two doses (**Figure 5.2**). Among the six countries with information on three or more doses of IPTp received, a median of 23% (range 2–44%) of pregnant women attending ANC at least once received three or more doses. The low rates of IPTp coverage among pregnant women in settings where a high proportion of pregnant women attend ANC suggests that a large number of opportunities are missed for delivering recommended preventive treatment during ANC (see **Box 5.1**).

5.2.2 Intermittent preventive treatment of infants

IPTi is the administration of a therapeutic dose of SP, delivered through immunization services at defined intervals corresponding to routine vaccination schedules – usually at 10 weeks, 14 weeks, and approximately 9 months of age – to those at risk of malaria. Studies show that IPTi delivered through Expanded Programme on Immunization (EPI) services provides protection in the first year of life against clinical malaria and anaemia, and reduces hospital admissions for infants with malaria and admissions for all causes. Hence, WHO recommends IPTi in sub-Saharan African countries with moderate-to-high malaria transmission, and with low levels of parasite resistance to SP.

WHO published IPTi implementation guidelines in September 2011 (*6*). In 2012, only Burkina Faso had adopted IPTi as national policy, but it had not started implementation.

5.2.3 Seasonal malaria chemoprevention

SMC, previously termed IPT in children, is defined as the intermittent administration of full treatment courses of effective antimalarial regimens during the malaria season to prevent malarial illness, with the objective of maintaining therapeutic antimalarial drug concentrations in the blood throughout the period of greatest malarial risk. SMC has been studied in areas where the main risk of clinical malaria is restricted to a few months each year, and the main burden of malaria is in children, rather than in infants. In these settings, SMC has been shown to prevent about 75% of uncomplicated and severe malaria episodes.

An implementation manual for SMC, developed by the WHO Global Malaria Programme (GMP) with the support of partners, was issued in December 2012. (*7*) In 2012, two countries reported adopting the policy of SMC; in 2013, nine countries in the Sahel subregion are at an advanced stage of finalizing the adoption of SMC as policy (Burkina Faso, Chad, Gambia, Ghana, Mali, Niger, Nigeria, Senegal and Togo). All but four of these countries (Burkina Faso, Gambia and Ghana) have started small-scale implementation in a few districts with support from partners, and in two cases with funding from the national government. The major barrier to rapid scale-up of SMC in all of these countries has been the difficulty of mobilizing the required resources early enough before the start of the 2013 malaria transmission season.

5.3 New therapies for malaria prevention

5.3.1 Malaria vaccine development

An effective vaccine against malaria has long been envisaged as a valuable addition to the available tools for malaria control.

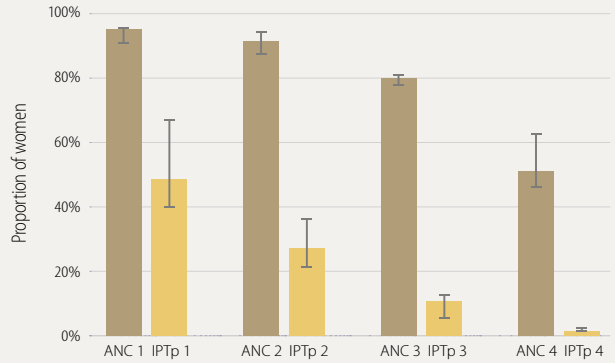
Box 5.1 Missed opportunities in the delivery of IPTp

Household surveys make it possible to analyse the delivery of IPTp in relation to attendance at ANC. Such attendance is high in most sub-Saharan African countries: among nine countries with available surveys during 2010–2012, approximately 95% of pregnant women attended ANC at least once, 92% at least twice, and 80% and 51% made three and four visits respectively (**Figure Box 5.1a**). The proportion who received one IPTp dose was 48%, two doses 27%, three doses 11% and four doses 1.0%. Given the gap between the proportion of pregnant women attending ANC and the proportion receiving IPTp, a substantial number of ANC visits appear to represent missed opportunities for delivery of IPTp.

One can quantify the extent of missed opportunities for IPTp delivery by subtracting the number of IPTp doses received from the number of ANC visits made by each pregnant woman. Even making the conservative assumption that all initial ANC visits occurred in the first trimester when IPT is not given (and thus subtracting one from the recorded number of ANC visits), the number of ANC visits representing missed opportunities for IPTp is large. In the nine recently surveyed countries, a median of 72% of ANC visits represented missed opportunities to deliver IPTp. Several barriers to the delivery of IPTp at health facilities have been identified, including unclear policy and guidance regarding IPTp, stockouts of medication, and health worker confusion regarding the timing of IPTp dosing (*5*). Although some of the identified barriers involve larger health-system deficiencies, many appear amenable to improvement with focused interventions, especially implementation of the revised WHO policy recommendation.

To understand the potential for improving delivery of IPTp, it is useful to compare delivery of SP for IPTp to another service delivered during pregnancy, through ANC, such as administration of tetanus toxoid (**Figure Box 5.1b**). In most countries surveyed in 2000–2012 with information on both IPTp and receipt of tetanus toxoid, a substantially higher proportion of pregnant women received at least two doses of tetanus toxoid (median 56%, interquartile range [IQR] 43–64%) than at least two doses of IPTp (median 10%, IQR 4–28%). Overall, it appears that the ability to administer certain preventive services during ANC is high in most ANC clinics, and that barriers to delivering SP for IPTp can be overcome.

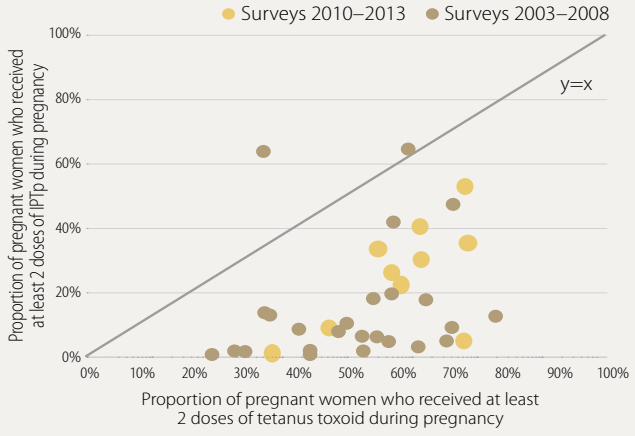
Figure Box 5.1a Proportion of pregnant women attending ANC and proportion receiving IPTp, by number of ANC visits and IPTp dose, in nine Africa countries, 2010–2012



ANC, antenatal care; IPTp, intermittent preventive treatment in pregnancy

Source: *Household surveys in Benin, Cameroon, Gabon, Mozambique,Malawi, Senegal, Tanzania, Uganda, Zimbabwe*

Figure Box 5.1b The proportion of pregnant women who received at least 2 doses of tetanus toxoid and the proportion who received at least two doses of IPTp during pregnancy, 2003–2013



IPTp, intermittent preventive treatment in pregnancy

Source: *Household surveys*

Although research towards the development of malaria vaccines has been pursued since the 1960s, as yet there are no licensed malaria vaccines. However, a number of candidate vaccines are being evaluated in clinical trials, with one candidate vaccine currently being assessed in Phase 3 clinical trials (RTS,S/AS01) (*8*), and about 20 others in Phase 1 or Phase 2 clinical trials.[5]

Vaccine candidate RTS,S/AS01

The RTS,S/AS01 vaccine targets *P. falciparum*. Now in Phase 3 clinical trials, the vaccine is being developed in a partnership between GlaxoSmithKline (GSK) and PATH Malaria Vaccine Initiative (MVI), with MVI receiving funds from the Bill & Melinda Gates Foundation. The vaccine comprises a fusion protein of a malaria antigen – the carboxy terminus of the *P. falciparum* circumsporozoite (CS) antigen – with hepatitis B surface antigen, and includes a new and potent adjuvant. The manufacturer's clinical development plan for the vaccine focuses on infants and young children living in malaria-endemic African countries.

In October 2013, a third set of results on the efficacy of the RTS,S/AS01 vaccine were reported for 6–14 week and 5–17 month age groups (*9*). In the 5–17 month age group, efficacy estimates, pooled across all trial sites, remained statistically significant against clinical malaria (46%) and severe malaria (35.5%). Reductions in both malaria hospitalizations (41.5%) and all-cause hospitalizations (19%) were noted over 18 months. By contrast, in the 6–14 week age group, the efficacy estimate for severe malaria was not statistically significant (although efficacy against clinical malaria remained statistically significant at 27%). In the 5–17 month age group, site-specific efficacy was demonstrated in all 11 settings in seven African countries. The site-specific efficacy estimates over 18 months of follow-up ranged from 40% to 77%, with statistical significance at all sites. By contrast, statistically significant efficacy was confirmed at four of the 11 sites in the younger 6–14 week age group. The reasons for this difference between the age groups are unclear, but co-administration with DTP-containing vaccines and the presence of maternally acquired antibodies to malaria may contribute to a lower immune response in infants aged 6–14 weeks.

The full Phase 3 trial results will become available to WHO in late 2014 and will include 30 months of follow-up safety and efficacy data from groups of children aged 6–14 weeks and 5–17 months, together with data on efficacy and safety of an 18-month booster dose and site-specific efficacy. The WHO Joint Technical Expert Group on Malaria Vaccines (together with the Global Malaria Programme and Department of Immunization, Vaccines and Biologicals), has advised that, in the light of the results published to date, a policy recommendation could be considered once the full trial results become available. The timelines of the Phase 3 trial may allow a WHO review and recommendation in late 2015, as a potential addition to the current WHO-recommended malaria preventive measures. The WHO process for review will also depend on the timings and outcome of the regulatory review that will be performed by the European Medicines Agency in 2014–2015. Any possible recommendation related to vaccination in the 5–17 month age group would require at least two visits to be added to the routine immunization schedule.

Other malaria vaccine candidates in development

Several other vaccine candidates are currently being explored, but their development is at least 5–10 years behind that of RTS,S/AS01. Details are provided in *The Rainbow Tables*: WHO's comprehensive spreadsheets of global malaria vaccine project activity, which are updated every 6 months. In November 2013, WHO and the malaria vaccine funders group launched an update to the Malaria Vaccine Technology Roadmap,[6] with two new strategic goals. These goals are the development of highly efficacious vaccines to prevent malaria disease and deaths, and of vaccines designed to interrupt malaria transmission and contribute towards the long-term aim of malaria eradication. The revised goals also expand the roadmap to include *P. vivax* as well as *P. falciparum*.

5.4 Conclusions

Monitoring IPTp uptake following revised WHO IPTp policy

The key indicators for monitoring uptake of IPTp have been revised following updated WHO recommendations that IPTp be given at every scheduled ANC visit after the first trimester. IPTp indicators include the proportion of pregnant women who receive one, two, three and four doses among all pregnant women and those attending ANC. Data to calculate these revised indicators are currently available from nationally representative household surveys and from several national programmes. Many programmes need to update their reporting systems to obtain the necessary data to monitor progress in implementing IPTp according to the revised policy.

Missed opportunities for IPTp implementation

Although the benefits of IPTp have been well established, implementation of IPTp has lagged in comparison to that of other malaria control interventions. In recently conducted household surveys in nine countries, about 37% of all pregnant women received one dose of IPTp, 23% two doses and 8% three doses. Among 26 countries reporting on IPTp delivered to pregnant women attending public ANC, about 64% received one dose, 38% two doses and 23% three doses of IPTp.

Analysis of household survey data suggests that, even accounting for ANC visits during the first trimester when IPTp is not given, an opportunity to give SP for IPTp is missed at about 70% of ANC visits. The high level of missed opportunities to deliver IPTp at ANC delivery compared to the delivery of other preventive interventions (e.g. administration of tetanus toxoid to pregnant women) suggests that it would be best to focus efforts to overcome barriers to IPTp implementation at the ANC level.

Implementation of IPTi and SMC

The slow uptake of IPTi as new policy and the lack of implementation of this policy highlight the challenges of adopting new control strategies, even where an established system for delivery of preventive services, such as EPI, exists. Adoption and

5. See http://who.int/malaria/areas/vaccine/en/index.html

6. www.who.int/immunization/topics/malaria/vaccine_roadmap

implementation of SMC appears to be more rapid than that of IPTi, even though implementation of SMC cannot rely solely on existing service delivery structures. In countries for which IPTi and SMC are recommended, implementation of SMC may take precedence over IPTi because of its greater estimated impact, given that it is not recommended that these interventions be implemented together.

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CHAPTER 6

Diagnostic testing and treatment of malaria

This chapter reviews: (i) the needs for malaria diagnostic testing and treatment; (ii) the adoption of policies and implementation of programmes to expand access to, and use of, universal diagnostic testing of suspected malaria cases; (iii) the adoption of policies and implementation of programmes to expand access to, and use of, effective treatment for malaria; (iv) the progress made in withdrawing oral artemisinin-based monotherapies from the market; (v) the current status of drug efficacy monitoring and the latest trends in antimalarial drug resistance; and (vi) efforts to contain artemisinin resistance.

6.1 Needs for diagnostic testing and treatment

WHO recommends that all persons of all ages in all epidemiological settings with suspected malaria should receive a parasitological confirmation of diagnosis by either microscopy or rapid diagnostic test (RDT), and that uncomplicated *Plasmodium falciparum* malaria should be treated with an artemisinin-based combination therapy (ACT) (*1*). Diagnostic testing for malaria is the cornerstone of WHO's initiative – T3: Test. Treat. Track – whereby testing of every suspected malaria case ensures appropriate antimalarial treatment and improves malaria surveillance. WHO provides guidance for quantifying (at the national programme level) diagnostic needs using malaria surveillance data (*2*), and treatment needs based on malaria morbidity (*3*). These data can be used to assess the scale of global and regional diagnostic and treatment needs.

The total number of suspected malaria cases that would require a malaria diagnostic test can be estimated by WHO region, by dividing the estimated number of malaria cases (Chapter 8, Section 8.3.1) by the malaria diagnostic test positivity rates derived from national programme data. Treatment needs for malaria depend in part on the extent to which malaria diagnostic testing is employed. If diagnostic testing were universally applied, the number of malaria cases from malaria burden estimates could be taken as representing the number of cases requiring treatment. However, to account for current levels of diagnostic testing in assessing malaria treatment needs, it is necessary to examine several factors: the proportion of patients with suspected malaria presenting for care in the public health sector or the private sector, and the proportion not seeking care; the proportion of patients with suspected malaria who receive a diagnostic test in each sector; and the proportion of people tested who have confirmed malaria (*4*). For this analysis, we assume that all confirmed cases and all suspected cases not tested are treated for malaria. The proportion of suspected malaria cases tested at public facilities can be calculated from national programme data. There is less information on malaria testing in the private sector; however, based on data from available household surveys (see Section 6.2.3), the proportion tested in the private sector can be derived from the rate in the public sector. Treatment needs for *P. falciparum* and *P. vivax* infections can be calculated by considering the proportion of cases due to each species, based on country-reported testing data.

Estimated in this way, the estimated number of diagnostic tests needed annually for suspected malaria cases is large, at over 1 billion globally; in the African Region, this need is estimated at around 600 million (range 392–825 million). Treatment needs based on current levels of diagnostic testing are also large, with an estimated 479 million (range 312–656 million) ACT treatments needed in the African Region alone. If all suspected cases were tested, and only confirmed malaria cases were treated with ACTs, the need for malaria treatment would be dramatically reduced. For example, in the African Region, if universal testing of all suspected malaria cases were implemented, the need for ACT treatments would be reduced by more than 60%.

These estimates are intended to illustrate the magnitude of diagnostic and treatment needs on a regional and global scale, and the potential impact of implementing universal diagnostic testing, rather than being absolute needs for programme procurement purposes. Uncertainty limits around these diagnostic and treatment need estimates are large, because they are derived from similarly uncertain malaria case estimates and other data inputs. The diagnostic needs calculated here for the African Region, for example, may underestimate the true diagnostic needs, because the test positivity rates derived from reported national programme data used in this analysis are higher than those derived from published studies (*5*).

For full implementation of a universal diagnostic testing policy for suspected malaria, patients with suspected malaria must seek care delivered by trained health-care providers in the public or private sector, or at the community level. Household survey data from 69 countries from 1990 to 2012 show that, across WHO regions, a median of 20%–50% of children were not brought for care for a recent fever. Among countries in the African Region, a higher proportion (median 38%) of febrile children sought care in the public sector (public facilities or community programmes) than in the private sector (private clinics or shops), where the median was 17%.

6.2 Diagnostic testing for malaria

6.2.1 Policy adoption

National adoption and implementation of policies for parasitological confirmation of diagnosis of malaria by WHO region are shown in **Table 6.1**, and by country in Annex 2A. In 2012, 41 of 44 malaria-endemic countries in the African Region reported adoption of a policy of parasitological diagnosis for all age groups – an increase of six countries since 2009. In other regions, a policy of universal diagnostic testing was adopted in 49 of 55 endemic countries. Malaria diagnosis is reportedly provided free of charge in the public sector in 85 countries across all regions. Use of combination RDTs that can detect more than one species of *Plasmodium* has been adopted as policy by 40 countries globally, among 47 countries that report more than one *Plasmodium* species. A total of 26 African countries are now deploying RDTs at the community level, as are 22 countries in other regions.

6.2.2 RDTs procured and distributed, and microscopic examinations undertaken

RDTs procured

For 2013, a total of 31 manufacturers that have participated in the WHO Malaria RDT Product Testing Programme during 2008–2012 have supplied data on RDT sales to public and private sectors in malaria-endemic regions (**Figure 6.1**). Sales have increased dramatically over the past five years – for both *P. falciparum*-specific tests and combination tests that can detect more than one species – reaching 205 million in 2012. WHO and other organizations (Centers for Disease Control and Prevention [CDC], Foundation for Innovative New Diagnostics [FIND], Special Programme for Research and Training in Tropical Diseases [TDR]), have undertaken product-quality testing. Results show an improvement in test quality over time (*6*); they also indicate that information on test quality is being used, because organizations funding diagnostic testing programmes are procuring proportionally more high-quality tests over time.

RDTs distributed

The reported number of RDTs delivered by national malaria control programmes (NMCPs) provides information on where RDTs procured from manufacturers are deployed in the public sector. The number has increased rapidly, from less than 200 000 in 2005 to more than 108 million in 2012 (**Figure 6.2**). Most of the RDTs delivered in 2012 (78%) were used in the African Region, followed by the South-East Asia Region (16%) and Eastern Mediterranean Region (3%). These totals underestimate the total quantity of RDTs distributed (they represent public sector distributions only, and there is incomplete reporting – only 32 of the 44 endemic countries in the African Region reported these data in 2012); however, the same upward trend is seen as for RDT sales, with the highest growth occurring in the African Region.

Microscopic examinations undertaken

The number of microscopic examinations for malaria reported by national malaria control programmes increased to a peak of 188 million globally in 2012 (**Figure 6.3**). The global total is dominated by India, which accounted for over 120 million slide examinations in 2012. The global increase in microscopy from 2011 to 2012 is accounted for by the nearly 52 million examinations undertaken (a 42% rise) from Africa. Several countries in Africa reported increased microscopy in 2012, with seven countries accounting for 85% of the increase.

6.2.3 Parasitological testing in the public sector, private sector and community

Parasitological testing in the public sector

The proportion of reported suspected cases receiving a parasitological test can be calculated from information on testing and malaria cases reported by NMCPs. The number of suspected malaria cases may be reported directly, or can be derived from the reported number of presumed and confirmed malaria cases (*5*). A regional testing rate is calculated using data from countries reporting sufficient data each year.[1] The proportion of suspected cases tested in the public sector is highest in the Region of the Americas and the European Region, followed by the South-East Asia Region and the Western Pacific Region (**Figure 6.4**). The proportion of suspected cases tested in the public sector has risen steadily in the Western Pacific Region over the past 5 years. The

1. If countries report confirmed malaria cases only, then the number of suspected malaria cases equals the number of malaria diagnostic tests performed, and the proportion tested is fixed at 100%. However, these values are not informative for assessing diagnostic testing efforts; therefore, the analysis does not include country reports for the years in which only confirmed cases are reported.

Table 6.1 Adoption of policies for malaria diagnosis by WHO Region, 2012

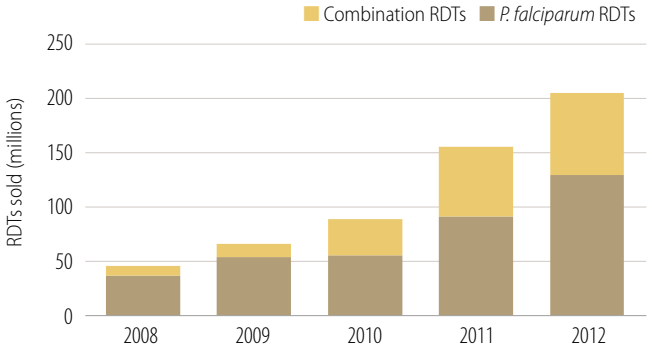
Policy	AFR	AMR	EMR	EUR	SEAR	WPR	Total
Patients of all ages should undergo diagnostic test	41	21	7	5	8	8	90
Malaria diagnosis is free of charge in the public sector	33	21	8	5	10	8	85
Combination RDTs available in public sector	17	9	1		6	7	40
RDTs used at community level	26	8	2		7	5	48
Number of countries/areas with ongoing malaria transmission	**44**	**21**	**9**	**5**	**10**	**10**	**99**
Number of *P. falciparum* endemic countries/areas	**43**	**18**	**9**	**0**	**9**	**9**	**88**
Number of *P. vivax* endemic countries/areas	**7**	**20**	**6**	**5**	**10**	**10**	**58**
Number of countries/areas endemic for both *P. falciparum* and *P. vivax*	**6**	**17**	**6**	**0**	**9**	**9**	**47**

AFR, African Region; AMR, Region of the Americas; EMR, Eastern Mediterranean Region; EUR, European Region; NMCP, National Malaria Control Programme; RDT, rapid diagnostic test; SEAR, South-East Asia Region; WPR, Western Pacific Region

value for the South-East Asia Region is heavily influenced by India, where the proportion of suspected cases receiving a diagnostic test is very high; without India, the proportion in 2012 drops from 99% to 56%. The testing rate in the Eastern Mediterranean Region has varied over the past decade, though it has risen steadily from 49% to 63% in the past five years. The proportion of suspected malaria cases tested in the public sector in the African Region has increased dramatically in the past two years, from 37% in 2010 to 61% in 2012 – a period of time during which 39 of 44 malaria-endemic African countries reported, including 8 of the 10 highest burden countries in the region. Globally, the proportion of suspected cases receiving a diagnostic test in the public sector (among countries with sufficient data to make this assessment) increased from 44% in 2010 to 64% in 2012. The recent increase in testing in the African Region is due to both an increase in microscopy performed and an increase in the use of RDTs, which accounted for 40% of all tested cases in 2012.

The reported testing rate may overestimate the true extent of diagnostic testing in the public sector, because, among other factors, it relies on accurate reporting of presumed malaria cases. Reporting bias, whereby countries with higher testing rates have a greater propensity to report, appears to be small; for example, in the African Region, the proportion of suspected cases tested among seven countries reporting sufficient data consistently since 2001 was slightly higher (67%) than the proportion among 31 countries reporting consistently since 2010 (60%).

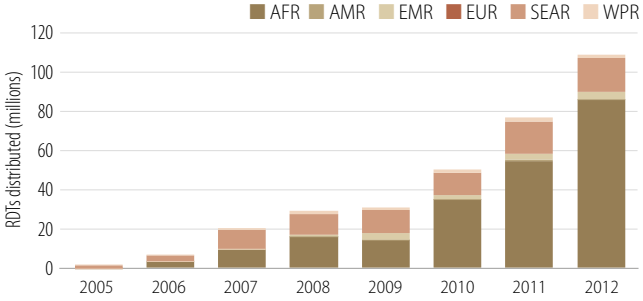
Figure 6.1 RDT sales to public and private sectors, 2008–2012



CDC, Centers for Disease Control; FIND, Foundation for Innovative New Diagnostics; RDT, rapid diagnostic test

Source: *Data provided by 31 (2008-2010), 24 (2011), 24 (2012) manufacturers eligible for the WHO FIND/CDC Malaria RDT Product Testing Programme*

Figure 6.2 RDTs distributed by NMCPs, by WHO region, 2005–2012

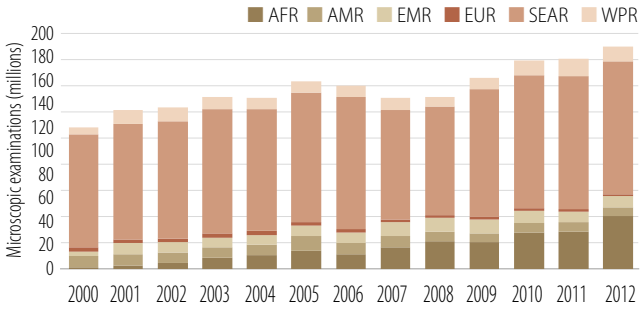


RDTs distributed in the European Region and the Region of the Americas are a very small fraction of the number distributed in other WHO Regions

AFR, African Region; AMR, Region of the Americas; EMR, Eastern Mediterranean Region; EUR, European Region; NMCP, National Malaria Control Programme; RDT, rapid diagnostic test; SEAR, South-East Asia Region; WPR, Western Pacific Region

Source: *National Malaria Control Programme reports*

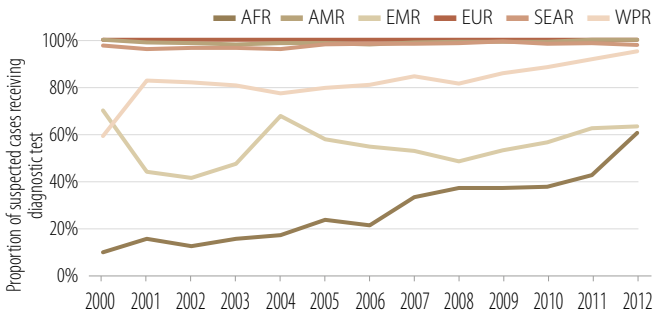
Figure 6.3 Number of microscopic examinations performed for malaria, by WHO region, 2010–2012



AFR, African Region; AMR, Region of the Americas; EMR, Eastern Mediterranean Region; EUR, European Region; SEAR, South-East Asia Region; WPR, Western Pacific Region

Source: *National Malaria Control Programme reports*

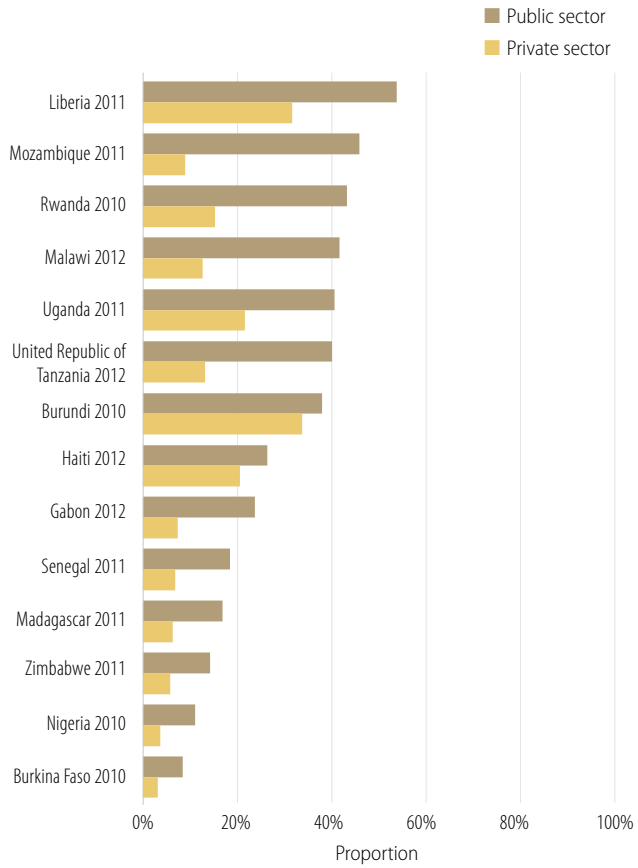
Figure 6.4 Proportion of suspected malaria cases attending public health facilities that receive a diagnostic test, 2000--2012



AFR, African Region; AMR, Region of the Americas; EMR, Eastern Mediterranean Region; EUR, European Region; RDT, rapid diagnostic test; SEAR, South-East Asia Region; WPR, Western Pacific Region

Source: *National Malaria Control Programme reports*

Figure 6.5 Proportion of febrile children who had a blood test, by health sector, countries with available survey data, 2010–2012



Public sector includes government and non-profit facilities, and community health workers; Private sector includes private clinics and providers, pharmacies, shops and traditional providers.

Source: *Household surveys*

Parasitological testing in the private sector

Data reported by NMCPs on the number of RDTs distributed and patients examined by microscopy or RDTs generally cover the public sector only. However, about 40% of patients with suspected malaria worldwide seek treatment in the private sector, which includes regulated health facilities, and pharmacies and other retail outlets (*4*). Information on the extent of parasitological testing in the private sector is limited, but some may be derived from household surveys. Among 14 household surveys conducted during 2010–2012, the proportion of children under 5 years of age who received a diagnostic test for suspected malaria was lower in the private sector (median across surveys 11%, IQR 6%–19%) than in the public sector (median across surveys 32%, IQR 18%–42%)) (**Figure 6.5**). Due to a large proportion of children who did not seek care in surveyed countries, only a low proportion (median 18%) of all febrile children – those who were brought for care in the public or private sector, and those who were not brought for care – received a parasitological test for malaria.

Malaria diagnostics in the community

A total of 46 countries reported deployment of RDTs at the community level, and 15 million patients were tested in 2012, including 13 million tested with RDTs in India. Outside India, the countries reporting the largest numbers of patients tested with RDTs in the community included Myanmar (514 000), Viet Nam (207 000 tested) and Niger (185 000). Overall, patients tested with RDTs in the community represent a relatively small proportion (6%) of the reported total number of patients who received a parasitological test. RDTs are increasingly used for diagnostic testing of malaria in health facilities, including for the diagnosis of *P. vivax* (**Box 6.1**).

6.3 Treatment of malaria

6.3.1 Policy adoption

The adoption of policies for the treatment of malaria is summarized by WHO region in **Table 6.2**, and by country in Annexes 2A and 2B. In 2012, ACTs had been adopted as national policy for first-line treatment in 79 of 88 countries where *P. falciparum* is endemic; chloroquine is still used in some countries in the Region of the Americas where it remains efficacious. Pre-referral treatment of severe malaria cases with quinine or artemether intramuscularly (IM), or with artesunate suppositories, has been adopted by 33 countries in the African Region and by 52 countries globally. Of the 58 countries with ongoing *P. vivax* transmission, 52 countries adopted a policy of using primaquine for radical treatment of *P. vivax* cases; in 26 of these 52 countries directly observed primaquine treatment is recommended and 13 of these 52 countries recommend testing for glucose-6-phosphate dehydrogenase (G6PD) deficiency before treatment with primaquine.

6.3.2 Quantity of ACTs procured and distributed

ACTs delivered

The number of ACT treatment courses delivered annually to the public sector (2005–2009) and to the public and private sectors[2] under the AMFm initiative (2010–2012) has increased consistently from 11.2 million treatment courses delivered in 2005 to 76 million delivered in 2006 and to 331 million delivered in 2012 (**Figure 6.6**). Artemether-lumefantrine (AL) continued to account for the largest volume of ACTs procured by the public and private sector (77%) in 2012, followed by artesunate + amodiaquine, which accounted for 22% of ACTs procured. The proportion of fixed-dose combination ACTs (two active pharmaceutical ingredients combined in the same tablet), preferred because of improved patient adherence to the recommended regimen, has been increasing and in 2012 accounted for 99% of all ACT deliveries.

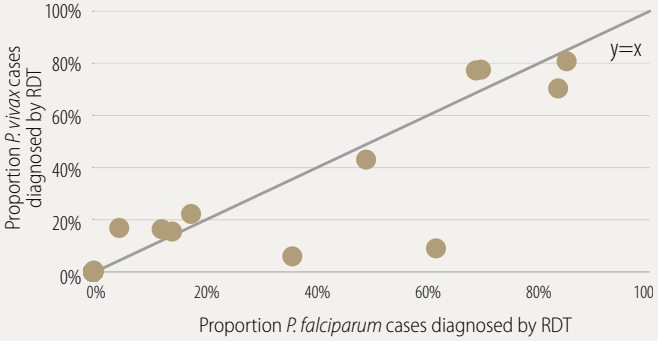
In 2012, a similar proportion of AL (31%) was delivered for young children (weighing <15 kg) as was delivered for patients with a body weight of >35 kg (32%). The treatment courses delivered for older children (weighting 15–24 kg) accounted for 28% and the

2. Data provided by 8 manufacturers eligible for procurement from WHO/UNICEF and AMFm reports. Routine ACT public sector deliveries monitored 2005–2012; AMFm-facilitated public and private sector deliveries through AMFm monitored 2010–2012, in 2010 by AMFm reports and in 2011–2012 by reports of manufacturers ACT deliveries through non-AMFm private sector channels are not monitored, but are estimated to be a small fraction (about 5–10%) compared to public sector deliveries.

Box 6.1 Use of RDTs for diagnosis of *P. vivax*

Combination RDTs that can detect more than one Plasmodium species are increasingly deployed; also, the quality of RDTs deployed, including those that can detect *P. vivax*, has improved (see Section 6.2.2). In 2012, among 42 countries that reported the types of RDTs deployed in public health facilities, 15 reported deploying both *P. falciparum*-specific RDTs and *P. vivax*-specific RDTs (12 countries used a *P. vivax*-specific RDT, and 3 used a pan-specific combination test); 16 countries deployed a test specific for *P. falciparum*; and 11 countries deployed both a *P. falciparum*-specific test and a non-species specific combination test. Among 13 countries that provided information on cases diagnosed by RDT or microscopy by species, the proportion of *P. vivax* cases diagnosed by RDT ranged from <1% to 81%. In most countries, the proportion of *P. vivax* cases diagnosed by RDT (rather than by microscopy) was similar to the proportion of *P. falciparum* cases diagnosed by RDT.

Figure Box 6.1 Proportion of *P. falciparum* and *P. vivax* cases diagnosed by RDT



RDT, rapid diagnostic test

Source: *National Malaria Control Programme reports*

Table 6.2 Adoption of policies for malaria treatment by WHO region, 2012

Policy	AFR	AMR	EMR	EUR	SEAR	WPR	Total
ACT for treatment of of *P. falciparum*	42	9	9	1	9	9	79
Pre-referral treatment with quinine/artemether IM/artesunate suppositories	33	4	6		6	3	52
Single dose primaquine (0.25mg base/kg) as gametocidal for *P. falciparum*	4	15	3	2	6	2	32
Primaquine for radical treatment of *P. vivax* cases	7	21	5	3	9	7	52
Directly observed treatment with primaquine	3	12	1	3	3	4	26
G6PD test is recommended before treatment with primaquine	3		3		1	6	13
Number of countries/areas with ongoing malaria transmission	**44**	**21**	**9**	**5**	**10**	**10**	**99**
Number of *P. falciparum* endemic countries/areas	**43**	**18**	**9**	**0**	**9**	**9**	**88**
Number of *P. vivax* endemic countries/areas	**7**	**20**	**6**	**5**	**10**	**10**	**58**
Number of countries/areas endemic for both *P. falciparum* and *P. vivax*	**6**	**17**	**6**	**0**	**9**	**9**	**47**

ACT, artemisinin-based combination therapy; AFR, African Region; AMR, Region of the Americas; EMR, Eastern Mediterranean Region; EUR, European Region; G6PD, Glucose-6-phosphate dehydrogenase; RDT, rapid diagnostic test; SEAR, South-East Asia Region; WPR, Western Pacific Region

Source: *National malaria control programme reports*

Figure 6.6 ACT deliveries to the public sector and private sector, 2005–2012

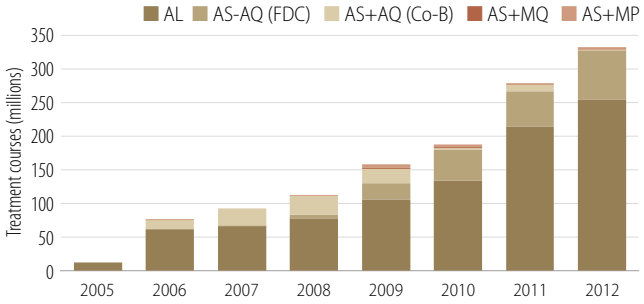


Figure 6.7 Artemether-lumefantrine deliveries to the public sector and private sector, by weight-based treatment course, 2006–2012

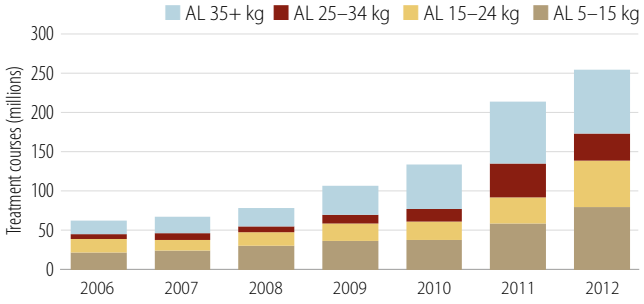
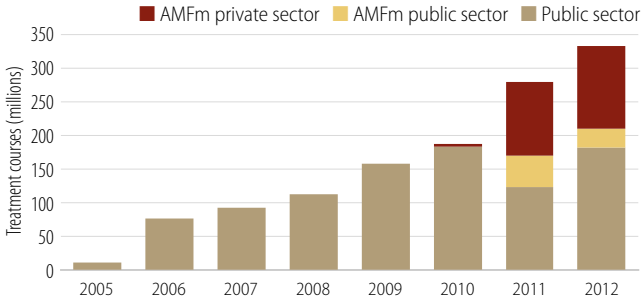


Figure 6.8 ACT deliveries, by health sector and AMFm contribution, 2005–2012



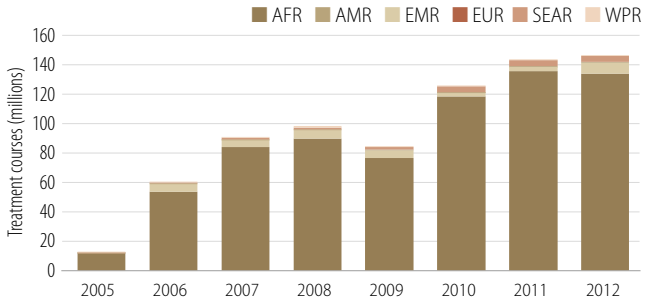
ACT, artemisinin-based combination therapy; AL, artemether-lumefantrine, AMFm, Affordable Medicine Facility – malaria; AQ, amodiaquine, AS, artesunate; Co-B, co=blistered pack; FDC, fixed-dose combination; MQ, mefloquine; SP, sulfadoxine-pyrimethamine

Source (Figures 6.6, 6.7, 6.8): *Data provided by 8 manufacturers eligible for procurement from WHO/UNICEF and AMFm reports*

Routine ACT public sector deliveries monitored 2005–2012; AMFm-facilitated public and private sector deliveries through AMFm monitored 2010–2012, in 2010 by AMFm reports and in 2011–2012 by reports of manufacturers

ACT deliveries through non-AMFm private sector channels are not monitored, but are estimated to be a small fraction (about 5–10%) compared to public sector deliveries

Figure 6.9 Number of ACT treatment courses distributed by NMCPs, by WHO region, 2005–2012



ACT, artemisinin-based combination therapy; AFR, African Region; AMR, Region of the Americas; EMR, Eastern Mediterranean Region; EUR, European Region; SEAR, South-East Asia Region; WPR, Western Pacific Region

Source: *National malaria control programme reports*

smallest proportion was supplied for patients with a body weight of 25–34 kg at 9%. Compared with the previous year, the amount of AL delivered for young children increased 35% and the amount for older children increased 82%, while the amount for those weighing >35 kg stayed the same and the amount delivered for those weighting 25–35 kg decreased by 20% (**Figure 6.7**).

The overall increase in ACT deliveries in 2012 was mainly due to the increase in ACT volumes made available for public sector deliveries, which saw growth of approximately 50% between 2011 and 2012. Medicines delivered to the public and private sector through the Affordable Medicines Facility for malaria (AMFm) initiative, which is now in a transitional phase toward full integration into routine Global Fund grant-making processes under the New Funding Model in 2014, decreased slightly from 156 million treatment courses in 2011 to 150 million in 2012 (**Figure 6.8**).

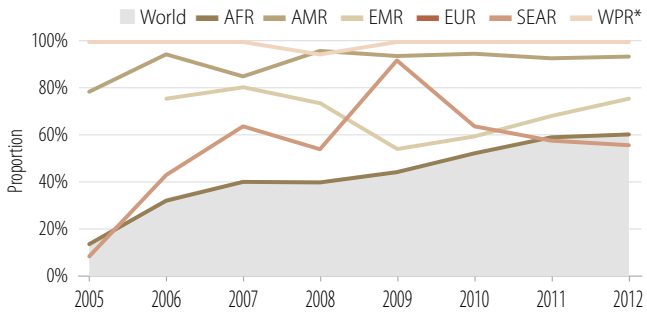
ACTs distributed by national programmes

The number of ACTs distributed by NMCPs provides information on where ACTs procured from manufacturers are deployed through the public sector. The number of ACTs distributed by NMCPs increased between 2009 and 2012 (**Figure 6.9**); however, due to incomplete reporting by countries and possible delays between delivery of ACTs by manufacturers and distribution by NMCPs, the annual totals do not match. The majority of ACTs distributed by NMCPs are in Africa, which accounted for 134 of 147 million treatments reportedly distributed by NMCPs worldwide in 2012.

6.3.3 Use of appropriate antimalarial medicines to treat patients with malaria in the public sector and private sector, and in the community

It has been difficult to track the extent to which patients with confirmed malaria (by RDT or microscopy) receive appropriate antimalarial medicines. Common sources for this information include household surveys and routine information systems. An increasing number of household surveys have included questions on both diagnostic testing and receipt of antimalarial medications. However, the validity of survey responses given to questions about test results and treatments is uncertain. A recent comparison of responses given in a household survey, with observed testing and treatment provided at health facilities, showed that sensitivity and specificity of caregivers recall of diagnostic and treatment information was moderate and greater for receipt of treatment than for receipt or results of a diagnostic test (*8*). Routine information systems usually include data on diagnostic confirmation, but they rarely track treatments given to patients diagnosed with malaria. If they do, the receipt of treatment cannot easily be linked to the diagnostic test result. The development of routine systems that track febrile patients, testing, results and treatments given would enable better tracking of the use of antimalarials; however, such systems are as yet uncommon.

Figure 6.10 Proportion of estimated presumed and confirmed *P. falciparum* cases at public facilities potentially treated with distributed ACTs, by WHO region, 2005–2012



*WPR does not include Papua New Guinea due to incomplete data

ACT, artemisinin-based combination therapy; AFR, African Region; AMR, Region of the Americas; EMR, Eastern Mediterranean Region; EUR, European Region; RDT, rapid diagnostic test; SEAR, South-East Asia Region; WPR, Western Pacific Region

Source: *National Malaria Control Programme reports*

Use of appropriate antimalarial medicines, national programme reports

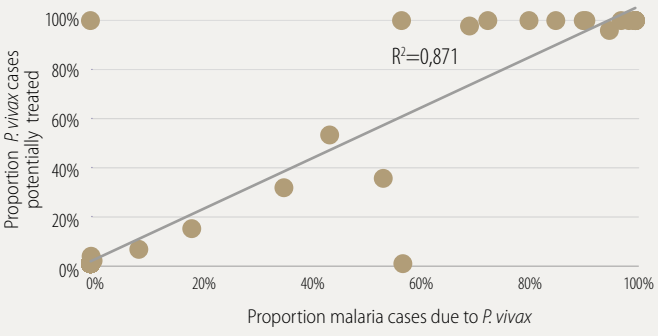
On the basis of the available data from national programmes on the number of ACT treatments distributed and the number of estimated presumed (cases treated without being tested) and confirmed *P. falciparum* cases in the public sector, it is possible to calculate the proportion of malaria cases from public facilities that could potentially be treated with ACTs. The proportion of presumed and confirmed *P. falciparum* cases potentially treated by distributed ACTs has varied over time (**Figure 6.10**). The trend in the African Region, which accounts for the over 90% of the estimated ACT treatment need, has risen steadily since 2005, in line with the increasing ACT deliveries by manufacturers and distributions by NMCPs; in 2012 it reached 60%. Trends in other regions are heavily influenced by inconsistent reporting by certain countries. An increasing number of countries have provided information on ACT distributions over time. Therefore, proportions of presumed and confirmed *P. falciparum* cases potentially treated with ACTs have been less subject to reporting bias in more recent years, and are more likely to reflect true access to ACTs.

Data from national programmes regarding treatment of *P. vivax* cases has been more limited than that for treatment of *P. falciparum*, although some insights can be gained by assessing the use of primaquine treatments (**Box 6.2**)

Box 6.2 Treatment of *P. vivax* with primaquine

Primaquine is currently the only drug available to treat the liver stage (hypnozoite) of *P. vivax* infection (i.e. radical treatment). Fifty-two countries reported adopting a policy of radical treatment with primaquine, and 26 of these countries have adopted a policy of directly observed therapy with primaquine; 13 countries require testing for G6PD activity before treatment with primaquine (see Section 6.3.1). Information on the extent to which patients with cases of *P. vivax* malaria are given radical treatment with primaquine has been lacking. For the *World Malaria Report 2013*, country programmes were asked to provide information on the number of treatment courses of primaquine distributed for use in public health facilities. The number of primaquine treatment courses reported by 24 national programmes was compared to the estimated number of *P. vivax* cases in public facilities for each country, similar to the way in which the proportion of *P. falciparum* cases potentially treated was calculated. The proportion of *P. vivax* cases potentially treated with primaquine varied widely (**Figure Box 6.2**), and appeared to be correlated with the proportion of malaria cases due to *P. vivax* in each country. Among countries that recommend testing for G6PD activity before primaquine treatment, only Algeria and Saudi Arabia reported distributing any primaquine treatment. Overall, about 10% of all patients with *P. vivax* in the 24 countries reporting on primaquine treatment could be potentially treated with the primaquine doses distributed.

Figure Box 6.2 Proportion of estimated *P. vivax* cases potentially treated with primaquine treatments distributed, by proportion of malaria cases due to *P. vivax*, 2012

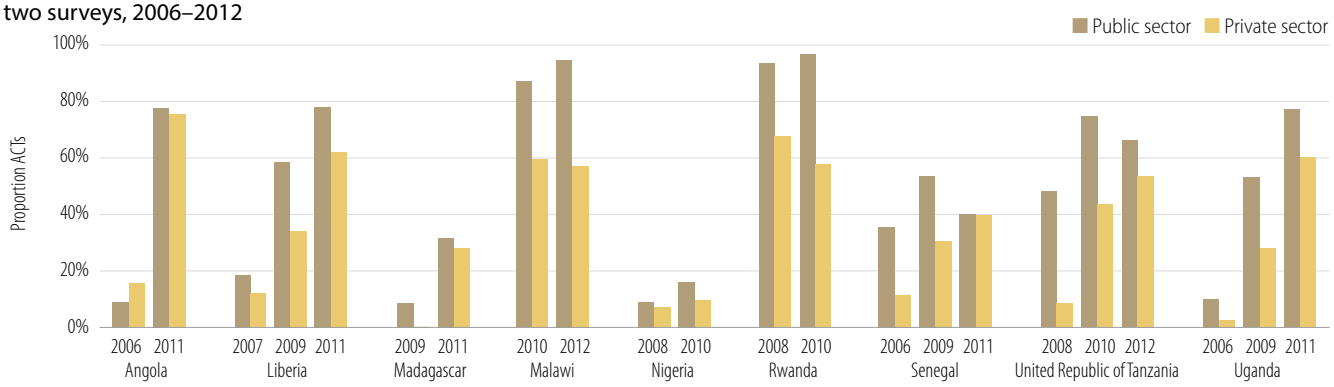


Source: *National Malaria Control Programme reports*

Use of appropriate antimalarial medicines, household surveys

From household survey data it is possible to examine the proportion of febrile children receiving antimalarial treatments who were given an ACT in the public sector and the private sector. In nine countries, at least two surveys that included information on the type of malaria treatment and the place of care were conducted during 2006–2012, (**Figure 6.11**). In all but 1 of these 22 surveys, a higher proportion of children treated for malaria in the public sector received ACTs than those treated in the private

Figure 6.11 Proportion of ACTs among antimalarial treatments given to febrile children, by health sector, among countries with at least two surveys, 2006–2012



Public sector includes government and non-profit facilities, and community health workers; Private sector includes private clinics and providers, pharmacies, shops and traditional providers.
ACT, artemisinin-based combination therapy
Source: *Household surveys*

Box 6.3 Estimating appropriate treatment of malaria

Although household surveys only record whether a child has had a fever, rather than confirmed malaria, results of RDTs administered by the surveyors at the time of a survey provide insight into the proportion of fevers in the previous two weeks that were associated with malaria parasites (because antigens detected by RDTs, can persist even after appropriate treatment). Therefore, the proportion of children who had a positive RDT and a fever in the two weeks before the survey, represents an approximate two week period prevalence of malaria parasite infection or confirmed malaria.[1] If this is combined with information on receipt of ACT reported during the survey, it is possible to estimate the proportion of children with confirmed malaria that received treatment with ACT.

Defining confirmed malaria as a report of fever within the two weeks before the survey and a positive RDT at the time of survey, the proportion of all children with confirmed malaria that received treatment with ACT has been low: below 50% in 42 surveys conducted between 2006 and 2012 (**Figure Box 6.3a**). The proportion of confirmed malaria treated with ACT appears to be higher in households surveys with a greater proportion of febrile children brought for care. The proportion of children with confirmed malaria receiving ACT was higher in most surveys conducted in 2010—2012 than in those conducted in 2006—2009. Across 26 surveys during 2010—2012, the mean proportion of children with confirmed malaria receiving ACTs was 16 % (range 1%-42%).

A low proportion of children who are not brought for care receive ACT, whether they have confirmed malaria or not (**Figure Box 6.3b**). In most surveys, a higher proportion of children with confirmed malaria who were brought for care at public or private health facilities received ACT than those without confirmed malaria, a finding that may reflect the availability of diagnostic testing at health facilities. However, the proportion of children without confirmed malaria that receive ACTs is still high, suggesting either that diagnostic testing is not being performed or that the results are not being used to guide malaria treatment nearly to the extent that they could be. Increased access to care for fever, as well as appropriate diagnostic testing and therapeutic management at all places of care, is needed to ensure that all patients with malaria receive prompt and effective treatment.

1. For surveys in which RDT is not performed (most Demographic and Health Surveys and Multiple Indicator Cluster Surveys) the likelihood of a respondent having a positive RDT can be modeled from the parasite prevalence in the area and individual and household characteristics.

Figure Box 6.3a The proportion of febrile children with positive RDT that received ACTs and the proportion of febrile children brought for care, by older and more recent surveys, 2006–2012

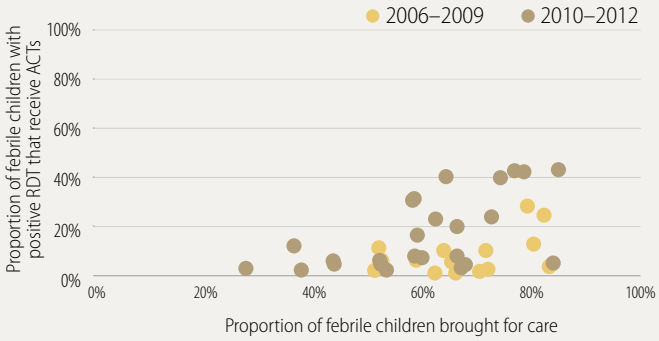
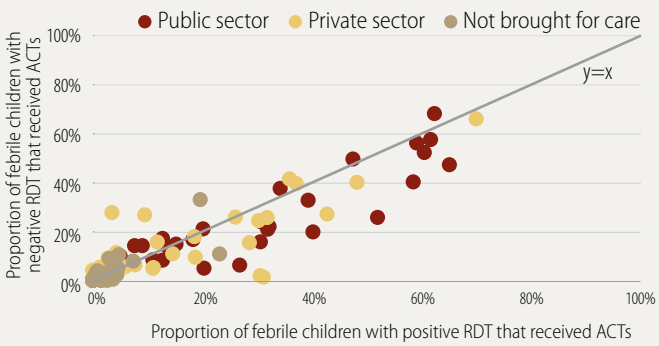


Figure Box 6.3b The proportion of febrile children with positive RDT that received ACTs and the proportion of febrile children with negative RDT that received ACTs, 2006–2012



ACT, artemisinin-based combination therapy; RDT, rapid diagnostic test
Source: *Households surveys*

sector. In nearly all follow-up surveys, the proportion of febrile children receiving antimalarial treatment who received an ACT had increased from the previous survey, in both the public and private sectors.

In the most recent surveys for these countries, the median proportion receiving an ACT among all children who received antimalarial treatment was 68%. This is a substantial level of ACT treatment among those treated, although it does not include those who did not seek care and thus received no treatment. Also, it is not possible to determine from these data what proportion of the children had confirmed malaria.

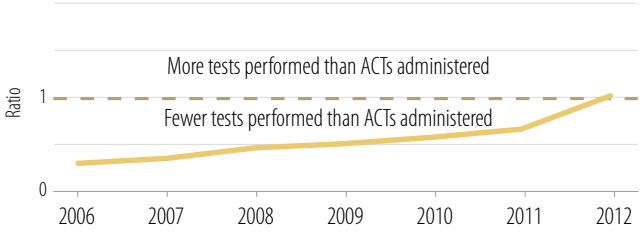
The proportion of all patients with malaria who are appropriately diagnosed and treated for malaria is likely to be much lower (see **Box 6.3**). Ensuring that all patients with malaria are appropriately diagnosed and treated involves increasing access to diagnosis and treatment, and providing appropriate testing and treatment to those who do seek care.

6.3.4 Scaling up diagnostics and reducing treatment needs

Although many patients with suspected malaria still do not receive a parasitological test, the recent expansion of malaria diagnostic testing – as evidenced by the increase in RDTs sales, RDTs distributed by country programmes and microscopy performed – has resulted in an increase in the proportion of suspected malaria cases tested at public facilities. In the African Region during 2006–2012, the total number of tests (microscopy + RDTs) conducted in the public sector has increased compared with the number of ACTs distributed by NMCPs during the year (**Figure 6.12**). In 2012, nearly as many patients were tested as received an ACT. This is an encouraging trend; however, considering that test positivity rates in most areas in Africa are less than 50%, if diagnostic testing is fully implemented, the ratio of diagnostic tests to ACTs should be ≥2. The data indicate that, although substantial progress has been made, the scale-up of diagnostic testing through RDTs and microscopy remains incomplete in the public sector, and to an even greater extent in the private sector.

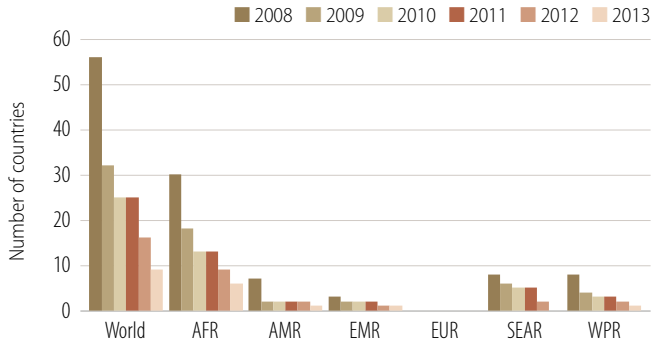
Expanding diagnostic testing, particularly through the scale-up of RDTs, can significantly reduce the need for ACTs and can thus reduce expenditures on antimalarial drugs (*9*). Overall cost-savings will depend on the intensity of malaria transmission and other factors; however, RDTs are cost-effective compared to presumptive treatment, in part due to improved patient outcomes for non-malarial febrile illness (*10*). Promotion of testing starts at the level of programme planning, budgeting and procurement. Country programmes and their supporting donors should aim to provide sufficient microscopy services and to procure an appropriate number of RDTs and ACTs (based on local data), according to procurement guidance described in WHO documents. If the projected number of ACTs required exceeds the estimated number of RDTs and microscopy required, the calculations should be carefully reviewed, because the ratio of diagnostic tests to ACTs procured for the public sector should exceed 2 in nearly every malaria-endemic setting.

Figure 6.12 Ratio of RDT and microscopy performed to ACTs distributed, African Region, 2006-2012



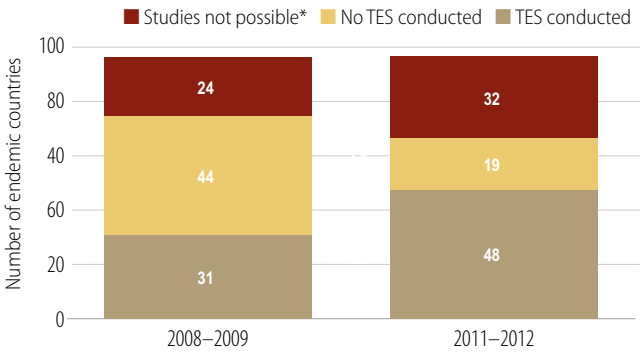
ACT, artemisinin-based combination therapy; RDT, rapid diagnostic test
Source: *National malaria control programme reports*

Figure 6.13 Number of countries allowing marketing of oral artemisinin-based monotherapies by WHO region, 2008–2013



AFR, African Region; AMR, Region of the Americas; EMR, Eastern Mediterranean Region; EUR, European Region; SEAR, South-East Asia Region; WPR, Western Pacific Region
Source: *http://www.who.int/malaria/monotherapy_NDRAs.pdf*

Figure 6.14 Status of therapeutic efficacy monitoring in countries with ongoing malaria transmission, 2008-2012



*TES studies are impractical in countries with low malaria transmission or transmission of *P. vivax* only
TES, therapeutic efficacy study
Source: *WHO Global Malaria Programme database on antimalarial therapeutic efficacy monitoring by country, November, 2013*

6.4 Antimalarial drug resistance

6.4.1 Policy adoption: withdrawal of oral artemisinin-based monotherapy medicines

The use of oral artemisinin-based monotherapies threatens the long-term usefulness of ACTs by fostering the emergence or spread of resistance to artemisinin. To contain this risk and to ensure high cure rates for *P. falciparum* malaria, WHO has long recommended the withdrawal of oral artemisinin-based monotherapies from the market, and their replacement by ACTs, as endorsed all WHO Member States at by the World Health Assembly in 2007.[3] WHO

3. The full text of the World Health Assembly resolution can be found at http://apps.who.int/gb/ebwha/pdf_files/WHA60/A60_R18-en.pdf.

also calls upon manufacturers to cease the marketing of oral artemisinin-based monotherapies.

To track adherence to this recommendation, WHO compiles data on the marketing of oral artemisinin-based monotherapies by manufacturers and on the regulatory action taken by malaria-endemic countries; these data are posted on the Internet.[4] When the World Health Assembly resolution was adopted, 55 countries worldwide, including 30 in Africa, allowed the marketing of oral artemisinin-based monotherapies. As of October, 2013, only nine countries still allowed the marketing of these products (**Figure 6.13**): Angola, Cabo Verde, Equatorial Guinea, Gambia, Sao Tome and Principe, Swaziland (in the African Region); Colombia (in the Region of the Americas); Somalia (in the Eastern Mediterranean Region); and Timor Leste (in the Western Pacific Region). As of May 2013, a total of 30 pharmaceutical companies, most located in India, continued to market oral artemisinin-based monotherapies. Although regulation of pharmaceutical markets in many malaria-endemic countries presents a challenge, steady progress has been made in phasing out oral artemisinin-based monotherapy. Greater collaboration and involvement of national regulatory authorities with NMCPs is required to ensure complete withdrawal of oral artemisinin-based monotherapies from all countries. Beyond the suspension of marketing authorizations for oral artemisinin-based monotherapies, the suspensions of manufacturing and import/export licenses need to be considered.

6.4.2 Drug efficacy monitoring

Status of drug efficacy monitoring

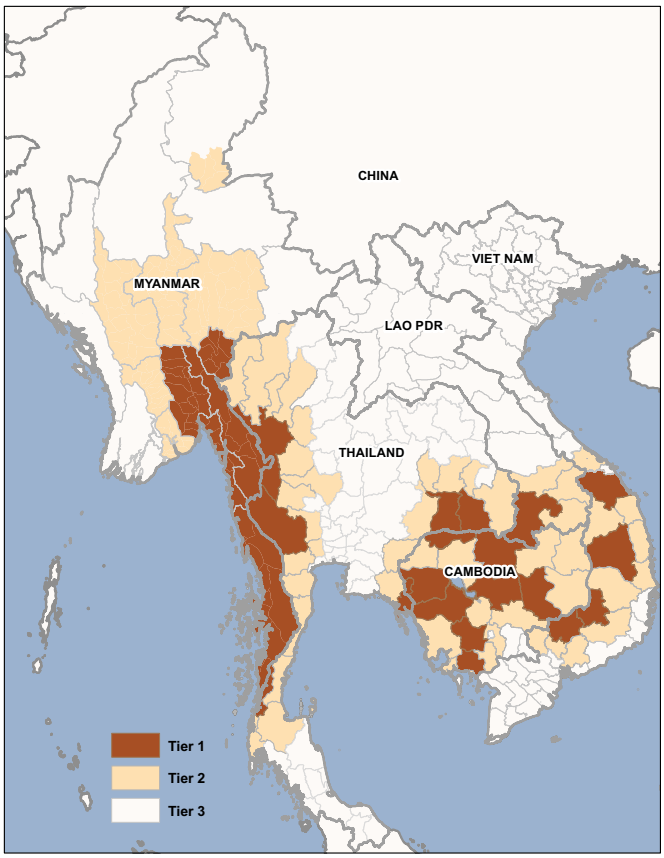
Therapeutic efficacy studies remain the gold standard for guiding drug policy; the standard WHO protocol was updated in 2009 (*11*). In the WHO Global Database on Antimalarial Drug Efficacy, WHO compiles the results of efficacy tests conducted by national programmes and research institutes. The database currently contains over 4000 studies carried out between 1996 and 2012, and forms the basis of the *Global report on antimalarial drug efficacy and drug resistance: 2000–2010* (*12*). Experience with previous antimalarial treatments shows that significant levels of resistance can develop within a short time; therefore, WHO recommends that the efficacy of first- and second-line antimalarial treatments should be monitored at least once every two years.

In 2011–2012, studies of first- or second-line antimalarial treatments were completed in 48 of 67 (72%) countries where *P. falciparum* efficacy studies were possible,[5] an increase from 41% of countries that conducted studies during 2008–2009 (**Figure 6.14**). Importantly, 19 countries did not conduct studies during 2011–2012, and were therefore not in compliance with the WHO recommendation on antimalarial drug efficacy monitoring.

4. Information is available via the following links: Manufacturing companies: http://www.who.int/malaria/monotherapy_manufacturers.pdf; National Regulatory Authorities: http://www.who.int/malaria/monotherapy_NDRAs.pdf

5. In certain countries (32 in 2012), efficacy studies are impractical because of low malaria incidence, or because the countries are endemic for *P. vivax* only.

Figure 6.15 Prioritized areas for artemisinin resistance containment activities, Greater Mekong subregion, 2013



Tier I are areas where there is credible evidence of artemisinin resistance; tier II are areas with significant inflows of people from Tier I areas, including those immediately bordering Tier I; Tier III are areas with no evidence of artemisinin resistance and limited contact with Tier I areas

Source: *Global Malaria Programme, WHO, November, 2013*

Status of *P. falciparum* resistance to artemisinins[6]

Routine monitoring of the therapeutic efficacy of ACTs is essential for timely changes to treatment policy, and it can help to detect early changes in *P. falciparum* sensitivity to artemisinins. WHO currently recommends changing antimalarial treatment policy when the treatment failure rate in a 28 or 42 day follow-up study (depending on the medicine) exceeds 10%. The proportion of patients who are parasitaemic on day 3 of treatment is currently the best widely available indicator used in routine monitoring to measure *P. falciparum* sensitivity to artemisinins. The working definition of suspected resistance to artemisinins is defined as an increase in parasite clearance time, as evidenced by 10% or more cases with parasites detectable on day 3 of treatment with an ACT; confirmed resistance is defined as treatment failure after treatment with an oral artemisinin-based monotherapy (administered under special study conditions) with adequate antimalarial blood concentration, as evidenced by the persistence of parasites for seven days, or the presence of parasites on day 3, and recrudescence within 28 or 42 days (depending on the drug).

6. Status of artemisinin resistance as of January 2014: http://www.who.int/malaria/publications/atoz/update-artemisinin-resistance-jan2014/en/index.html

In recent years, *P. falciparum* resistance to artemisinins has been detected in four countries in the Greater Mekong subregion: Cambodia, Myanmar, Thailand and Viet Nam. Despite these changes in parasite sensitivity to artemisinins, ACTs have generally remained clinically and parasitologically efficacious so long as the partner drug remains efficacious. In Pailin province, Cambodia, resistance to artemisinin and to several partner drugs in commonly used ACTs has been confirmed. Resistance to piperaquine is under investigation after a study in 2010 found 27% treatment failure with dihydroartemisinin-piperaquine. Due to the high failure rate of ACTs in Pailin, a consensus meeting – held in November 2011 in Cambodia – recommended the use of atovaquone-proguanil delivered as directly observed therapy for Pailin province; stringent follow-up of all treated patients was also recommended to detect any emergence of atovoquone resistance. Treatment options for this area continue to be reviewed.

P. falciparum resistance to artemisinins has not been documented outside of the Greater Mekong subregion. In South America, therapeutic efficacy studies conducted in a few countries during 2012–2013 reported an increased proportion of day-3 positive patients after treatment with AL. Review of the data from these studies by the Drug Resistance and Containment Technical Expert Group (DRC-TEG) of the Malaria Policy Advisory Committee (MPAC) concluded that there was no definitive evidence of artemisinin resistance. The DRC-TEG recommended that detailed confirmatory studies be conducted in Suriname, Guyana and neighbouring countries, and that malaria control measures be strengthened in these countries. To date, there have been no reports of delayed parasite clearance during routine therapeutic efficacy studies conducted in Africa.

Chloroquine resistance in *P. vivax* malaria

Chloroquine remains the currently recommended drug for the treatment of *P. vivax* in areas where the drug is still effective. Treatment failure on or before day 28, or prophylactic failures (or both) have been observed in 23 countries: Afghanistan, Bolivia, Brazil, Cambodia, China, Colombia, Guyana, Ethiopia, India, Indonesia, Madagascar, Malaysia (Borneo), Myanmar, Pakistan, Papua New Guinea, Peru, the Republic of Korea, Solomon Islands, Thailand, Turkey, Sri Lanka, Vanuatu and Viet Nam. However, confirmation of true chloroquine resistance requires additional drug concentration studies; hence, it is not entirely clear to what extent chloroquine-resistant *P. vivax* has spread. Among the countries with *P. vivax* treatment or prophylactic failure listed above, at least one case of chloroquine-resistant vivax malaria has been confirmed in 10 countries: Bolivia, Brazil, Ethiopia, Indonesia, Malaysia (Borneo), Myanmar, Solomon Islands, Thailand, Papua New Guinea and Peru. ACTs are now recommended for the treatment of chloroquine-resistant *P. vivax*, particularly where ACTs have been adopted as the first-line treatment for *P. falciparum*.

Containment of artemisinin resistance

In follow-up to the *Global Plan for Artemisinin Resistance Containment* (GPARC) (*13*), which was launched in 2012, WHO released the *Emergency response to artemisinin resistance in the Greater Mekong subregion: A regional framework for action 2013–2015* (ERAR) in 2013 (*14*). The emergency plan provides further guidance for field implementation of the containment efforts outlined in the GPARC. The framework identifies four priority areas where action is needed in the coming years to contain artemisinin resistance and move towards elimination of malaria: reaching all risk groups with full coverage of quality interventions in priority areas; achieving tighter coordination and management of field operations; obtaining better information for artemisinin resistance containment; and strengthening regional oversight and support.

As described in the GPARC, the ERAR defines geographic priority areas for implementation of containment efforts. Tier I are areas where there is credible evidence of artemisinin resistance for which intensified and accelerated malaria control towards universal coverage is recommended; Tier II are areas with significant inflows of people from Tier I areas, including those immediately bordering Tier I, where intensified and accelerated control is recommended; Tier III are areas with no evidence of artemisinin resistance and limited contact with Tier I areas for which good malaria control is emphasized. The boundaries of these geographical priority areas have recently been updated (**Figure 6.15**), and they will be periodically reviewed and updated by the DRC-TEG and the MPAC in consultation with countries affected, as efficacy study results become available.

6.5 Conclusions

Implementation of parasitological testing

There have been significant increases in the availability and use of parasitological testing in recent years, particularly in the African Region, where the proportion of reported suspected cases receiving a parasitological test in the public sector increased substantially from 37% in 2010 to 61% in 2012. Most of the increase is attributable to an increase in the use of RDTs, although reported microscopy increased substantially in the African region as well. The limited information available indicates that testing in the private sector is less than the public sector, and overall testing rates are well below the target of testing all suspected malaria cases. Further funding and technical support are required to help countries to achieve universal diagnostic testing of suspected malaria in the public and private sector, and in the community. Promotion of malaria diagnostic testing needs to begin during planning, budgeting and procurement. Considering that in most malaria-endemic areas, malaria diagnosis will be confirmed in less than half of patients tested, programmes should aim to obtain at least as many diagnostic tests as ACT treatment courses until such time as surveillance and test consumption data allow for more precise procurement estimation.

Access to treatment

Information from manufacturers and from country programmes indicates that the number of ACTs procured has increased dramatically since 2005. It is difficult to track the extent to which patients with confirmed malaria either (by RDT or microscopy) receive antimalarial medicines, because diagnostic test results are not usually linked to the treatment given to patients, in either household surveys or routine information systems. A limited number of recent household surveys suggest that febrile patients

attending public health facilities who are treated for malaria are more likely to receive an ACT than those attending private facilities; in countries surveyed most recently, the proportion has increased in both public and private sectors. Using RDT result as a proxy for confirmed malaria, the proportion of patients with confirmed malaria who receive treatment with ACT is low. This is due to a substantial proportion of patients who do not seek care as well as under-treatment at facilities. At the same time, given low rates of testing among patients treated for malaria, a substantial proportion of those who do receive ACTs probably do not have malaria. Consequently, both undertreatment and overtreatment with ACT continues. The development of routine systems that track febrile patients, diagnostic testing, test results, and treatments administered would enable better tracking of antimalarial use. Given that routine system development may take time, national programmes may consider other sources of testing and treatment information, such as health facility-based surveys.

Combating drug resistance

The recent spread of resistance to antimalarial drugs has led to an intensification of efforts to prohibit the marketing of oral artemisinin-based monotherapies and to expand antimalarial drug efficacy monitoring. In 2012, eight countries withdrew marketing authorization of oral artemisinin-based monotherapies, and by October 2013, another seven countries had taken regulatory steps to remove these products from their markets. In contrast, a total of nine countries still allow oral artemisinin-based monotherapies; six of the countries are in the Africa Region and one each from the American, Eastern Mediterranean, and South-East Asian Regions. The number of countries conducting therapeutic efficacy studies for antimalarial drugs has increased, particularly in the African Region, where the reliance on ACTs is high. Despite the observed changes in parasite sensitivity to artemisinins, ACTs remain efficacious in curing patients, provided that the partner drug is still efficacious. The ERAR was released in 2013 to guide countries in the region in implementing containment efforts.

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CHAPTER 7

Malaria surveillance, monitoring and evaluation

This chapter examines the extent to which data are available for reporting on key WHO and Roll Back Malaria (RBM) indicators from: (i) routine information systems, and (ii) household surveys.

7.1 Introduction

WHO, together with other RBM partners, recommends that a core set of indicators be used for malaria surveillance, monitoring and evaluation (see Chapter 2, Table 2.2) (*1*). The *World Malaria Report* aims to report annually on relevant indicators,[1] for all countries with ongoing malaria transmission. The key indicators are derived from two main data sources: routine health information systems and household surveys. This chapter reviews global trends on availability of these indicators.

7.2 Indicators derived from routine information systems

Of the 15 key indicators in Table 2.2 (Chapter 2), 7 can be derived from routine information systems:

- *the proportion of suspected cases receiving a parasitological test and the proportion of confirmed cases that receive first-line antimalarial according to national policy* are discussed in Chapter 6;
- *the proportion of the population protected by indoor residual spraying (IRS)* is summarized in Chapter 4;
- *the number of new countries in which malaria has been eliminated* is reported in Chapter 8;
- *the percentage of districts reporting monthly numbers of suspected malaria cases, number of cases receiving a diagnostic test and number of confirmed malaria cases* is not currently available at global level, but some insight can be obtained from reported data on confirmed cases; and
- *confirmed malaria cases per 1000 persons per year (malaria case incidence) and inpatient malaria deaths per 100 000 persons per year* (malaria mortality rate) are the focus of this section.

The ability of routine information systems to provide reliable information on malaria case incidence and mortality rate is influenced by several factors: (i) the extent to which malaria patients seek treatment; (ii) whether or not patients use and die in health facilities covered by a country's surveillance system; (iii) the proportion of patients who receive a reliable diagnostic test; and (iv) the completeness of recording and reporting (see Chapter 7 of the *World malaria report 2012* (*2*).

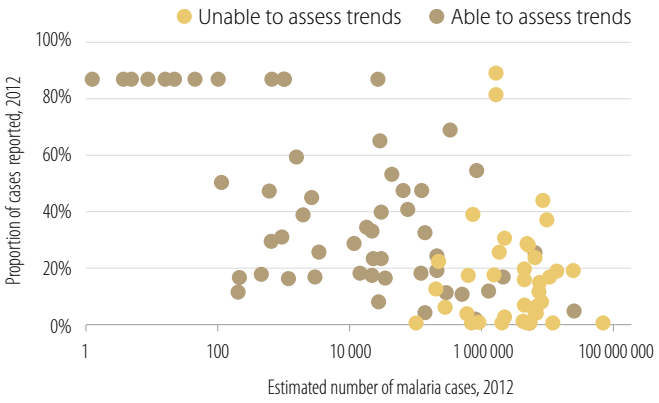
1. Some indicators are only relevant for certain geographical regions or programme phases.

7.2.1 Malaria case incidence

In 2012, WHO estimated that there were 207 million malaria cases worldwide (Chapter 8, Section 8.3), and received reports of 30 million confirmed cases from endemic countries, representing a case detection rate of 14% globally (an increase from 3% in 2000 and 11% in 2010). Much of the increase in the case detection rate is due to increased diagnostic testing in the WHO African Region, through the use of rapid diagnostic tests (RDTs) (see Chapter 6, Section 6.2). Case detection rates are lower in countries with higher estimated numbers of cases (**Figure 7.1**); therefore, by this criterion, surveillance systems are weakest where the malaria burden is highest.

Surveillance systems do not need to detect all cases in order to assess trends in malaria incidence; however, case detection efforts do need to be reasonably uniform over time. Every year, WHO assesses whether or not case reporting is sufficiently consistent from year to year to make it possible to draw conclusions about trends in disease incidence. This involves examining the number of diagnostic tests carried out, and the proportion of monthly health-facility reports received; monitoring trends in total patient attendances and proportionate morbidity (e.g. test positivity rate and percentage of admissions due to malaria); and examining the consistency of trends between different malaria indicators (cases, admissions and deaths). In 2012, in 62 countries of 103 that had been endemic for malaria in 2000, reporting was considered to be sufficiently consistent to make a reliable judgement about malaria trends for 2000–2012 (Chapter 8; Table 8.1). Although these countries comprise the majority of malaria-endemic countries, they account for just 15% of the estimated total number of cases worldwide. In the remaining 41 countries, in which most malaria cases (85%) are present, it is not possible

Figure 7.1 Proportion of malaria cases captured by surveillance systems, in relation to total estimated number of cases, 2012, and whether trends over time can be assessed



Source: *National malaria control programme data, WHO estimates*

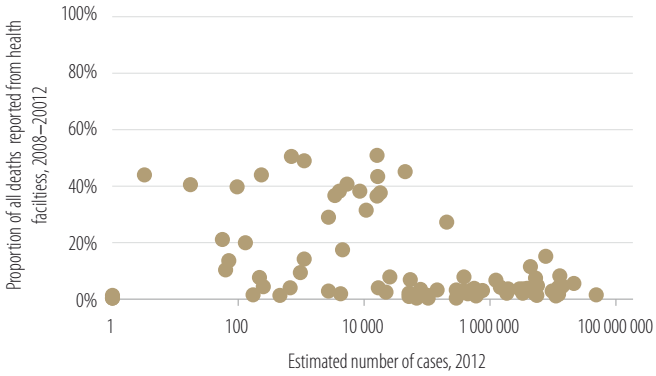
to assess malaria trends from reported data on case incidence submitted to WHO, because of incompleteness or inconsistency of reporting over time. Thus, measured by this criterion, information systems are weakest, and the challenges for strengthening systems are greatest, where the malaria burden is greatest.

7.2.2 Malaria mortality rates

It is not possible to examine the proportion of malaria deaths that are reported in relation to total estimated malaria deaths, because not all malaria deaths are confirmed by a parasitological test. However, it is possible to examine the total number of deaths reported from all causes, and compare this to the number of all deaths expected to occur in a country, as derived from life tables (*3*). Such a comparison can give some insight into the extent of underreporting of malaria deaths.

In 2012, only 45 malaria-endemic countries reported on health-facility deaths from all causes as part of reporting for the *World Malaria Report 2013*. The countries that reported were mostly from highly endemic areas of Africa. Less highly endemic countries, particularly those outside Africa, were less likley to report on deaths from all causes. However, some data on the proportion of deaths registered in these countries are available from other sources (*4*). These data are correlated with the proportion of deaths reported for the *World malaria report 2013*. Hence, this source was used to infer the proportion of deaths occurring in health facilties for a further 21 countries. It is clear that a lower proportion of health-facilty deaths are reported in countries with the highest number of malaria deaths (**Figure 7.2**); again information systems are weakest, and the challenges for strengthening systems are greatest, where the malaria burden is greatest.

Figure 7.2 Proportion of all deaths captured from health-facility reports in relation to total estimated number of cases, 2012



Source: *National malaria control programme data, Vital registration database, WHO estimates*

7.3 Indicators derived from household surveys

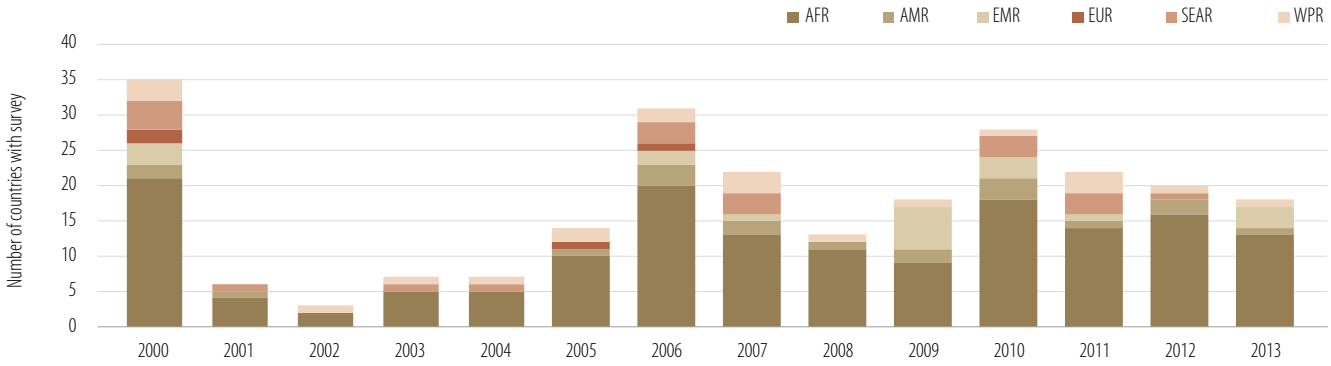
Household surveys can provide information on the following:

- coverage of preventive interventions – insecticide-treated mosquito nets (ITNs), IRS and intermittent preventive treatment in pregnancy (IPTp) – the coverage of IRS programmes is usually monitored through routinely collected data, rather than through a household survey, but a household survey can help to clarify the degree of overlap in the coverage of IRS and ITN programmes;
- where patients sought care for fever, whether or not they received a diagnostic test, the types of medicines taken and what proportion of antimalarial treatments were artemisinin-based combination therapies (ACTs) or other first-line treatments; and
- two indicators of health status: parasite prevalence and under-five mortality rate.

Household surveys are generally not appropriate for countries that are in the pre-elimination or elimination phase, in which malaria is highly focal; in such countries, malaria is best monitored through intensive surveillance. Moreover, not all indicators are relevant to all settings, owing to variation in the epidemiology of malaria and range of interventions implemented:

- If IRS is the sole means of vector control, then there may be little advantage to including vector control questions in a household survey, since IRS coverage may be better measured by routine information systems.
- Questions on IPTp are only relevant in sub-Saharan Africa and in Papua New Guinea (see Chapter 5, Section 5.2).
- Questions on diagnostic testing and treatment are relevant in all settings, but may not be appropriate to include in a survey if the incidence of malaria is low, and the sample sizes required to obtain information on the rate of diagnostic testing and medicines taken would be too high. If the incidence of malaria in a population is 100 cases per 1000 persons at risk each year, then a sample of 5000 individuals will yield only 19 individuals with malaria over a 2-week period (the usual recall period for examining the treatment-seeking behaviour of fever cases), assuming that malaria occurs evenly over a year. For some countries with low incidence rates nationally, it may still be useful to conduct surveys subnationally. It may also be of interest to examine the extent of diagnostic testing for fever, even if the number of malaria cases is low. In some settings in which the number of cases expected to receive a diagnostic test in a sample is too low, it may still be appropriate to include questions on where patients seek treatment for fever, in order to better understand case detection rates of surveillance systems (see Section 7.1). The estimated incidence of malaria nationally exceeds 100 cases per 1000 population per year in 39 countries in sub-Saharan Africa, and has done so for at least five years between 2000 and 2012 in nine countries outside sub-Saharan Africa (Afghanistan, Bangladesh, Cambodia, Guyana, Papua New Guinea, Solomon Islands, Suriname, Timor-Leste and Vanuatu).
- When parasite prevalence is low, then the sample sizes required to measure parasite prevalence with precision may also prove prohibitive.
- It is only appropriate to measure all-cause under-five mortality rates as an indicator of the success of malaria control in situations where malaria accounts for a substantial proportion of deaths in children under 5 years of age. Malaria accounts for more than 10% of all under-five deaths in 33 countries in sub-Saharan Africa, and (in at least some years since 2000) has accounted for more than 10% of deaths in three countries outside Africa (Papua New Guinea, Solomon Islands and Timor-Leste).

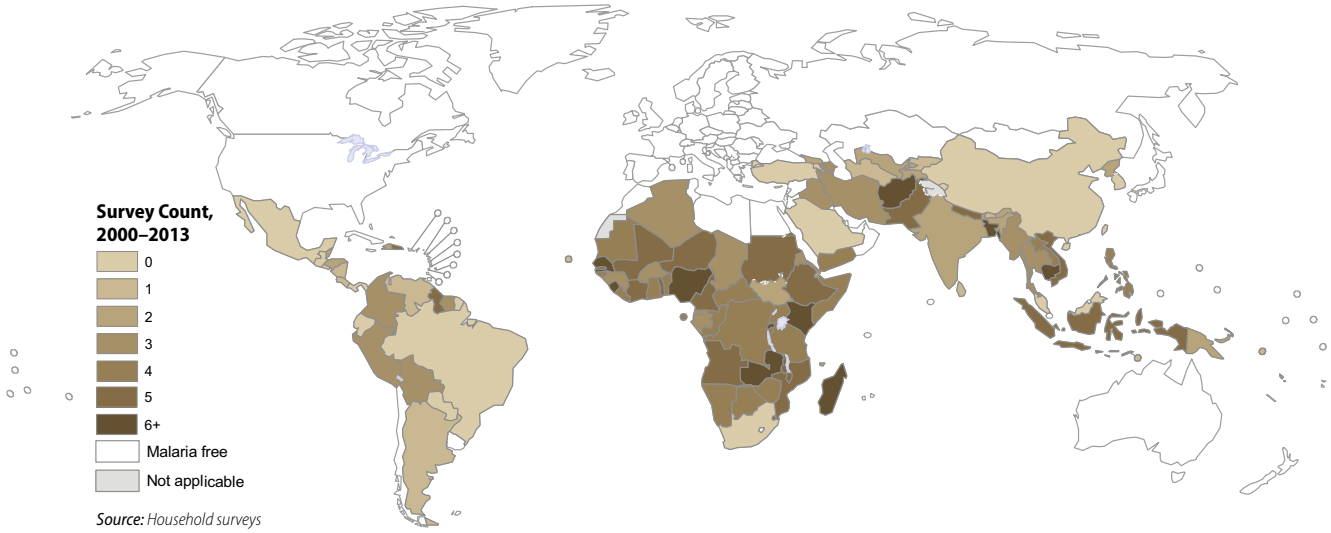
Figure 7.3 Number of countries with household surveys measuring at least one malaria-specific indicator, 2000–2012



AFR, African Region; AMR, Region of the Americas; EMR, Eastern Mediterranean Region; EUR, European Region; SEAR, South-East Asia Region; WPR, Western Pacific Region0

Source: *Household surveys*

Figure 7.4 Number of household surveys conducted, 2000–2013



Source: *Household surveys*

Given the diversity of malaria epidemiology across the world, and the range of interventions adopted by national malaria control programmes (NMCPs), not all countries with ongoing transmission would be expected to conduct household surveys or measure all recommended indicators. The remainder of this chapter summarizes the availability of data on different indicators from nationally representative household surveys. It does not consider surveys whose sampling scheme is not representative of all malaria-endemic areas within a country, or surveys that employ non-random sampling schemes that prevent results from being generalized nationally.[2]

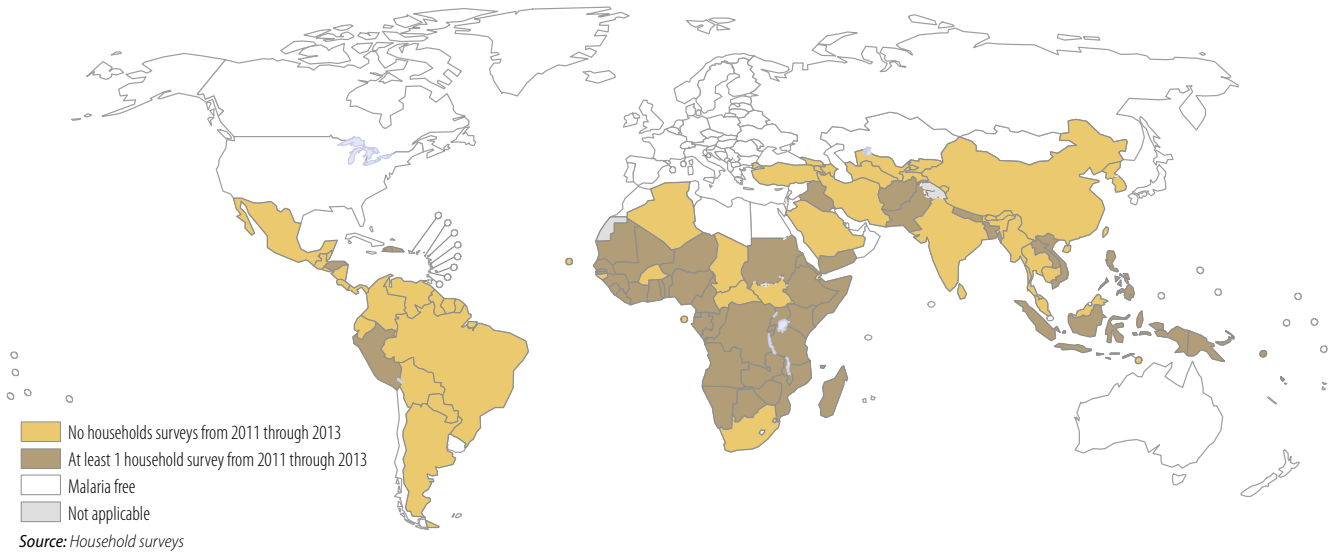
The number of countries with household surveys that enable at least one malaria-specific indicator to be calculated (i.e. not counting under-five mortality rates) has fluctuated between 2000 and 2013, with peaks in 2000, 2006, and 2010 (**Figure 7.3**). In total, 50 countries had at least one survey between 2011 and 2013, of which 34 were in the African Region (**Figure 7.4**). The most common type of survey has been the multiple indicator cluster survey (MICS) (115), followed by demographic and health surveys (DHS) (99) and malaria indicator surveys (MIS) (40). Both DHS and MICS aim to measure a range of maternal and child-health indicators, whereas MIS focus only on malaria-related indicators.

Between 2010 and 2013, an average of 21 nationally representative household surveys were conducted per year, of which an average of 15 were conducted annually in the African Region. Fifty countries had at least one household survey over the 3-year period 2011–2013, of which 34 were in the African Region (about 79% of all countries with ongoing transmission in 2013) (**Figure 7.5**).

The key indicators most commonly measured were those on the availability and use of ITNs and IPTp (**Table 7.1**). Surveys that include questions on the proportion of fever cases receiving a finger stick or heel prick have become more common since 2009, when it was first recommended as a standard malaria indicator (*1*). However, it was still included in only 25% of surveys conducted between 2011 and 2013, compared to the proportion that enquired about malaria treatment (90%). There has been a pronounced increase in the number of surveys that measure parasite prevalence since 2005, with 81% of all surveys conducted between 2011 and 2013 including measure-

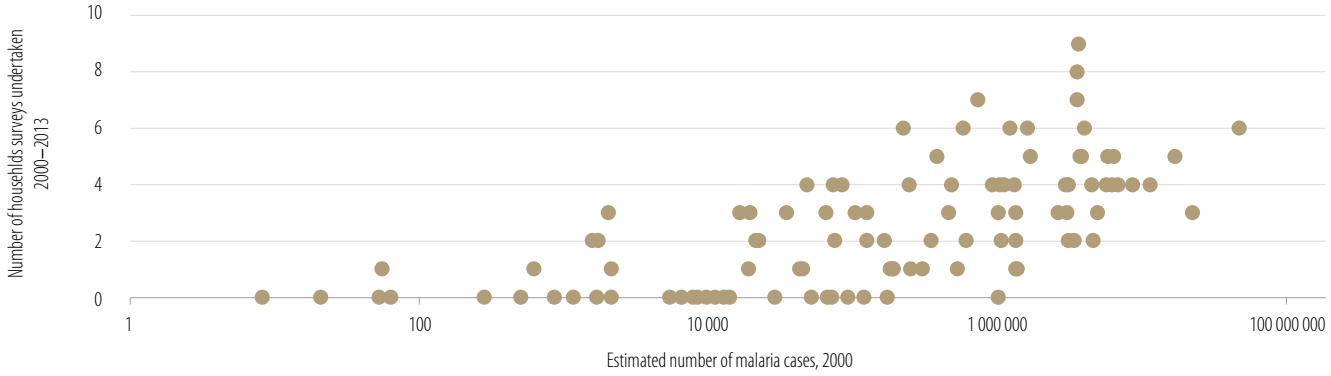
2. If malaria is restricted to geographically limited areas within a country, and a survey is representative of these areas, then the survey can be considered to be nationally representative.

Figure 7.5 Countries with at least one household survey over the 3-year period 2011–2013



Source: *Household surveys*

Figure 7.6 Number of household surveys between 2000-2013 by number of cases estimated to occur in a country in 2000



Source: *Household surveys, WHO estimates*

ment of parasite prevalence. The under-five mortality rate was commonly measured, being included in all DHS and MICS (but generally excluded from MIS, for which sample sizes are insufficient to measure with precision).

In contrast to routinely reported data, household surveys are more commonly undertaken in countries with the highest number of malaria cases (**Figure 7.6**), possibly because of the poor quality of routine data available.

7.4 Conclusions

Routine health information systems detected only 14% of cases estimated to occur globally in 2012. Case detection rates were lowest in countries with the highest numbers of malaria cases. The proportion of deaths that are reported is also lowest in countries with the greatest number of malaria deaths. Surveillance systems do not need to detect all cases in order to reliably assess trends; however, case detection efforts do need to be reasonably uniform over time. Countries with fewer estimated cases of malaria appear to be most able to assess trends in incidence. In the 41 countries that account for 85% of estimated cases, it is not possible to reliably assess malaria trends using the data submitted to WHO. Thus, information systems are weakest where the malaria burden is greatest.

In contrast to routinely reported data, household surveys are more commonly undertaken in countries with the highest number of malaria cases. Fifty countries, of which 34 were in the African Region, had at least one household survey over the 3-year period 2011–2013. Indicators most commonly measured were those on the availability of ITNs. Only 25% of surveys included questions on fever cases receiving a finger prick or heel stick, whereas 90% enquired about malaria treatment – a finding that will need to change if progress towards universal diagnostic testing is to be tracked. The number of surveys that measure parasite prevalence has increased since 2005, rising to 81% of surveys conducted between 2011-2013.. The all-cause under-five mortality rate is the most commonly measured indicator across surveys.

Nationally representative household surveys are not generally appropriate for countries that are in the pre-elimination or elimination phase, in which malaria is highly focal and is best monitored through intensive surveillance. In countries with a low incidence of malaria the large sample sizes required may prohibit the measurement of some malaria indicators (e.g.

Table 7.1 Proportion of surveys in which key indicators were measured

For calculation of proportions the denominator for malaria specific indicators is the number of surveys with malaria specific questions. For all-cause under-five mortality rate the denominator is total surveys undertaken.

	2000–2013		2011–2013	
	Number	Proportion	Number	Proportion
Proportion of population with access to an ITN within their household	209	83%	61	97%
Proportion of population who slept under an ITN the previous night	188	75%	60	95%
Proportion of households with at least one ITN for every two people and/or sprayed by IRS within the past 12 months	58	23%	26	41%
Proportion of women who received three or more doses of IPTp during ANC visits during their last pregnancy	194	77%	54	86%
Proportion of children under 5 years old with fever in the past two weeks who had a finger prick or heel stick	42	17%	16	25%
Proportion receiving first line treatment among children under 5 years of age with fever in the past two weeks who received any antimalarial drugs	209	83%	57	90%
Parasite prevalence: proportion of children aged 6–59 months with malaria infection	51	16%	33	41%
Surveys with malaria specifc questions	**252**		**63**	
All-cause under-five mortality rate (5q0)	288	89%	77	95%
Total surveys	**323**		**81**	

ACT, artemisinin-based combination therapy, ANC, antenatal clinic; IRS, indoor residual spraying; IPTp, intermittent preventative treatment in pregnancy; ITN insecticide-treated net

Source: *Household surveys*

antimalarial medicines received and parasite prevalence,) with precision. Nevertheless, household surveys can aid the interpretation of data from routine information systems (e.g. they can provide information on what proportion of fever cases do not use public health facilities).

Although household surveys are of widespread utility, on their own they do not supply sufficient information for global, national or subnational monitoring of malaria programmes. Programme managers need data on a monthly basis (or more frequently), to determine whether control programmes are progressing as intended or whether programme adjustment is necessary. Moreover, as malaria incidence decreases and becomes more focal, data need to be disaggregated at a finer level to understand where problems remain and where programmes need to be intensified, so general sampling of populations becomes less useful. Thus, surveillance, monitoring and evaluation of malaria requires a combination of household surveys and routine information systems. Household survey data can help in validating and interpreting data from routine information systems, and routine systems can fill in data gaps for years and geographical areas in which surveys are not conducted.

References

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CHAPTER 8

Changes in malaria incidence and mortality

This chapter (i) reviews trends in reported malaria cases for 62 countries that have reported consistently between 2000 and 2012; (ii) summarizes progress towards elimination for countries with low numbers of cases; and (iii) presents estimated numbers of cases and deaths globally and regionally from 2000 to 2012, and the numbers of cases and deaths averted between 2001 and 2012.

8.1 Introduction

The *reported* number of confirmed malaria cases can be used as a core indicator for tracking progress towards the World Health Assembly and the Roll Back Malaria (RBM) Partnership targets for 2015 (which are to reduce malaria cases by 75% from 2000 levels), and the Millennium Development Goal (MDG) target of reversing the incidence of malaria. For many high-burden countries in the WHO African Region, where case confirmation remains variable and often inadequate, it is not possible to assess trends in confirmed cases. Therefore, attempts are made to evaluate trends in the reported numbers of malaria admissions (inpatient cases) and deaths. Although the diagnosis of admitted patients is not always confirmed with a diagnostic test, the predictive value of an unconfirmed diagnosis for an admitted patient is considered to be higher than for an outpatient, because signs of severe malaria are more specific than those for uncomplicated malaria.

A description of the strategy used to analyse trends, and a summary of results for individual countries, is provided in the **Country Profiles**, Section C.1.7. In brief, the strategy aims to exclude data-related factors (e.g. incomplete reporting or changes in diagnostic practice) as explanations for a change in the reported incidence of disease. If changes in diagnostic testing or reporting are large, then it may be concluded that it is not possible to draw inferences about trends in malaria. Of the 103 countries that had ongoing malaria transmission in 2000, 62 were judged to have submitted data that are sufficiently complete and consistent to reliably assess trends in between 2000 and 2012.

Even if trends in health-facility data appear to be real, rather than an artefact of data reporting, they may not reflect changes in the entire community. The conclusion that trends inferred from health-facility data reflect changes in the community has more weight if: (i) the changes in disease incidence are large; (ii) access to public health services is high; and (iii) interventions that promote a reduction in cases, such as use of insecticide-treated mosquito nets (ITNs), are delivered throughout the community rather than being restricted to some population groups, especially those with better access to health facilities.

In considering progress towards international targets, it is preferable to examine changes in malaria case incidence rather than absolute numbers, in order to take into account the expected rise in the number of cases due to population growth over a long period. For example, a 75% reduction in malaria case incidence is equivalent to a 5 percentage point reduction against the baseline per year between 2000 and 2015. Thus, to be on track to achieve the targets, countries need to have reduced the incidence of malaria by at least 60% between 2000 and 2012. Countries that reduced malaria incidence rates by 40%–60% between 2000 and 2012 are projected to achieve reductions in malaria case incidence of 50%–75% in 2015. A summary of progress by WHO region is provided in **Table 8.1**, **Figure 8.1**, in the **Regional profiles** and the following text.

In the **African Region**, of 43 countries with ongoing malaria transmission, eight countries (Botswana, Cabo Verde, Eritrea, Namibia, Rwanda, Sao Tome and Principe, South Africa and Swaziland) and the island of Zanzibar (United Republic of Tanzania) are on track to achieve reductions in reported malaria case incidence or malaria admission rates of 75% or more. A further two countries (Ethiopia and Zambia) are projected to achieve reductions in malaria admission rates of 50%–75% by 2015, and one country (Madagascar) by <50%. An increase in locally acquired cases, from 35 in 2000 to 59 in 2012, was reported from Algeria. An assessment of trends was not possible in the remaining 32 countries in the subregion, owing to changes in health-service access, diagnostic testing or reporting over time. A limited number of research studies suggest that progress in reducing malaria case incidence may be more widespread, but the small scale and lack of representativeness of these studies do not permit an extrapolation of results to a national or wider geographical scale.

In the **Region of the Americas**, reductions in incidence of >75% in microscopically confirmed malaria cases were reported in 13 out of 21 countries with ongoing transmission between 2000 and 2012 (Argentina, Belize, Plurinational State of Bolivia, Costa Rica, Ecuador, El Salvador, French Guiana (France), Guatemala, Honduras, Mexico, Nicaragua, Paraguay and Suriname); a further three countries are projected to achieve reductions of >75% by 2015 (Brazil, Colombia and Peru). Two countries (the Dominican Republic and Panama) are projected to achieve reductions of 25%–50% by 2015. Increases in numbers of cases between 2000 and 2012 were reported by two countries (Guyana and the Bolivarian Republic of Venezuela). In Haiti, the number of reported malaria cases increased, but it is unclear whether the rise is real, or is simply due to changes in the extent of diagnostic testing and reporting.

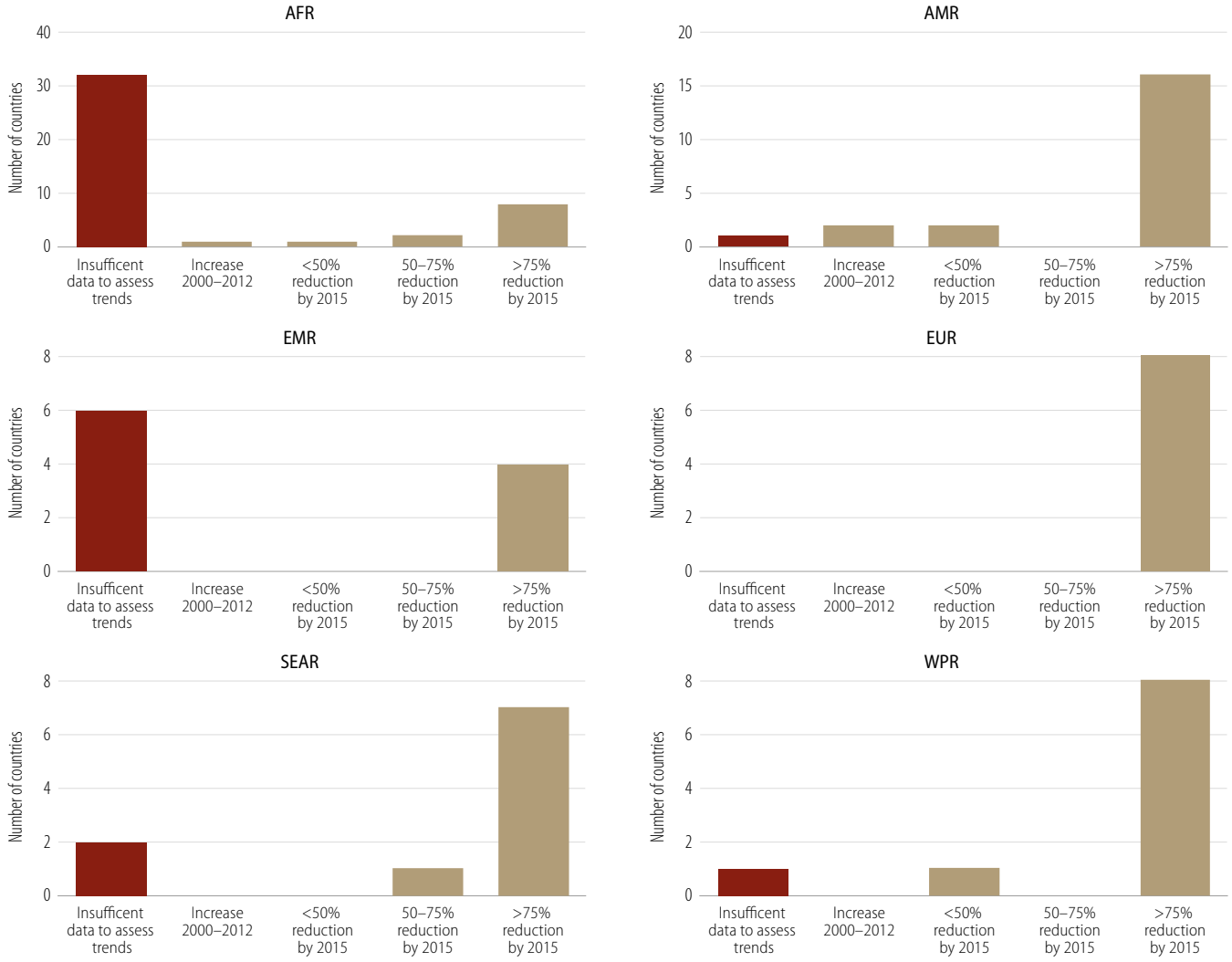
In the **Eastern Mediterranean Region**, 3 of the 10 countries with ongoing transmission in 2000 (Islamic Republic of Iran, Iraq and Saudi Arabia) attained a decrease of more than 75% in case inci-

Table 8.1 Summary of trends in reported malaria incidence 2000–2012

WHO Region	On track for ≥75% decrease in incidence 2000–2015		50%–75% decrease in incidence projected 2000–2015	<50% decrease in incidence projected 2000–2015	Increase in incidence 2000–2012[2]	Insufficiently consistent data to assess trends	
African	**Botswana** **Cabo Verde** **Eritrea** **Namibia** **Rwanda** **Sao Tome and Principe** **South Africa** **Swaziland**		Ethiopia Zambia	Madagascar	Algeria	Angola Benin Burkina Faso*+ Burundi+ Cameroon Central African Republic Chad Comoros Congo Côte d'Ivoire Democratic Republic of the Congo Equatorial Guinea* Gabon Gambia Ghana	Guinea Guinea-Bissau Kenya* Liberia+ Malawi Mali Mauritania Mayotte, France Mozambique Niger Nigeria Senegal Sierra Leone+ Togo*+ Uganda*+ United Republic of Tanzania* Zimbabwe+
Region of the Americas	**Argentina** **Belize** **Bolivia (Plurinational State of)** **Costa Rica** **Ecuador** **El Salvador** **French Guiana, France**	**Guatemala** **Honduras** **Mexico** **Nicaragua** **Paraguay** **Suriname** Brazil Colombia Peru		Dominican Republic Panama	Guyana Venezuela (Bolivarian Republic of)	Haiti	
Eastern Mediterranean	**Iran (Islamic Republic of)** **Iraq**	**Saudi Arabia** Afghanistan				Djibouti Pakistan* Somalia	South Sudan Sudan* Yemen*
European	**Armenia** **Azerbaijan** **Georgia** **Kyrgyzstan**	**Tajikistan** **Turkey** **Turkmenistan** **Uzbekistan**					
South-East Asia	**Bangladesh** **Bhutan** **Democratic People's Republic of Korea**	**Nepal** **Sri Lanka** Thailand Democratic Republic of Timor-Leste	India			Indonesia Myanmar+	
Western Pacific	**Cambodia** **China** **Malaysia** **Philippines** **Republic of Korea**	**Solomon Islands** **Vanuatu** **Viet Nam** Lao People's Democratic Republic		Papua New Guinea			

Source: National Malaria Control Programme reports
Countries in prevention of reintroduction phase are not included in this table
Countries in bold achieved ≥75% decrease in case incidence by 2012
* Progress in reducing cases has been reported sub-nationally where interventions have been intensified.
+ Country has recently expanded diagnostic testing, so assessment of trends is difficult.

Figure 8.1 Decreases in reported malaria case incidence rates, 2000–2012, by WHO region



AFR, African Region; AMR, Region of the Americas; EMR, Eastern Mediterranean Region; EUR, European Region; SEAR, South-East Asia Region; WPR, Western Pacific Region
Source: *National Malaria Control Programme Data*

dence rates in 2012 compared to 2000. No locally acquired cases have been reported in Iraq since 2009. Afghanistan is projected to achieve a reduction of >75% in case incidence by 2015. The number of confirmed cases has fluctuated from year to year in the other 6 countries (Djibouti, Pakistan, Somalia, South Sudan[1], Sudan and Yemen), and it is not possible to determine whether malaria case incidence is increasing, decreasing or constant.

In the **European Region**, all of the eight countries with ongoing transmission of malaria in 2000 achieved reductions in case incidence of more than 75% between 2000 and 2012. Only 255 locally acquired cases were reported in 2012, all due to *Plasmodium vivax*; of these 255 cases, 218 were in Turkey, 13 in Tajikistan, 3 in Azerbaijan and there was 1 introduced case in Georgia. Another 20 cases were reported from Greece after importation of parasites in 2010. Three locally acquired *P. vivax* cases were also detected in 2013. Despite this setback, the European Region appears to be on track to achieve elimination of malaria by 2015 as planned, provided that countries address the remaining challenges and prevent the reintroduction of malaria transmission.

In the **South-East Asia Region**, of the 10 countries with ongoing transmission, five (Bangladesh, Bhutan, the Democratic People's Republic of Korea, Nepal and Sri Lanka) registered decreases in the incidence of confirmed malaria cases of 75% or more between 2000 and 2012, and two (Thailand and Timor-Leste) are projected to decrease malaria case incidence by more than 75% by 2015. India is projected to reduce case incidence by 50%–75% by 2015. In the two remaining countries (Indonesia and Myanmar), incidence trends are obscured by changes in diagnostic or reporting practices.

In the **Western Pacific Region**, decreases of more than 75% in the incidence of microscopically confirmed malaria cases between 2000 and 2012 were reported in 8 of the 10 endemic countries (Cambodia, China, Malaysia, the Philippines, the Republic of Korea, Solomon Islands, Vanuatu and Viet Nam). The Lao People's Democratic Republic is projected to achieve a decrease of >75% by 2015, although it saw a twofold increase in malaria cases in 2012, primarily due to increased incidence in six southern provinces, which was associated with population movement related to economic development. Papua New Guinea reported an increase

1. In May 2013 South Sudan was reassigned to the Who African Region (WHA resolution 66.21 http://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R21-en.pdf). Nonetheless, since most data in this report precede 2013, South Sudan is placed in Eastern Mediterranean Region.

in confirmed cases in 2012 owing to wide extension of diagnostic testing to health facilities that had not previously undertaken testing; otherwise, Papua New Guinea would be on track to achieve a reduction in case incidence of more than 25% since 2000.

Based on an assessment of trends in reported malaria cases, a total 59 countries are meeting the MDG target (6.2c) of reversing the incidence of malaria. Of these 59 countries, 52 are on track to meet RBM and World Health Assembly targets of reducing malaria case incidence rates by 75% by 2015. The 52 countries accounted for only 8 million (4%) of the total estimated cases of 226 million in 2000. Only three countries with more than 1 million estimated cases in 2000 (Afghanistan, Bangladesh and Brazil) are projected to achieve a reduction in malaria case incidence of 75% or more. This is partly because progress has been faster in countries with lower numbers of cases, but it is also influenced by the poorer quality of surveillance data submitted by countries with larger estimated numbers of cases. Countries with higher numbers of cases are less likely to submit sufficiently consistent data for assessing trends (Section 7.2); therefore, it is necessary to draw inferences about trends in these countries using estimated numbers of cases rather than surveillance data (Section 8.2).

8.2 Progress towards elimination

The criteria used to classify countries according to programme phase were updated in 2012, in order to facilitate tracking of progress over time (*1*). The updated criteria are based on an evaluation of three main components: the malaria epidemiological situation, case management practices, and the state of the surveillance system see **Country Profiles**, Table C.1.). The evaluation concentrates on the situation in districts of the country reporting the highest incidence of malaria. **Table 8.2** shows the current classification of endemic countries by programme phase, and the movement between phases over 2012–2013. Altogether, 19 countries were in the pre-elimination and elimination phases in 2013. Their progress is summarized below.

In the **African Region**, Cabo Verde is in the pre-elimination phase, and continues to progress towards eliminating malaria. It reported a total of 36 confirmed malaria cases in 2012, of which only 1 was locally acquired (compared with 18 indigenous cases in 2011). Algeria, which is in the elimination phase, reported only four locally acquired cases in 2011 but saw 55 indigenous cases and three introduced cases in 2012. The number of imported cases also rose, from 187 in 2011 to 829 in 2012, possibly associated with population movements from sub-Saharan Africa. Both Algeria and Cabo Verde implement active case detection (ACD), case investigation and a quality assurance (QA) system for diagnostic testing guided by a national reference laboratory; they also provide treatment with primaquine for radical cure of *P. vivax* and clearance of gametocytes in *P. falciparum* infections.

Eight countries in southern Africa are signatories to the Elimination Eight (E8) regional initiative launched in March 2009, a goal of which is to achieve the eventual elimination of malaria in the region, and elimination in four countries (Botswana, Namibia, South Africa and Swaziland) by 2015. These four countries report relatively low numbers of malaria cases – Botswana (432), Namibia (194), South Africa (1632), Swaziland (171 confirmed cases and 405 presumed cases). With continued investments in malaria control, it is expected that these countries will continue to progress towards elimination, although they do not yet meet the case management and surveillance criteria to be classified as being in the pre-elimination phase.

In the **Region of the Americas**, Belize moved from the control phase to the pre-elimination phase in 2013, joining six other countries (Argentina, Costa Rica, Ecuador, El Salvador, Mexico and Paraguay). Belize reported 37 cases in 2012, and undertakes ACD, case investigation and radical treatment. Costa Rica, which reported only six indigenous cases in 2012; it applies ACD, case

Table 8.2. Classification of countries by stage of elimination, December 2013

Region	Pre-elimination	Elimination	Prevention of re-introduction	Recently certified as malaria free
African	Cabo Verde	Algeria		
Region of the Americas	Argentina Belize Costa Rica Ecuador El Salvador Mexico Paraguay			
Eastern Mediterranean		Iran (Islamic Republic of) Saudi Arabia	Egypt Iraq Oman Syrian Arab Republic	Morocco - 2010 United Arab Emirates – 2007
European		Azerbaijan Tajikistan Turkey	Georgia Kyrgyzstan Uzbekistan	Armenia - 2011 Turkmenistan – 2010
South-East Asia	Bhutan Democratic People's Republic of Korea	Sri Lanka		
Western Pacific	Malaysia	Republic of Korea		

Source: *NMCP reports*

investigation, radical treatment of *P. vivax* malaria and QA of microscopy services. Argentina and Paraguay reported no indigenous cases in 2012.

In the **Eastern Mediterranean Region**, the Islamic Republic of Iran and Saudi Arabia are in the elimination phase. In the Islamic Republic of Iran, the number of indigenous cases was reduced from 1710 in 2011, to 787 in 2012 (comprising 756 indigenous, 12 introduced and 19 suspected relapsing cases). In contrast, there has been a slight increase in the number of indigenous cases in Saudi Arabia during the past three years (29 cases in 2010, 69 in 2011 and 82 in 2012) against a background of rising malaria importation (in 2012 there were 2088 imported *P. vivax* cases and 1197 *P. falciparum*). Both countries apply intensive surveillance interventions, as well as vector control activities in affected areas.

No locally acquired cases have been reported in Iraq since 2009, and the country is in the prevention of reintroduction phase along with Egypt (zero locally acquired cases reported in 2012) and Syria (zero locally acquired cases reported in 2011 and 2012). Oman is also in the prevention of reintroduction phase. It had inter-

Box 8.1 Trends in malaria cases due to *P. vivax*

Several factors make *P. vivax* more difficult to control than *P. falciparum*:

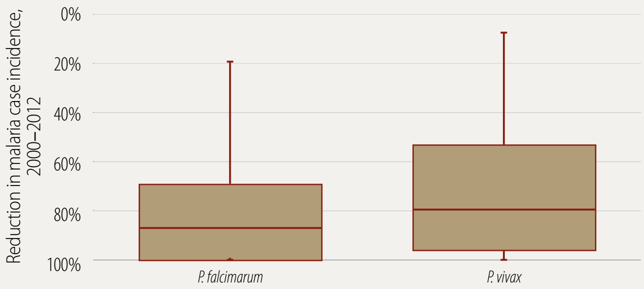
- *P. vivax* sporozoites develop faster than those of *P. falciparum* in *Anopheles* mosquitoes, and at wider temperature ranges, enabling transmission to occur from younger mosquitoes and in a wider variety of geographical conditions;
- *P. vivax* has a liver stage that is undetectable by current diagnostic techniques and is unresponsive to drugs commonly used to treat blood stages – the one drug used to treat the liver stage can cause severe side-effects (haemolysis) in patients who are deficient in the metabolic enzyme, glucose-6-phosphate dehydrogenase (G6PD); and
- once an infection occurs in a human, gametocytes (the form of the parasite that can infect mosquitoes) appear more quickly than those of *P. falciparum*, and are transmitted more efficiently to mosquitoes, such that most patients can transmit to mosquitoes before a case is diagnosed.

As a result of these characteristics, it is expected that *P. vivax* will respond more slowly to control measures. However, differences in the rates at which each parasite decreases are not always obvious. When aggregated at national level, data may conceal variation in case detection efforts over time. For example, a decrease in reported malaria cases overall in India between 2005 and 2009 occurred at the same time as increased efforts at case detection in Odisha state, where *P. falciparum* is more common; as a result, the number of reported *P. falciparum* cases decreased more slowly than those of *P. vivax*. In addition, when the total number of cases in a country decreases to low levels, then case counts are increasingly influenced by the number of imported cases, which reflect where patients have been travelling rather than the predominant species of malaria locally. For example, in China, only nine locally acquired cases of *P. falciparum* and 133 of *P. vivax* were reported in 2012, compared to 1403 and 39 imported cases, respectively (there were also two locally acquired mixed infections and 39 imported cases).

Despite the potential for trends to be distorted, it is apparent that, among the 62 countries in which reported data on numbers of cases is sufficiently consistent to assess trends, decreases in *P. falciparum* incidence are generally larger than those of *P. vivax* (**Figure Box 8.1a**). Moreover, in all countries in which malaria is microscopically confirmed, the proportion of cases due to *P. falciparum* is larger in years with more cases than in years with fewer cases (**Figure Box 8.1b**).

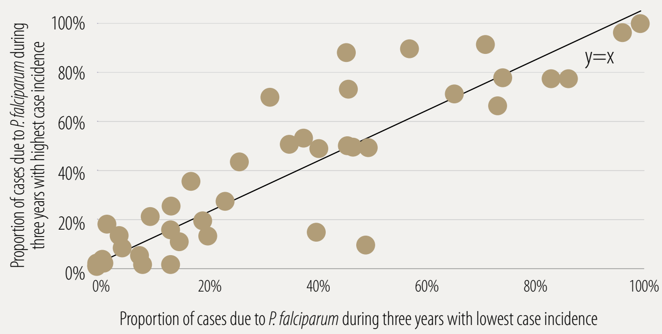
As a result of the slower rates of decrease in the incidence of *P. vivax*, many malaria control programmes that are moving towards elimination are needing to give greater attention to the control of *P. vivax*, particularly in countries outside sub-Saharan Africa. Indeed, *P. vivax* predominates in countries in the pre-elimination and elimination phases (**Figure Box 8.1c**).

Figure Box 8.1a Percentage reduction in case incidence by parasite species for countries in which it is possible to assess trends from reported data



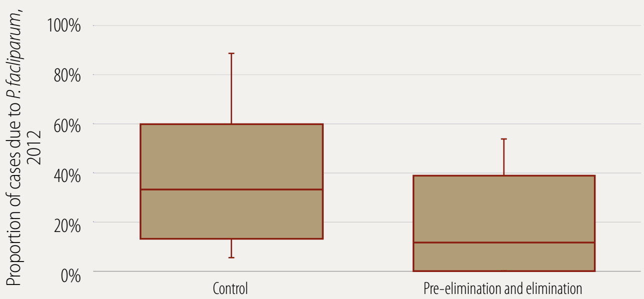
Source: *NMCP reports*

Figure Box 8.1b Proportion of cases due to *P. falciparum* in years with the highest incidence of disease 2000–2012, versus proportion of cases due to *P. falciparum* in years with lowest incidence 2000–2012



Source: *NMCP reports*

Figure Box 8.1c Percentage of malaria cases due to *P. falciparum* by programme phase outside of sub-Saharan Africa, 2012



Source: *NMCP reports*

rupted transmission of malaria from 2004 to 2006, but has been battling small outbreaks since 2007 involving both *P. falciparum* and *P. vivax*. In 2012, the country reported 2051 cases, all parasitologically confirmed, of which only 22 were locally acquired. Oman is applying a prevention of reintroduction strategy, with general health services vigilant for the occurrence of any new cases, and case investigation followed by outbreak response as needed.

In the **European Region**, three countries are in the elimination phase and together reported just 255 locally acquired cases in 2012, all due to *P. vivax*, of which 218 were in Turkey, 13 in Tajikistan and 3 in Azerbaijan. In Turkey, as a result of *P. vivax* importation by international truck drivers, and a delay in the recognition of an index case, a malaria outbreak occurred in one village in the province of Mardin, with 219 cases (1 imported, 1 introduced and 217 indigenous). By conducting a massive scale-up of control and surveillance interventions – including vector control through indoor residual spraying (IRS), screening of populations most at risk and directly observed radical treatment – the national malaria control programme (NMCP) promptly contained the outbreak.

Georgia, Kyrgyzstan and Uzbekistan are in the prevention of reintroduction phase. Indigenous malaria cases were last detected in these countries in 2010 (Georgia reported one introduced case in 2011 and one in 2012, as a result of malaria importation by migrant workers). In all these countries, malaria is a notifiable disease; that is, each case and focus is epidemiologically investigated and classified, QA of microscopy is carried out by a national reference laboratory and there is radical treatment of *P. vivax* cases.

The year 2009 marked the start of renewed local *P. vivax* transmission in the Lakonia region of Greece, after importation of parasites. Containment interventions were applied, with a focus on both migrant workers and local residents in high-risk areas (including establishment of a functional system for early detection that included ACD, prompt radical treatment of cases, reinforced surveillance, strengthening of institutional capacities of health services at all levels, better targeted IRS, and improved intersectoral collaboration and public awareness). The localized outbreak of malaria reported recently in the Lakonia region was successfully contained. In 2012, the number of locally acquired cases in Lakonia dropped to 10 (in addition to 10 locally acquired cases in other areas and 73 imported cases all over Greece) and to zero in 2013. However, in 2013 two locally acquired *P. vivax* cases were detected in the Municipality of Alexandroupolis, Evros, and one in the Municipality of Sofades, Karditsa, in addition to 22 imported cases all over Greece, of which 13 were reported from immigrants from malaria-endemic countries. Greece continues to work to prevent the reintroduction of malaria.

The European Region is close to attaining the goal of eliminating malaria by 2015, as set out in the 2005 Tashkent Declaration. Nonetheless, the experience of Greece and Turkey highlights the persistent threat of reintroduction and the need for continued vigilance to ensure that any resurgence is rapidly contained.

In the **South-East Asia Region**, Bhutan and the Democratic People's Republic of Korea are in the pre-elimination phase, and Sri Lanka in the elimination phase. Bhutan reported a total of 82 locally acquired cases in 2012, down from 228 in 2011. The number of people living in the 26 active foci is still high (518 000). All cases in these three countries are microscopically confirmed by quality-assured laboratories. Malaria is a notifiable disease, with each case investigated and reported by districts to the central level on a weekly basis.

There has been a rise in the number of *P. vivax* cases in the Democratic People's Republic of Korea, from 13 383 in 2010, to 15 633 in 2011 and 21 850 in 2012. The number of active foci remains high (146) and >50% of the population lives in malaria-endemic areas. The situation calls for strengthening of vector control interventions, and responsive surveillance aiming at fast

Box 8.2 Malaria burden estimation evidence review group

In 2012, the MPAC endorsed the creation of an ERG on malaria burden estimation that would make recommendations on:

1. What approaches WHO should use to:

a) estimate the number of malaria cases and deaths occurring in a country, in order to prioritize countries for resource allocation decisions;

b) understand trends over time, in order to assess the success of global strategies; and

c) prioritize malaria in comparison with other health conditions.

2. What approaches endemic countries should use to:

a) estimate the number of malaria cases and deaths national and subnationally; and

b) understand which populations are most badly affected.[1]

The ERG met three times between September 2012 and June 2013, and invited key researchers in the field of malaria burden estimation. Its principal recommendations were as follows:

a) For 2013, WHO should use the same methodology for case estimation as is currently used. In 2014 and thereafter, for African countries without strong surveillance systems, WHO should derive estimates of the number of cases from estimates of parasite prevalence generated by the Malaria Atlas Project (MAP). In other countries, it should continue to use existing methodologies, but should further investigate assumptions about parasitaemia and different care-seeking behaviours. To facilitate this, data on parasite prevalence from household surveys should be stratified by type of care-seeking behaviour.

b) WHO should use the same methodology for the World malaria report 2013 malaria mortality estimates as is presently used. However, further research should be conducted, particularly in relation to the age structure of malaria deaths, including (i) a review of data from selected hospitals in Africa to explore further the age distribution of severe malaria and death; and (ii) a review of published and unpublished data from health facilities or intervention trials.

c) WHO should report on parasite prevalence as a key morbidity indicator (in addition to cases and deaths). As with cases and deaths, the World malaria report will show country-reported parasite prevalence values and modelled parasite prevalence.

d) WHO should develop user-friendly and transparent methods for generating country-level estimates of prevalence, cases and deaths. This will increase country ownership over the estimates, which should, in turn, encourage more investment in data quality.

1. See http://www.who.int/malaria/mpac/evidencereviewgroups/en/index.html for Terms of reference and list of members of the ERG.

reduction of transmission and foci clearance. In Sri Lanka, the number of cases continues to decline rapidly, from 684 in 2010, to 124 in 2011 and 23 in 2012. The number of the active foci was reduced to 17, with 500 000 people living in these foci. The NMCP applies reactive and proactive ACD (including mass screening), compulsory notification of cases within 24 hours using text messaging (SMS), case and focus investigation, quality-assured microscopic diagnosis of cases, radical treatment for *P. vivax* malaria and gametocytocidal treatment of *P. falciparum* cases.

In the **Western Pacific Region**, Malaysia is in pre-elimination phase and the Republic of Korea in the elimination phase. In Malaysia, there has been a progressive decrease of malaria cases over recent years, with 3662 indigenous cases and 35 introduced cases reported in 2012. Malaria transmission is limited mainly to Sabah and Sarawak, occurring among 3134 active foci with a population of 1.2 million. In the Republic of Korea there has been a marked decline in locally acquired cases, from 1267 in 2010 to 394 in 2012. There are still 22 active malaria foci with a population of 3.8 million.

China is on the brink of eliminating malaria from Hainan province, which has a population of 8.8 million, and reported no indigenous cases in 2012 (13 imported cases). Yunnan is the province with the highest malaria burden, and it has a population of 49 million; this province reported a total of 853 cases in 2012 (679 imported), down from 1321 in 2011. The Philippines is progressing with eliminating malaria in some provinces, and has declared 28 of its 80 provinces to be free of malaria. The number of confirmed malaria cases nationwide in 2012 was 7133. The most affected provinces are Maguindanao, Palawan and Tawi-Tawi. The Philippines is progressively meeting the pre-elimination criteria regarding surveillance systems and case management; for example, all suspected malaria cases are confirmed by quality-assured microscopy and there is a national policy for radical treatment. However, the worst affected malaria-endemic areas of the Philippines are still in the control phase; thus, the country is classified as being in control phase.

8.3 Trends in estimated malaria cases and deaths

Surveillance systems do not capture all malaria cases occurring in a country, and the data reported to WHO are not sufficiently reliable to assess trends in some countries (Chapter 7). It is therefore necessary to use *estimates* of the total number of cases or deaths occurring in countries to make inferences about trends in malaria cases and deaths in some countries and at regional and global levels. The methods for producing estimates either (i) adjust the number of reported cases to take into account the proportion of cases that are not captured by a surveillance system; or (ii) for countries with insufficient surveillance data, produce estimates using a modelled relationship of case incidence and mortality rates that takes into account malaria transmission intensity and vector control coverage (**Country Profiles,** Section C.1.9). These estimates help to make numbers more comparable between countries, and fill gaps where data are missing. However, the estimates are limited in that they rely on relationships between variables that are uncertain, and draw upon data that may have been imprecisely measured, or measured in previous years and projected forward. Thus, estimates of the number of malaria cases or deaths are accompanied by a large degree of uncertainty, and inferences concerning trends are less certain than those made directly from good-quality surveillance data. In 2012, the Malaria Policy Advisory Committee (MPAC) endorsed the creation of an evidence review group (ERG) on malaria burden estimation, to advise WHO on what approaches to use to estimate the number of malaria cases and deaths occurring in a country. The MPAC proposed that revisions be made in the methodology, beginning in 2014; a summary of its recommendations is shown in **Box 8.2**.

Table 8.3 Estimated number of (a) malaria cases and (b) malaria deaths by WHO region, 2012

a)	Estimated cases ('000s)			Estimated *P. vivax* cases ('000s)			*P. vivax* as % of total cases
Region	Estimate	Lower	Upper	Estimate	Lower	Upper	
African	165 000	93 000	245 000	1 900	1 600	2 100	1%
Region of the Americas	800	700	1 000	500	400	600	65%
Eastern Mediterranean	13 000	10 000	18 000	3 700	3 000	4 500	28%
European	.03	.02	.03	.02	.02	.02	
South-East Asia	27 000	22 000	33 000	13 000	10 000	16 000	47%
Western Pacific	1 000	1 000	2 000	200	100	300	16%
World	**207 000**	**135 000**	**287 000**	**18 900**	**16 000**	**22 200**	**9%**
Outside sub-Saharan Africa	33 300	28 000	39 400	16 600	13 800	19 800	50%

b)	Estimated deaths, all ages			Estimated deaths, <5			Deaths <5 as % of total
Region	Estimate	Lower	Upper	Estimate	Lower	Upper	
African	562 000	410 000	722 000	462 000	386 000	534 000	82%
Region of the Americas	800	500	1 200	230	200	270	27%
Eastern Mediterranean	18 000	11 000	31 000	6 600	5 400	8 100	37%
European	0	0	0	0	0	0	
South-East Asia	42 000	26 000	60 000	11 000	9 000	14 000	26%
Western Pacific	3 500	2 100	5 200	1 600	900	2 400	46%
World	**627 000**	**473 000**	**789 000**	**482 000**	**408 000**	**565 000**	**77%**
Outside sub-Saharan Africa	50 000	33 000	68 000	14 000	11 000	17 000	28%

Source: *WHO estimates*

Table 8.4 Estimated number of (a) malaria cases and (b) malaria deaths by WHO region, 2000–2012

a) Number of cases (000's)	2000	2001	2002	2003	2004	2005	2006	2007
African	174 000	178 000	182 000	187 000	190 000	192 000	190 000	185 000
Region of the Americas	2 000	2 000	2 000	2 000	2 000	2 000	1 000	1 000
Eastern Mediterranean	16 000	16 000	16 000	16 000	15 000	13 000	14 000	13 000
European	38	28	24	19	11	6	3	1
South-East Asia	31 000	31 000	29 000	30 000	31 000	34 000	29 000	26 000
Western Pacific	3 000	3 000	2 000	2 000	3 000	2 000	2 000	2 000
World	**226 000**	**229 000**	**231 000**	**236 000**	**240 000**	**244 000**	**236 000**	**227 000**
Lower bound	151 000	153 000	152 000	156 000	158 000	160 000	154 000	149 000
Upper bound	304 000	307 000	312 000	319 000	325 000	329 000	322 000	313 000

b) Number of deaths	2000	2001	2002	2003	2004	2005	2006	2007
African	802 000	804 000	804 000	800 000	791 000	779 000	737 000	714 000
Region of the Americas	2 100	1 900	1 700	1 700	1 600	1 700	1 500	1 300
Eastern Mediterranean	22 000	22 000	22 000	22 000	20 000	20 000	19 000	19 000
European	0	0	0	0	0	0	0	0
South-East Asia	49 000	45 000	43 000	43 000	45 000	49 000	43 000	40 000
Western Pacific	6 900	5 800	5 100	5 700	6 100	4 700	4 900	4 100
World	**881 000**	**878 000**	**876 000**	**872 000**	**864 000**	**854 000**	**806 000**	**778 000**
Lower bound	670 000	666 000	664 000	662 000	656 000	644 000	613 000	595 000
Upper bound	1 113 000	1 113 000	1 110 000	1 102 000	1 094 000	1 076 000	1 015 000	985 000

Source: *WHO estimates*

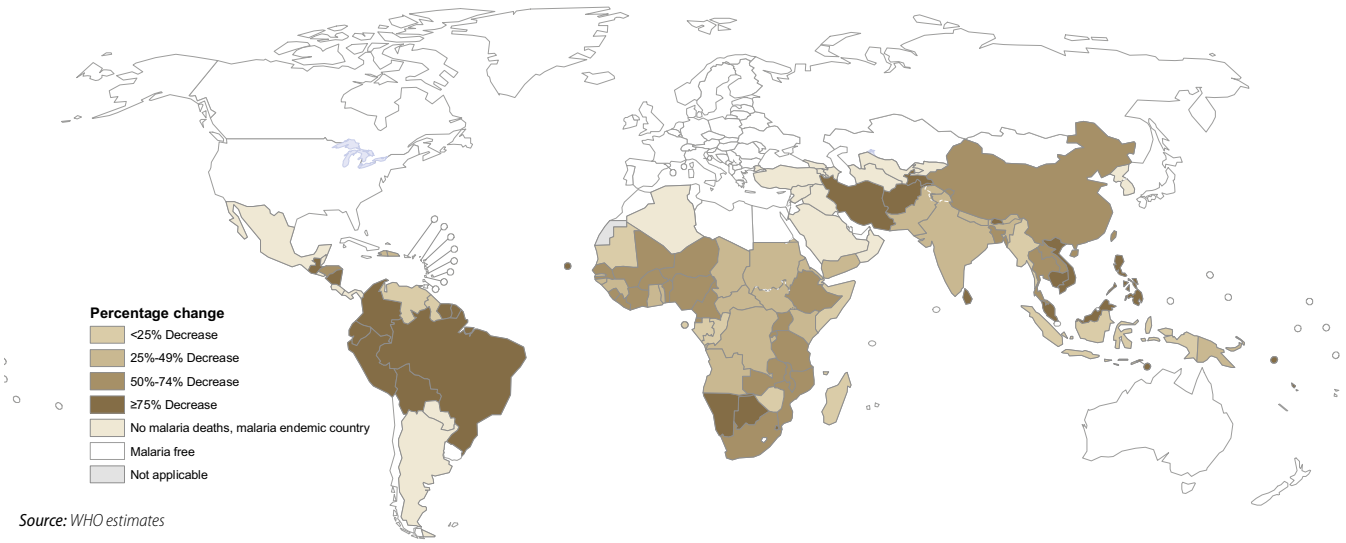
Estimates of cases and deaths are accompanied by wide uncertainty intervals; nevertheless, they can provide useful insight into the distribution of malaria across countries and trends over time. The remainder of this chapter analyses the global distribution of the estimated numbers of cases and deaths in 2012, and of trends in estimates of malaria cases and deaths from 2000 to 2012.

8.3.1 Estimated cases

In 2012, worldwide, there were an estimated 207 million cases of malaria (95% uncertainty interval, 135–287 million) (**Table 8.3**). Most of these cases (80%) were in the African Region, followed by the South-East Asia Region (13%) and the Eastern Mediterranean Region (6%). Approximately 9% of estimated cases globally are due to *P. vivax*, although the proportion outside the African continent is 50%.

The number of cases was estimated to have increased from 226 million in 2000 to 244 million in 2005, before decreasing to 207 million in 2012 (**Table 8.4**). The estimated number of malaria cases per 1000 persons at risk of malaria (which takes into account population growth over time) shows a reduction in case incidence of 25% globally between 2000 and 2012, and 31% in the African Region. Decreases are greatest in the

Figure 8.2 Percentage change in malaria mortality rates, 2000-2012



Source: *WHO estimates*

2008	2009	2010	2011	2012
181 000	176 000	170 000	165 000	165 000
1 000	1 000	1 000	1 000	1 000
13 000	12 000	12 000	13 000	13 000
0.7	0.3	0.2	.09	.03
29 000	29 000	28 000	25 000	27 000
2 000	2 000	2 000	1 000	1 000
225 000	**219 000**	**214 000**	**206 000**	**207 000**
146 000 307 000	142 000 300 000	140 000 293 000	133 000 285 000	135 000 287 000

2008	2009	2010	2011	2012
677 000	647 000	608 000	575 000	562 000
1 000	1 200	1 200	900	800
18 000	17 000	18 000	18 000	18 000
0	0	0	0	0
46 000	48 000	46 000	41 000	42 000
3 900	5 000	3 900	3 400	3 500
747 000	**718 000**	**676 000**	**640 000**	**627 000**
569 000 937 000	547 000 901 000	516 000 851 000	485 000 804 000	473 000 789 000

European Region (100%), Region of the Americas (70%) and Western Pacific Region (56%). If the annual rate of decrease that has occurred over the past 12 years is maintained, then malaria case incidence is projected to decrease by 31% globally and 39% in the African Region by 2015.

8.3.2 Estimated deaths

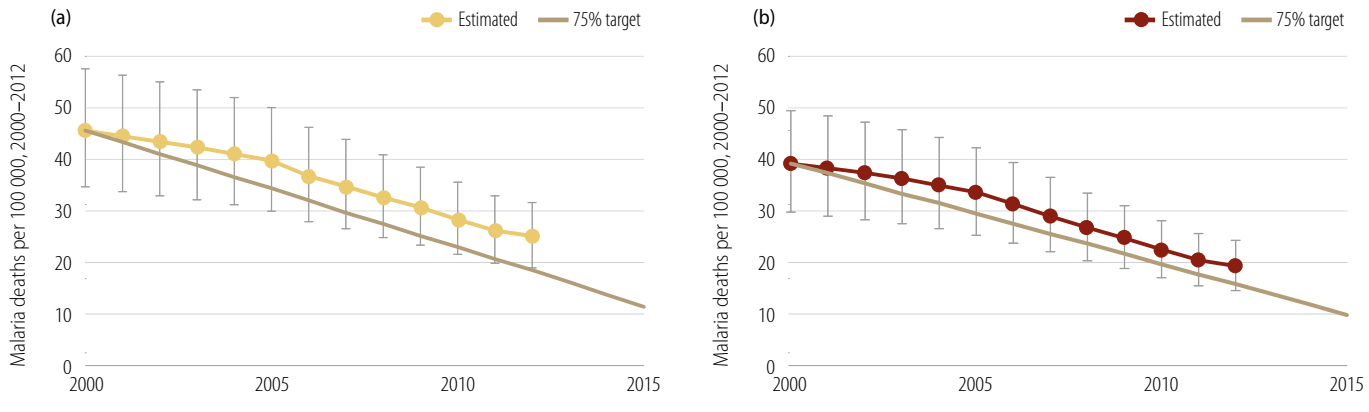
There were an estimated 627 000 malaria deaths worldwide in 2012 (95% uncertainty interval, 473 000–789 000) (**Table 8.3**). It is estimated that 90% of deaths in 2012 were in the African Region, followed by the South-East Asia Region (7%) and Eastern Mediterranean Region (3%). About 482 000 malaria deaths (uncertainty interval, 408 000–565 000) were estimated to occur in children under 5 years of age, or 77% of the global total. An estimated 462 000 of deaths occurred in children under 5 years of age in the African Region (uncertainty interval, 386 000–534 000). Most of the deaths were due to *P. falciparum*; however, *P. vivax* is increasingly recognized as a cause of severe malaria and death (**Box 8.3**).

The estimated number of deaths fell in all regions between 2000 and 2012 although there was some fluctuation year by year (**Table 8.4**). During the same period, the population at risk for malaria increased by 23% globally and by 29% in sub Saharan Africa. Malaria mortality rates, which take into account population growth, are estimated to have decreased by 42% globally across all age groups between 2000 and 2012, and by 48% in children under 5 years of age. In the African Region, malaria death rates decreased by 49% across all age groups and by 54% in children under 5 years of age (**Figure 8.2**). If the annual rate of decrease that has occurred over the past 12 years is maintained, then malaria mortality rates will have decreased by 52% globally across all age groups, and by 60% in children under 5 years of age by 2015; in the African Region they are projected to decrease by 62% in all age groups and by 68% in children under 5 by 2015.

There is considerable uncertainty associated with the calculated reductions in mortality rates, since they are based on the estimated numbers of deaths which have wide uncertainty intervals (**Figure 8.3**). The pace of decrease in estimated malaria mortality rates was initially slow, but it accelerated from 2005. Between 2007 and 2011, the rate of decline was sufficiently fast to achieve a 75% reduction over 15 years (the plotted points are parallel to the target line in **Figure 8.3**). However, the decrease in malaria mortality rates was slower between 2011 and 2012. Of the 103 countries that had ongoing transmission in 2000, 60 are projected to achieve reductions in malaria mortality rates of >75% in 2015, or to maintain zero malaria deaths.

The rate of decrease is faster than reported previously in the *World Malaria Report 2011* (*2*) and *2012* (*1*). Two factors are responsible: (i) a steeper rate of decline in the total number of deaths of children under 5 years of age from all causes following revisions to the under-five mortality envelope by the United Nations (UN) Inter-agency Group for Child Mortality Estimation (the number of deaths was estimated to decrease from 9.6 million globally in 2000 to 7.6 million in 2010 in previous estimates, compared to a decrease from 9.7 million deaths globally in 2000 to 7.0 million in 2010 in the current estimates); and (ii) changes in the proportion

Figure 8.3 Estimated malaria mortality rates, 2000–2012 in (a) all age groups and (b) children <5 years of age



Source: *WHO estimates*

of deaths attributed to malaria in the current estimates after the addition of more input data to the verbal autopsy model used to estimate the proportion of child deaths due to different causes (a total of 47 study data points were used compared to 30 in the previous estimates). As a result, the proportion of global deaths in children under 5 years of age that are due to malaria rose from 6.6% in 2000 to 7.4% in 2010 in the previous estimates, but has fallen from 7.8% in 2000 to 7.6% in 2010 in the current set of estimates (and to 7.3% in 2012).

Geographical distribution of cases and deaths

About 80% of malaria deaths in 2012 are estimated to occur in just 17 countries, and 80% of cases in 18 countries (**Figure 8.4**). For *P. vivax* cases, four countries account for more than 80% of estimated cases (Ethiopia, India, Indonesia and Pakistan). The global burden of mortality is dominated by countries in sub-Saharan Africa: the Democratic Republic of the Congo and Nigeria together account for 40% of the global total of estimated malaria deaths and 32% of cases. International targets for reducing cases and deaths will not be attained unless considerable progress can be made in these countries. In 2012, WHO, along with the RBM and other partners, launched a situation room to provide focused strategic support to 10 high-burden countries in sub-Saharan Africa (see **Box 8.4**).

Table 8.5. Estimated cases and deaths averted by reduction in incidence and mortality rates between 2000 and 2012

Region	Cases averted, 2001–2012 (millions)	Percentage of total	Deaths averted, 2001–2012 (millions)	Percentage of total
African	337	67%	3.08	93%
Region of the Americas	14	3%	0.01	0%
Eastern Mediterranean	66	13%	0.09	3%
European	0,4	0%	–	0%
South-East Asia	67	13%	0.11	3%
Western Pacific	15	3%	0.04	1%
World	**500**	**100%**	**3.32**	**100%**

Source: *WHO estimates*

Box 8.3 Severe malaria due to *Plasmodium vivax*

Plasmodium vivax infection has been associated with severe malaria and death, although the risk of severe *P. vivax* malaria and case fatality rates (CFRs) are not well defined.[1] Comorbidities are considered important contributors to severe complications of *P. vivax* infection. In particular, concomitant malnutrition is suspected to increase the risk of severe vivax disease, but again this is not well understood. Notably, healthy travellers from non-malaria-endemic countries and healthy residents of low-endemicity regions rarely develop severe disease with *P. vivax* infection. The risk of severe *P. vivax* disease in residents of endemic areas has been observed to rise with increasing transmission intensity, although the contribution of less access to care and more co-morbidities in these settings is not well quantified.

The spectrum of reported severe *P. vivax* syndromes is similar to that with *P. falciparum*; however, the relative frequency and significance of each syndrome differs between severe vivax and severe falciparum disease. Clinical manifestations of severe *P. vivax* malaria include severe anaemia (<5 mg haemoglobin/dL), acute respiratory distress syndrome (ARDS), acute kidney injury and splenic rupture. *P. vivax* infection in pregnant women has also been associated with spontaneous abortion and intrauterine growth retardation. Coma and other neurological complications are rare. Metabolic acidosis and coma occur less frequently in severe *P. vivax* malaria. Mortality from severe anaemia and acute lung injury – the most commonly reported manifestations of severe *P. vivax* – is less frequent in *P. vivax* than in *P. falciparum* infection.

Severe *P. vivax* malaria is characterized by lower blood-stage parasitaemia than is observed in severe falciparum cases. Unlike *P. falciparum*, *P. vivax*-associated pathogenesis is not associated with significant microvascular obstruction of vital organs. Nevertheless, low blood-stage parasitaemia may be masking parasite sequestration outside the vascular system (e.g. in the spleen), which may explain how severe syndromes can develop at relatively low levels of parasitaemia. The severity of anaemia observed with low parasitaemia may also be due to the cumulative impact of multiple relapses of disease, as is the norm for most *P. vivax* infections.

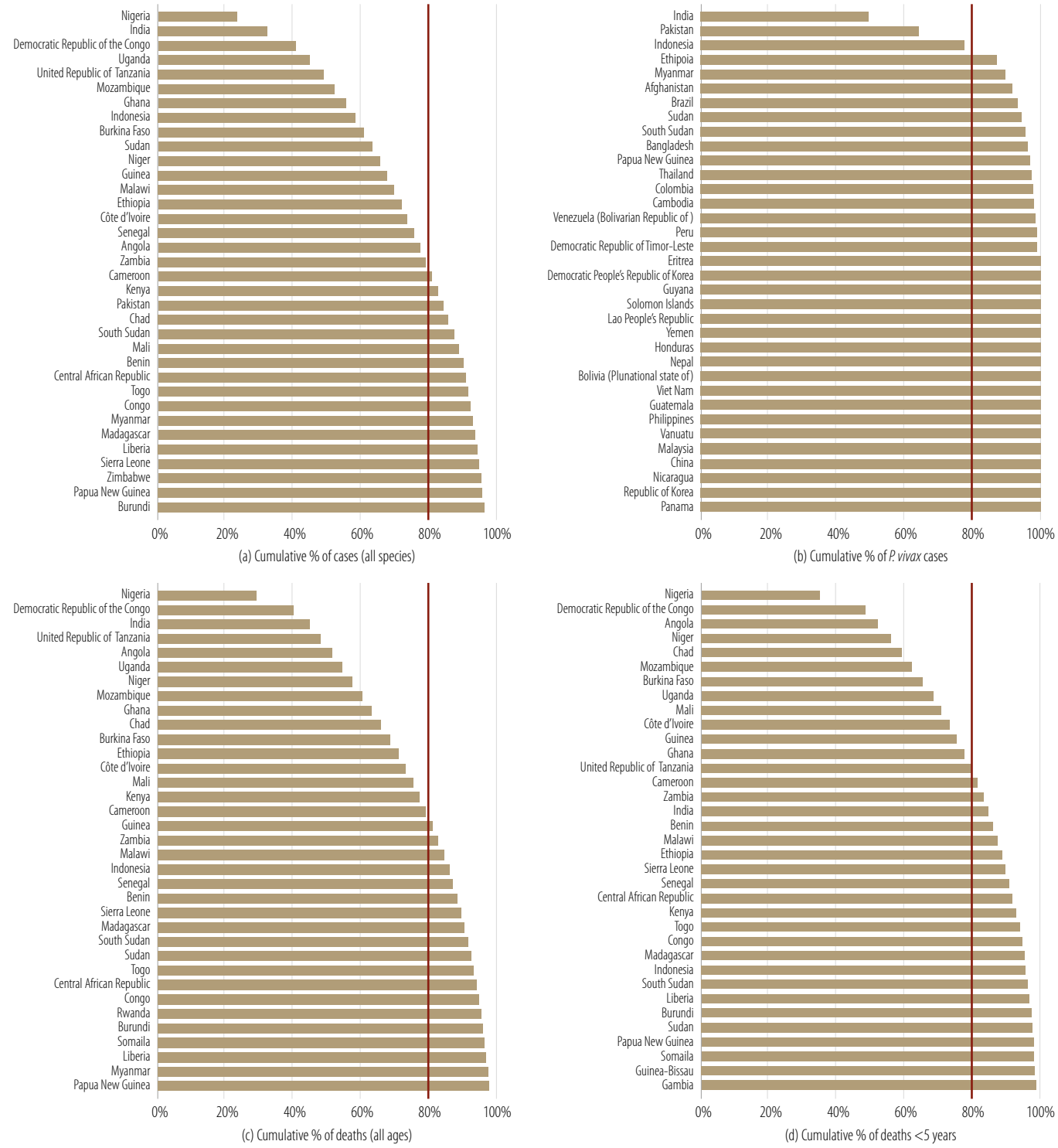
The population-based risk of severe disease and CFRs for *P. vivax* infection have been examined in only a small number of studies and reports of severe *P. vivax* are often limited by incomplete investigation into other contributing factors. Some studies have reported similar risks of death among hospitalized patients as for *P. falciparum*; however, the population-attributable risks of death from the two organisms have rarely been compared. Where such risks have been compared, the risk from *P. vivax* is less than half that associated with *P. falciparum*. A firmer evidence base for these risks would support refined estimates of the clinical burden of *P. vivax*. The demographic risk of severe vivax malaria in regions of relatively high endemicity is skewed towards early infancy (a stage when severe anaemia is a major cause of morbidity), and decreases as immunity builds up into childhood and adolescence.

A clearer picture of severe vivax malaria is emerging, but further study is required to refine existing knowledge of the spectrum of syndromes, and their risks of severe morbidity and mortality. Improved data from inpatient settings on hospitalized malaria cases by *Plasmodium* species, as well as population-based assessments of the risk of severe *P. vivax* infection, are needed so that the true burden of severe *P. vivax* malaria can be understood.

1. For a full discussion see Anstey et al, Plasmodium vivax: Clinical Spectrum, risk factors and pathogenesis, in Hay SI, Price R, Baird JK, eds, *The Epidemiology of Plasmodium Vivax: History, Hiatus and Hubris, Part A., Advances in Parasitology*, Oxford: Academic Press, 2012, vol 80: pp 151-201

Figure 8.4 Cumulative proportion of the global estimated cases and deaths accounted for by the countries with the highest number of (a) cases (b) *P. vivax* cases (c) deaths and (d) deaths in children under 5

The 80% gridline is highlighted to more easily distinguish countries that account for 80% of the estimated number of malaria cases and deaths in 2012.



Source: *WHO estimates*

Cases and deaths averted, 2001–2012

An estimate of the number of cases averted and lives saved between 2001 and 2012 can be made by calculating the number of cases and deaths that would have occurred if incidence and mortality rates remained at 2000 levels until 2012 (i.e. there was no progress). The calculated number of cases and deaths can be compared with the estimated number of cases and deaths presented above. Such an analysis indicates that 500 million fewer cases and 3.3 million fewer malaria deaths occurred between 2001 and 2012 globally than would have occurred had incidence and mortality rates remained unchanged since 2000 (**Table 8.5**). Of the 3.3 million deaths averted between 2001 and 2012, 3 million (90%) are estimated to be in children under 5 years of age in sub-Saharan Africa, and account for 20% of the 15.1 million fewer deaths that would have occurred between 2001 and 2012 had 2000

Box 8.4 The Malaria Situation Room

The Malaria Situation Room is a joint initiative of WHO, the RBM Partnership Secretariat, the African Leaders Malaria Alliance, the Office of the UN Secretary-General's Special Envoy for Health MDG Financing and Malaria, and the International Federation of Red Cross and Red Crescent Societies.

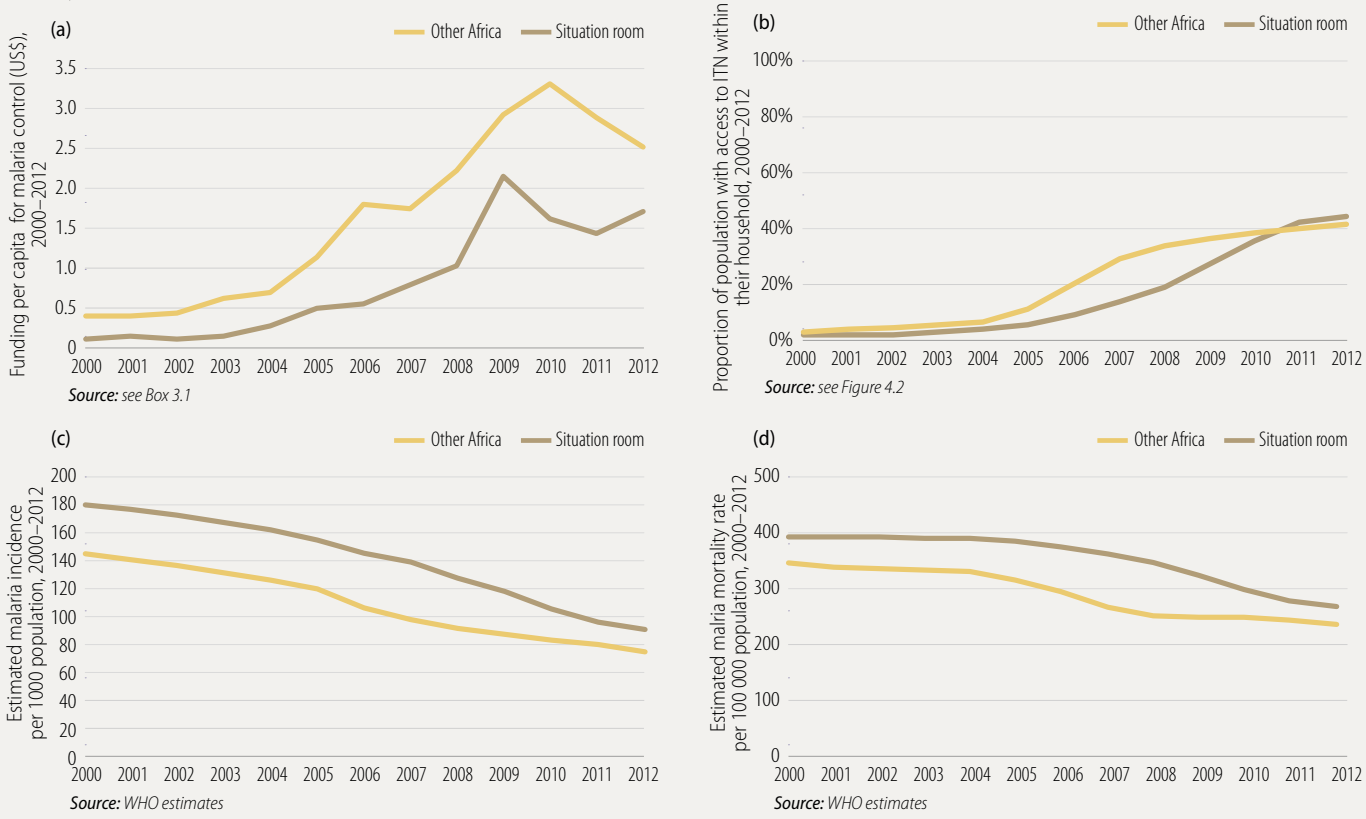
The Malaria Situation Room provides strategic support to 10 high-burden countries in Africa: Burkina Faso, Cameroon, Côte d'Ivoire, the Democratic Republic of the Congo, Ghana, Mozambique, Niger, Nigeria, Uganda and the United Republic of Tanzania. These 10 countries are estimated to account for more than 389 000 malaria deaths each year, representing about 60% of all malaria deaths in Africa in 2012.

The Malaria Situation Room experts collate and synthesize malaria-related information on financial flows, commodities, intervention coverage and disease trends – tracking challenges and progress, and identifying bottlenecks that hinder country scale-up of malaria control interventions. Relevant partners are then approached to help resolve the problems identified, and progress in bottleneck resolution is monitored. The aim is to support countries in their efforts to achieve the health-related MDG goals and other global targets as the 2015 MDG deadline nears.

The Malaria Situation Room is co-located within WHO Headquarters and the RBM Partnership Secretariat in Geneva, Switzerland, and the WHO Regional Office for Africa in Brazzaville, Democratic Republic of the Congo. The Bill & Melinda Gates Foundation has generously committed three years of operational funding.

The 10 Malaria Situation Room countries not only account for substantial malaria cases and deaths, but also have higher malaria incidence and mortality rates and receive less malaria funding per capita than other African countries (**Figure Box 8.4**). Progress in securing funds, increasing ITN coverage, and reducing morbidity and mortality was initially slower in these 10 countries, but the gap has narrowed in the most recent years. Rates in decline of case incidence and mortality have slowed in more recent years for both these and other African countries.

Figure Box 8.4 Funding ITN coverage and trends in estimated malaria case incidence and mortality rates, 2000-2012, in countries covered by situation room and other African countries.

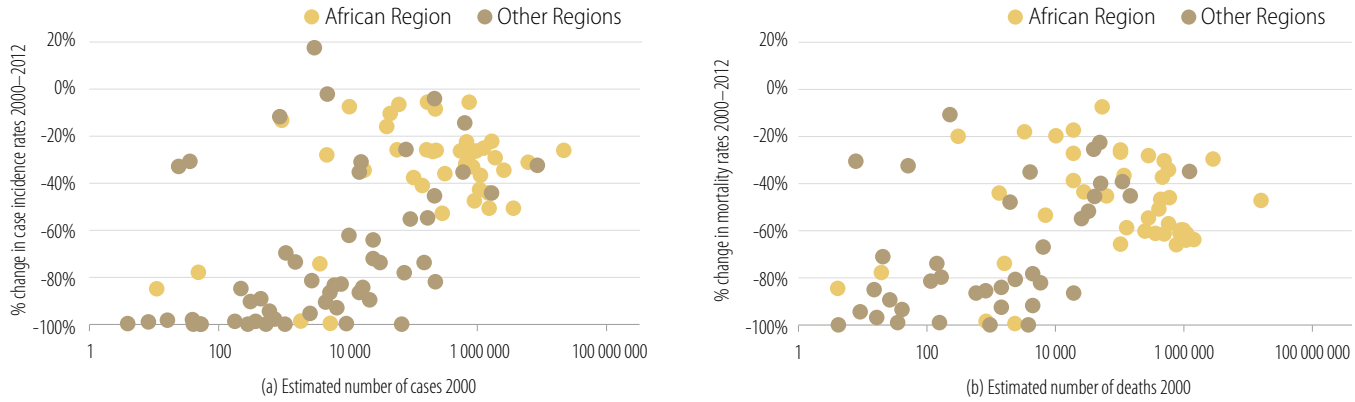


under-five mortality rates applied for each year between 2001 and 2012. Most of the malaria cases averted (67%) have also been in the African Region.

Larger percentage decreases in case incidence and mortality rates are seen in countries with the lowest estimated malaria burdens in 2000 (**Figure 8.5**). However, although progress in reducing incidence and mortality rates has been faster in countries with smaller estimated numbers of malaria cases and deaths, this does not imply a lack of impact in higher burden countries: overall, more cases and deaths have been averted during 2001–2012 in countries with the highest estimated initial number of cases and deaths (**Figure 8.6**), with 59% of cases and 69% of deaths averted being in the 10 countries that had the highest estimated malaria burdens in 2000.

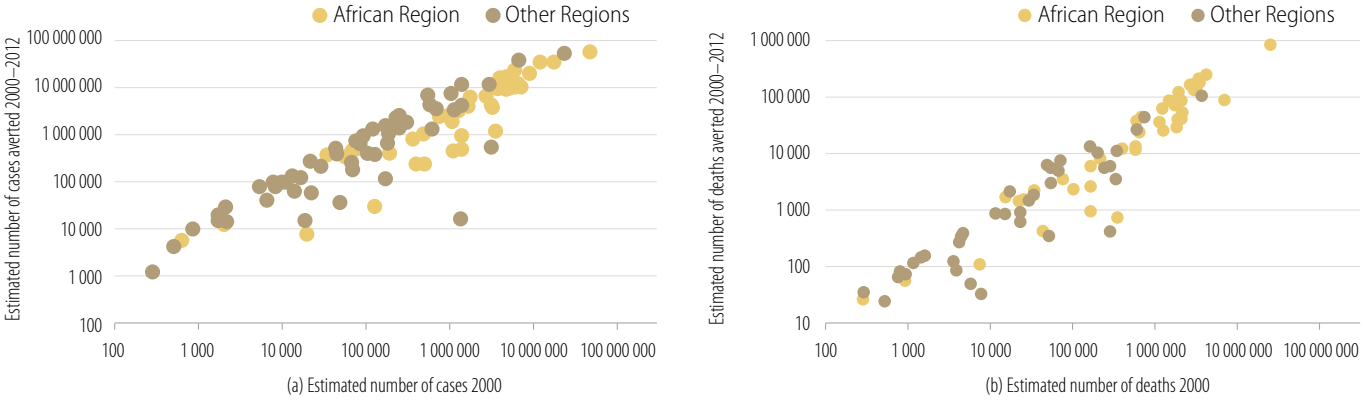
Not all of the cases and deaths averted can be attributed to malaria control programmes. Some progress is likely to be related to increased urbanization and overall economic development, which lead to improvements in housing and nutrition.

Figure 8.5 Relations between (a) % change in estimated number of cases between 2000 and 2012 versus estimated cases in 2000 and (b) % change in estimated number of deaths between 2000 and 2012 versus estimated deaths in 2000



Source: *National malaria control programme data, Vital registration database, WHO estimates*

Figure 8.6 Estimated numbers of (a) cases averted in 2000–2012 versus cases in 2000 and (b) number of deaths averted in 2000–2012 versus deaths in 2000



Source: *WHO estimates*

8.4 Conclusions

Of the 103 countries that had ongoing malaria transmission in 2000, 62 submitted sufficiently complete and consistent data on malaria cases between 2000 and 2012 to enable an assessment of trends. Based on these reported data, 59 countries are meeting the MDG target (6.2c) of reversing the incidence of malaria, and 52 of the 59 (including eight countries of the African Region) are on track to meet RBM and World Health Assembly targets of reducing malaria case incidence rates by 75% by 2015. Decreases in the incidence of *P. falciparum* incidence are, on average, larger than those of *P. vivax*, suggesting that *P. vivax* responds more slowly to control measures, possibly because of its biological characteristics.

Of 97 countries with ongoing transmission in 2013, 11 are classified as being in the pre-elimination phase of malaria control, and seven as being in the elimination phase. A further seven countries are classified as being in the prevention of reintroduction phase. As a result of the slower rates of decrease in the incidence of *P. vivax*, many malaria control programmes need to give greater attention to the control of *P. vivax*. In countries where both species are transmitted, *P. vivax* predominates in those countries that are in the pre-elimination and elimination phases.

The 52 countries that are on track to achieve a 75% reduction in case incidence, as measured through surveillance systems, accounted for only 8 million (4%) of the global total of 226 million estimated cases in 2000. This is partly due to faster progress in countries with fewer cases, but it is also heavily influenced by the poorer quality of surveillance data submitted by countries with a larger estimated number of cases. In the 41 countries that accounted for 80% of cases in 2000, it is not possible to assess trends using reported data because of inconsistencies in the completeness of reporting over time, changes in diagnostic practice, or health-service use. Improved surveillance and evaluation in these countries is needed to provide a more complete and accurate picture of the impact of malaria investments.

Because countries with higher numbers of cases are less likely to submit sufficiently consistent data, it is necessary to draw inferences about the distribution of malaria and trends in some countries using estimates of numbers of cases. The estimated numbers of malaria cases and deaths are accompanied by a large degree of uncertainty. In 2012, there were an estimated 207 million cases of malaria worldwide (95%uncertainty interval, 135–287 million) and 627 000 malaria deaths (95% uncertainty interval, 473 000–789 000). Most of the estimated cases (80%) and deaths (90%) occur in sub-Saharan Africa, and most (77%) of the deaths occur in children under 5 years of age. About 9%

of estimated cases globally are due to *P. vivax*, although the proportion outside the African continent is 50%.

The estimated number of malaria cases per 1000 people at risk of malaria, which takes into account population growth over time, shows a reduction in case incidence of 25% globally between 2000 and 2012 and 31% in the African Region. At these rates, by 2015, malaria case incidence is projected to decrease by 36% globally and by 44% in the African Region. Malaria mortality rates are estimated to have decreased by 42% worldwide between 2000 and 2012, and by 49% in the African Region; they are also estimated to have decreased by 48% globally in children under 5 years of age and by 54% in the African Region. At these rates, by 2015, malaria mortality rates are projected to decrease by 52% globally and by 57% in the African Region. In children under 5 years of age they are projected to decrease by 60% globally and by 68% in the African Region by 2015. The pace of decrease in estimated malaria mortality rates accelerated from 2005, but slowed between 2011 and 2012. This slowing of the decrease in estimated mortality rates is partly because the model that is used to estimate malaria deaths in children under-five years of age in Africa uses ITN coverage to adjust the proportion of all deaths that are attributed to malaria (**Country Profiles**, Section C.1.9), and ITN coverage flattened in 2011-2012 following decreases in funding for malaria control in 2011.

More than 80% of estimated malaria deaths occur in just 17 countries, and 80% of estimated cases occur in 18 countries, with the Democratic Republic of the Congo and Nigeria together accounting for 40% of the estimated global total. Targets for reduction of cases and deaths will not be attained unless substantial progress can be made in countries that account for the vast majority of the malaria burden. In 2012, WHO, along with the RBM and other partners, launched a situation room to provide strategic support to 10 high-burden countries in sub-Saharan Africa.

Four countries (Ethiopia, India, Indonesia and Pakistan) account for more than 80% of estimated *P. vivax* cases. *P. vivax* infection has been associated with severe malaria and death, although the risks of severe disease and case fatality rates for *P. vivax* infection have not been firmly established. The presence of comorbidities - in particular, concomitant malnutrition – is suspected to increase the risk of severe disease in *P. vivax* infection, although this risk also remains poorly defined. Further study is required to refine existing knowledge of the spectrum of severe *P. vivax* malaria, and the risks of severe disease and death with this infection.

Progress in reducing malaria case incidence and mortality rates has been faster in countries that had lower numbers of cases and deaths in 2000. However, the majority of numbers of cases and deaths averted between 2000 and 2012 have been in countries that had the highest malaria burdens in 2000. If the malaria incidence and mortality rates in 2000 had remained unchanged over the decade, 500 million more cases and 3.3 million more deaths would have occurred between 2001 and 2012. Most of the malaria cases averted (67%) and lives saved (93%) have been in the African Region.

Of the 3.3 million deaths averted between 2001 and 2012, 3 million (90%) are estimated to be in children under 5 years of age in sub-Saharan Africa. They account for 20% of the 15 million fewer deaths that are estimated to have been averted in sub-Saharan Africa since 2000 through overall reductions in child mortality rates. Thus, decreases in malaria deaths have contributed substantially to progress towards achieving the target for MDG 4, which is to reduce, by two thirds, the under-five mortality rate between 1990 and 2015.

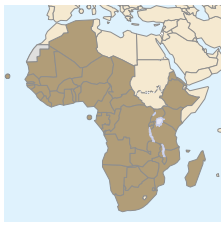
There remain many inherent uncertainties in any approach to producing estimates of malaria case incidence and mortality, and to producing analyses based on the estimates. In 2012, the MPAC endorsed the creation of an ERG on malaria burden estimation, to advise WHO on what methods should be used to estimate the number of malaria cases and deaths. Recommendations will be implemented during 2014. The global malaria community needs to increase its efforts to support malaria-endemic countries in improving diagnostic testing, surveillance, vital registration and routine health-information systems, so that accurate information on malaria morbidity and mortality can be obtained to inform and direct programmes.

References

1. *World malaria report 2012*. Geneva, World Health Organization, 2012 (http://www.who.int/malaria/publications/world_malaria_report_2012/en/index.html, accessed 15 October 2013).
2. *World malaria report 2011*. Geneva, World Health Organization, 2011 (http://apps.who.int/iris/bitstream/10665/44792/2/9789241564403_eng_full.pdf, accessed 22 November 2013).

Regional profiles

African Region



Central Africa

Algeria
Benin
Burkina Faso
Cabo Verde
Côte d'Ivoire
Gambia
Ghana
Guinea
Guinea-Bissau
Liberia
Mali
Mauritania
Niger
Nigeria
Sao Tome & Principe
Senegal
Sierra Leone
Togo

West Africa

Angola
Burundi
Cameroon
Central African Republic
Chad
Congo
Democratic Republic of the Congo
Equatorial Guinea
Gabon

East Africa and high transmission areas in Southern Africa

Comoros
Eritrea
Ethiopia
Kenya
Madagascar
Malawi
Mozambique
Rwanda
Uganda
United Republic of Tanzania (Mainland)
United Republic of Tanzania (Zanzibar)
Zambia

Low transmission Southern African Countries

Botswana
Namibia
South Africa
Swaziland
Zimbabwe

Region of the Americas

Argentina
Belize
Bolivia (Plurinational State of)
Brazil
Colombia
Costa Rica
Dominican Republic
Ecuador
El Salvador
French Guiana, France
Guatemala
Guyana
Haiti
Honduras
Mexico
Nicaragua
Panama
Paraguay
Peru
Suriname
Venezuela (Bolivarian Republic of)

Eastern Mediterranean Region

Afghanistan
Djibouti
Iran (Islamic Republic of)
Iraq
Pakistan
Saudi Arabia
Somalia
South Sudan
Sudan
Yemen

European Region

Azerbaijan
Georgia
Kyrgyzstan
Tajikistan
Turkey
Uzbekistan

South-East Asia Region

Bangladesh
Bhutan
Democratic People's Republic of Korea
India
Indonesia
Myanmar
Nepal
Sri Lanka
Thailand
Timor-Leste

Western Pacific Region

Cambodia
China
Lao People's Democratic Republic
Malaysia
Papua New Guinea
Philippines
Republic of Korea
Solomon Islands
Vanuatu
Viet Nam

This section (i) describes the graphs used in the regional profiles, and (ii) summarizes trends in malaria case incidence and their link to malaria programme implementation by WHO region.

The following maps and graphs are shown for each WHO region:

Figure A. Population at risk: The population at high risk for malaria is that living in areas where the incidence of parasitologically confirmed is more than 1 per 1000 per year (defined at the second or lower administrative level). The population at low risk for malaria is that living in areas with >0 but ≤1 case of malaria per 1000 per year.

Figure B. Percentage of cases due to *P. falciparum*: The percentage of confirmed cases in which *P. falciparum* or a mixed infection was detected, calculated as the total number of *P. falciparum* and mixed infections between 2008 and 2012, divided by the number of positive cases between 2008 and 2012.

Figure C. Annual blood examination rate (ABER): Calculated as the number of slide and rapid diagnostic test (RDT) examinations carried out between 2008 and 2012, divided by the population at risk for malaria between 2008 and 2012.

Figure D. Change in malaria case incidence: The percentage change in the incidence of reported confirmed cases between 2000 and 2012 (decrease, downward bars; increase, upward bars). For countries in the WHO African Region, the figure shows percentage reductions in the rate of hospital admissions (except for Algeria, Cabo Verde and Sao Tome and Principe, and five countries in low-transmission south-east Africa, where incidence of reported confirmed cases are used) and in the rate of reported malaria deaths. Although the diagnosis of admitted patients is not always confirmed with a diagnostic test, the predictive value of diagnosis undertaken for an admitted patient is considered to be higher than for outpatient diagnosis that is based only on clinical signs and symptoms.

Figures E and F. The numbers of cases (or admissions) for each country between 2000 and 2012: Countries are divided into those that are on track to achieve a >75% decrease in case incidence by 2015, using 2000 as the baseline (Figure G) and those that are projected to achieve a decrease of ≤75%, incur an increase, or for which reported data are insufficiently consistent to make an inference about trends (Figure H). A 75% reduction in malaria case incidence is equivalent to a 5% reduction per year between 2000 and 2015. Thus, to achieve a reduction of 75% by 2015, countries need to have reduced the incidence of malaria by at least 60% between 2000 and 2012. Countries that reduced malaria incidence rates by 40%–60% between 2000 and 2012 are projected to achieve reductions in malaria case incidence of 50%–75% in 2015.

Figure G. Percentage of population at risk protected with IRS and ITNs: The horizontal scale shows the estimated proportion of the population at risk for malaria protected by preventive programmes with IRS and ITNs. For the WHO African Region and for Djibouti, Somalia, South Sudan and the Sudan in the Eastern Mediterranean Region, the proportion of the population with access to an ITN is derived from a model that takes into account household-survey data, ITNs distributed by NMCPs, and ITNs delivered by manufactures (*3*). For other countries, the proportion of the population protected with ITNs is estimated from the number of ITNs delivered by NMCPs in the past 3 years divided by the population at high risk. It is assumed that each net delivered can cover on average 1.8 people, that conventional nets are re-treated regularly, and that nets are not replaced for at least 3 years. The denominator is the population living at high risk for malaria, since it is assumed that, in countries with lower levels of transmission, ITNs will be preferentially targeted to populations at higher risk. IRS coverage is calculated as the total number of people protected with IRS, divided by the population at high risk. There are limited data on the extent to which these interventions overlap, so the two bars simply represent the percentage of populations protected by the respective interventions individually.

Figure H. Percentage of cases potentially treated with antimalarial medicines: Few countries have information systems that record treatments given to individual patients. It is therefore necessary to use aggregate information on numbers of treatment courses delivered to public health facilities, and relate this information to the number of patients attending such facilities. For countries in the WHO African Region, the number of treatment courses available is calculated as the total number of ACT courses delivered by an NMCP, divided by the **estimated** number of confirmed plus presumed *P. falciparum* malaria cases attending public health facilities. In other WHO regions, the number of treatment courses available is shown as a percentage of confirmed plus presumed malaria cases **reported** in the public sector (correcting for reporting completeness). The bars for any antimalarial treatment show the number of all treatment courses supplied in relation to all malaria cases, including those due to *P. falciparum*. The bars for ACT show the number of ACT treatment courses in relation to the number of *P. falciparum* cases reported in the public sector. In many countries in sub-Saharan Africa, patients with clinically diagnosed malaria do not receive a diagnostic test but are presumed to have *P. falciparum*.

West Africa

Population affected: Approximately 324 million people in the 17 countries of this subregion are at some risk for malaria, with 313 million people at high risk (**Figure A**). Transmission is generally intense in this subregion except in Cabo Verde and Algeria, which are in the pre-elimination and elimination phases, respectively. Malaria cases are almost exclusively due to *P. falciparum* (**Figure B**).

Trends in cases and deaths: Cabo Verde has seen consistent decreases in malaria cases since 2000, and in 2012 it reported only one local case and zero deaths for the first time (**Figures D, E**). Algeria reported only 4 locally acquired cases in 2011, but 59 in 2012. The number of imported cases also rose from 187 in 2011 to 828 in 2012, possibly associated with population movements from Mali. It was not possible to assess trends in the 14 remaining countries in the subregion because of variation in health service coverage, diagnostic testing or reporting rates over time. In several cases, improved health service coverage and reporting has led to increased numbers of admissions being reported (**Figures D, F**).

Decreases in malaria morbidity and mortality have been reported from limited areas of Burkina Faso (*4*) and Togo (*5, 6*), but these research findings are not sufficient to draw conclusions about national trends.

Links with antimalarial interventions: The reduction in cases in Cabo Verde appears to be associated with a high coverage of IRS and delivery of ACTs (**Figures G, H**). The proportion of the population with access to an ITN within their household is estimated to exceed 50% in 10 countries: Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Liberia, Mali, the Niger, Sierra Leone, Senegal and Togo. The use of IRS has increased in the subregion, but coverage remains relatively low. Only seven countries reported delivering sufficient antimalarial medicines to treat all patients attending public health facilities: Algeria, Burkina Faso, Cabo Verde, Gambia,, Liberia, Mali and Sierra Leone.

Country in the pre-elimination phase

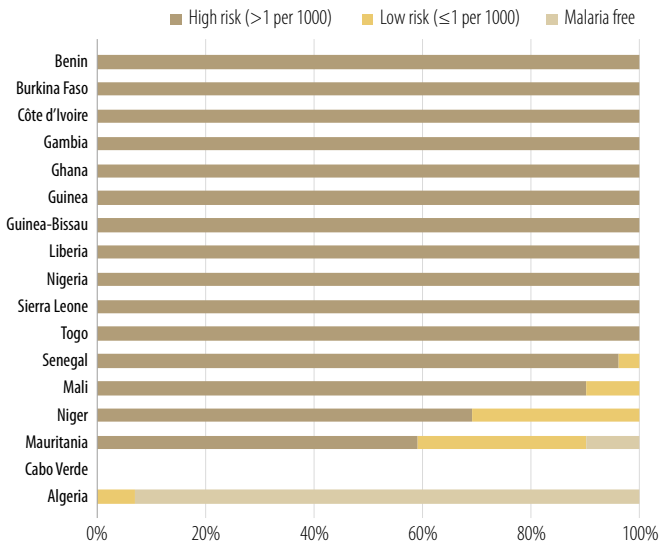
Cabo Verde

Country in the elimination phase

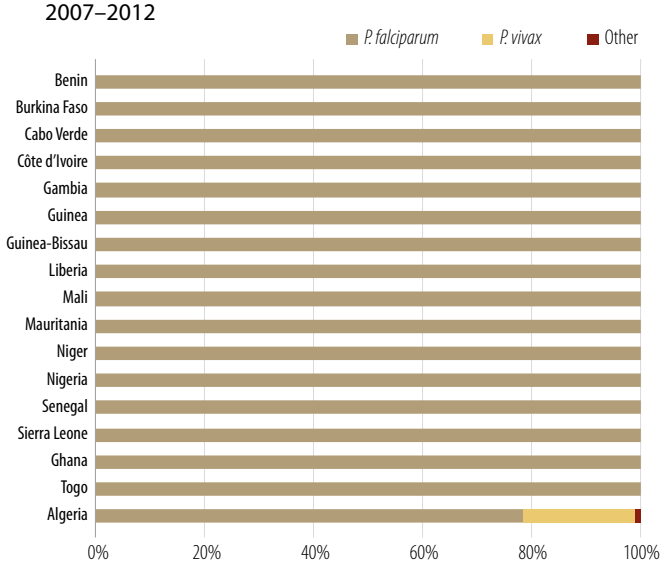
Algeria

Summary: Cabo Verde continues to progress towards eliminating malaria, having reported decreases in malaria case incidence of >75% between 2000 and 2012. Algeria reported an increase in 2012. Several countries in the subregion have improved their levels of intervention coverage, but it was not possible to assess trends in cases or admissions owing to changes in health service access, diagnostic testing or reporting over time.

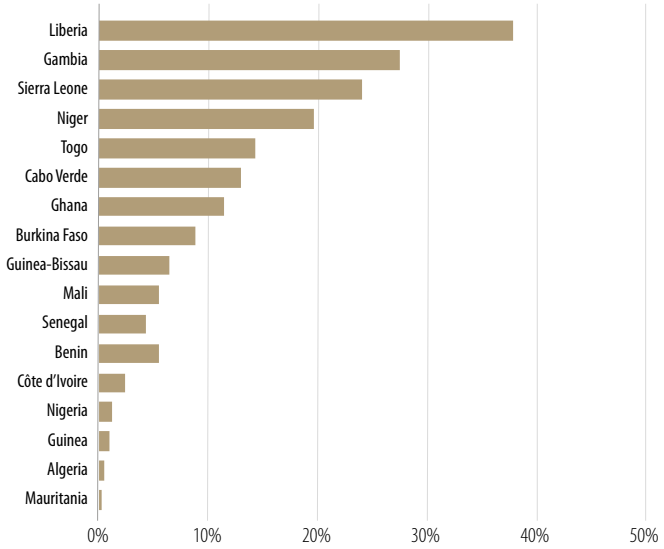
A – Population at risk, 2012



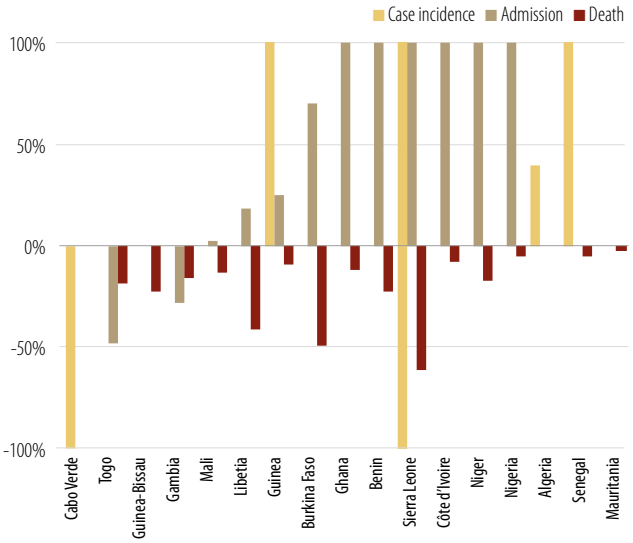
B – Percentage of cases due to *P. falciparum* and *P. vivax*, 2007–2012



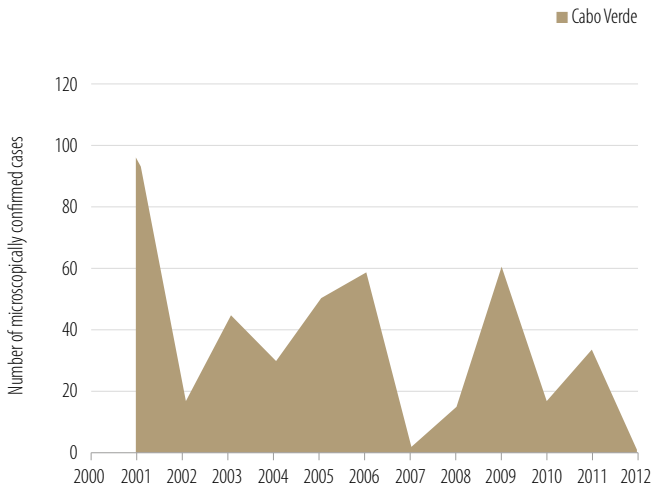
C – Annual blood examination rate, 2007–2012



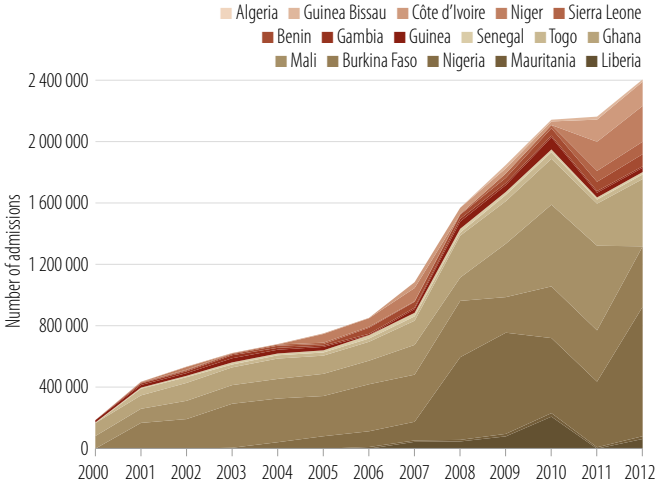
D – Percentage change in case incidence or admission and death rates, 2000–2012



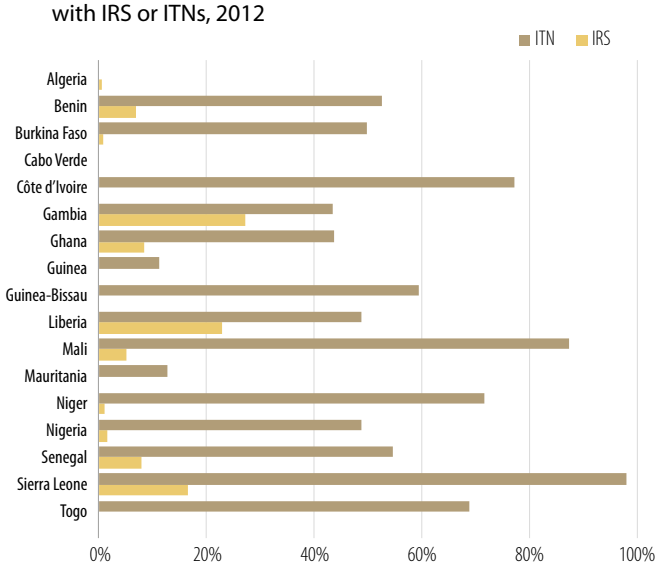
E – Countries projected to achieve >75% decrease in case incidence of microscopy confirmed cases by 2015



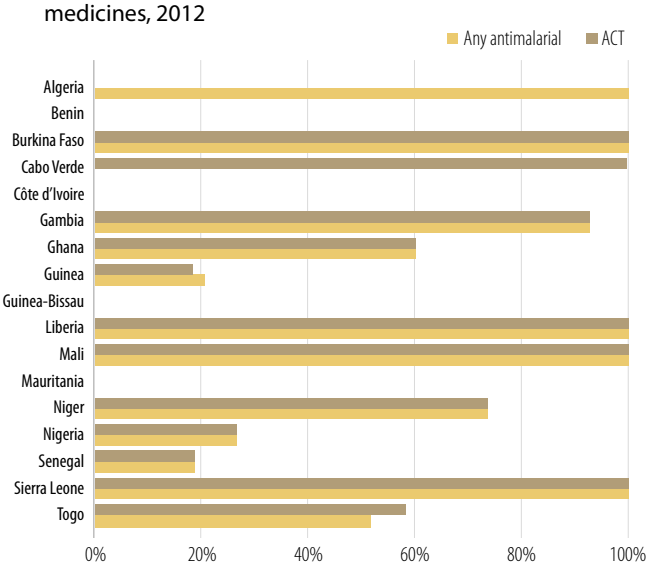
F – Countries projected to achieve ≤75% decrease in admission rates by 2015 or with insufficiently consistent data to assess trends



G – Estimated percentage of high risk population protected with IRS or ITNs, 2012



H – Percentage of cases potentially treated with antimalarial medicines, 2012



Central Africa

Population affected: About 140 million people in 10 countries are at some risk for malaria in this subregion, with 124 million people at high risk (**Figure A**). Cases are caused exclusively by *P. falciparum* (**Figure B**).

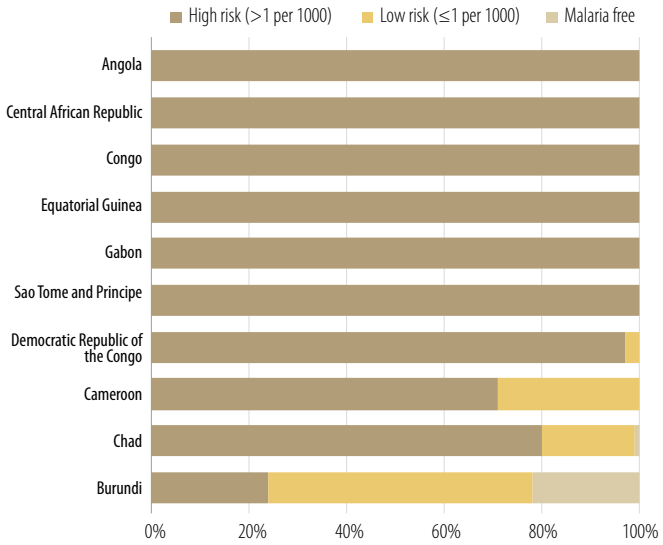
Trends in cases and deaths: In Sao Tome and Principe, the incidence of confirmed malaria decreased by >75% between 2000 and 2012. Similar decreases were observed in reported malaria admission and death rates (**Figures D, E**). However, confirmed and admitted cases increased twofold between 2009 and 2012. In the nine remaining countries, it was not possible to assess trends because of incompletely reported data or changes in health service access or diagnostic testing. In several countries, the total number of admissions from all causes increased, suggesting improved health service access that has led to an increase in the number of reported malaria admissions (**Figure D**).

Other evidence of changes in malaria incidence are scarce in this subregion. A study in the Island of Bioko in Equatorial Guinea reported a decrease in parasite prevalence between 2004 and 2011 following scale-up of ITNs and IRS (*7*), although a recent report indicates that foci of high transmission persist (*8*).

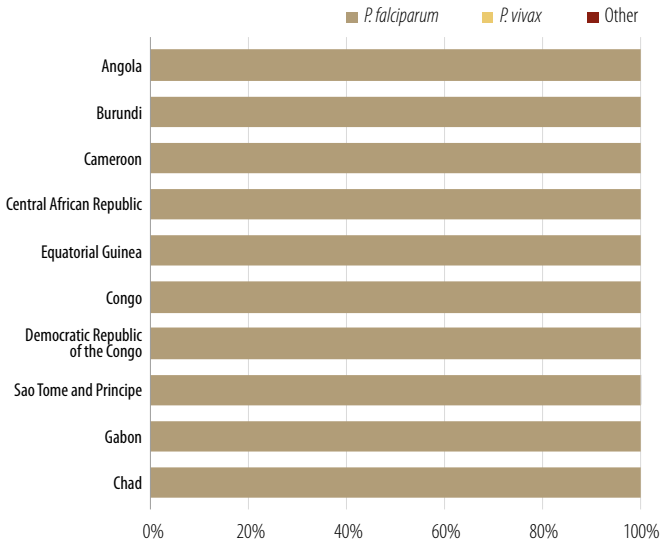
Links with antimalarial interventions: Sao Tome and Principe has high rates of coverage with ITNs (100%), IRS (85%) and diagnostic testing (≥70%), and has delivered sufficient ACTs to treat all patients attending public health facilities. The recent increase in malaria cases and admissions may be related to brief disruptions to spraying activities and supply of ACTs. The proportion of the population with access to an ITN within their household is estimated to exceed 50% in five countries (Burundi, Cameroon, Chad, Democratic Republic of the Congo and Equatorial Guinea) (**Figure G**). Angola and Burundi reported delivery of sufficient ACTs to treat >50% patients attending the public health facilities (**Figure H**).

Summary: Only Sao Tome and Principe was able to demonstrate decreases in malaria incidence of >75% between 2000 and 2012, but that country has suffered some resurgence in recent years. Assessment of trends in case incidence or admissions was not possible in the remaining countries in the subregion, owing to changes in health service access, diagnostic testing or reporting over time.

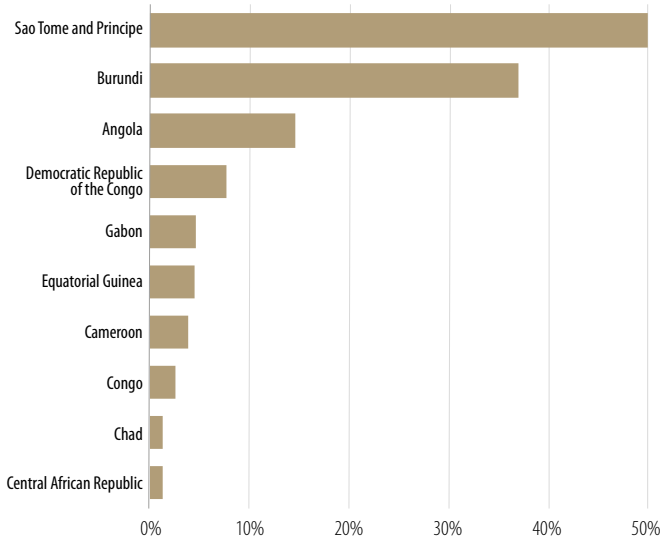
A – Population at risk, 2012



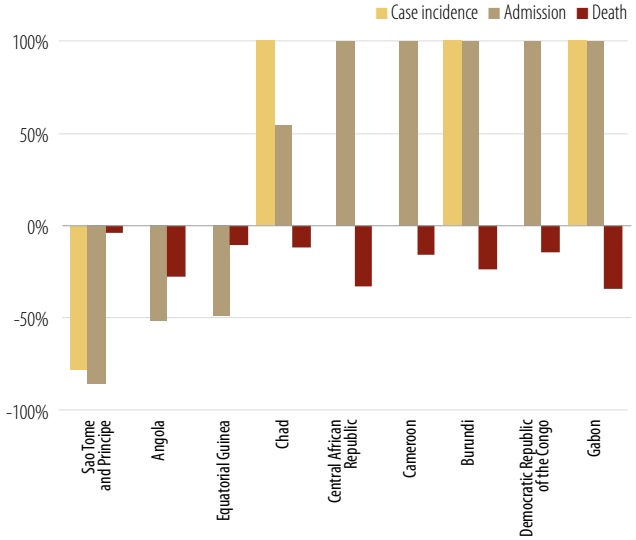
B – Percentage of cases due to *P. falciparum* and *P. vivax*, 2007–2012



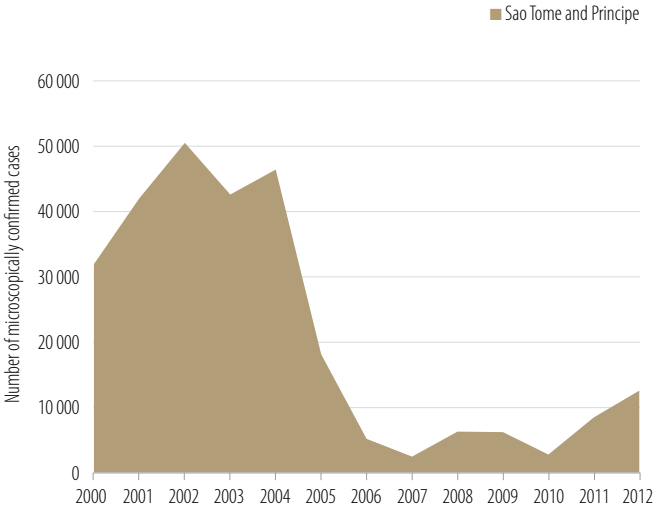
C – Annual blood examination rate, 2007–2012



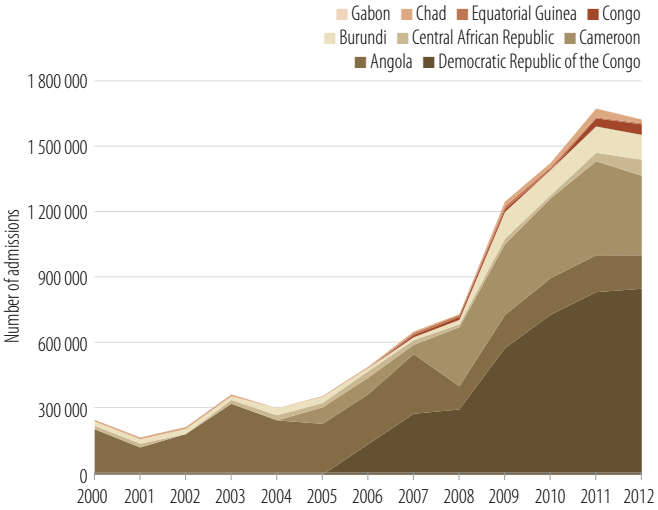
D – Percentage change in case incidence or admission and death rates, 2000–2012



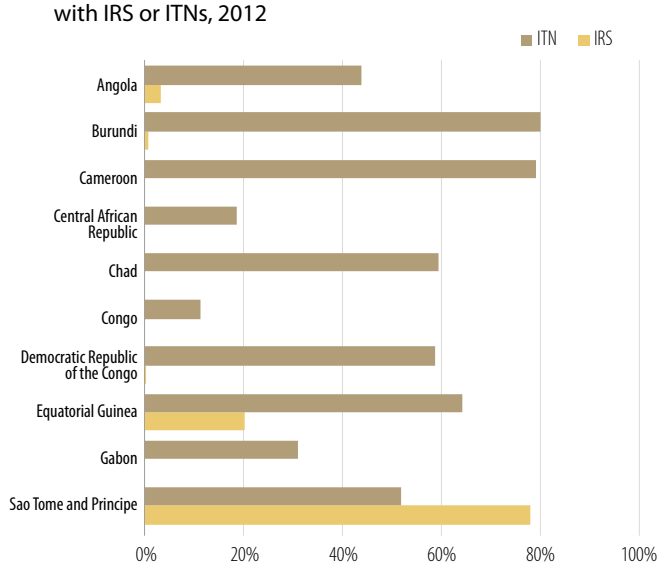
E – Countries projected to achieve >75% decrease in case incidence of microscopy confirmed cases by 2015



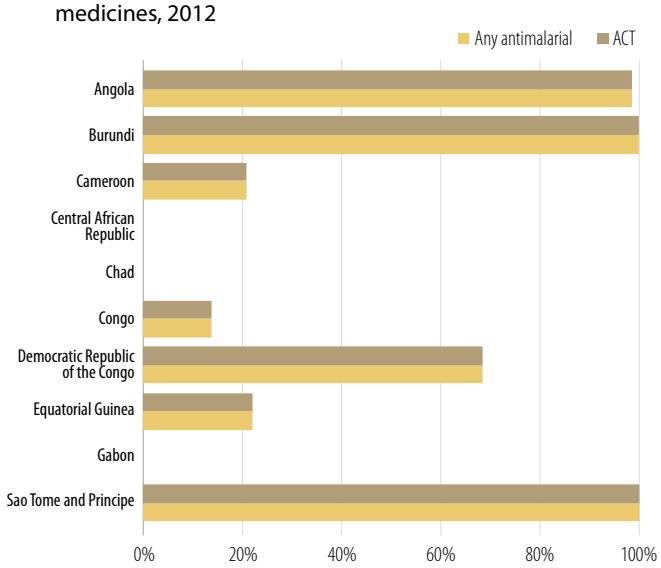
F – Countries projected to achieve ≤75% decrease in admission rates by 2015 or with insufficiently consistent data to assess trends



G – Estimated percentage of high risk population protected with IRS or ITNs, 2012



H – Percentage of cases potentially treated with antimalarial medicines, 2012



East and southern Africa

(excluding low transmission countries in southern Africa)

Population affected: About 274 million people in the 11 countries of this subregion are at some risk for malaria, with 162 million people at high risk (**Figure A**). About 25% of the population of Ethiopia and Kenya live in areas that are free of malaria. Cases are predominantly due to *P. falciparum*, except in Eritrea and Ethiopia, where *P. vivax* accounts for about 45% of cases (**Figure B**).

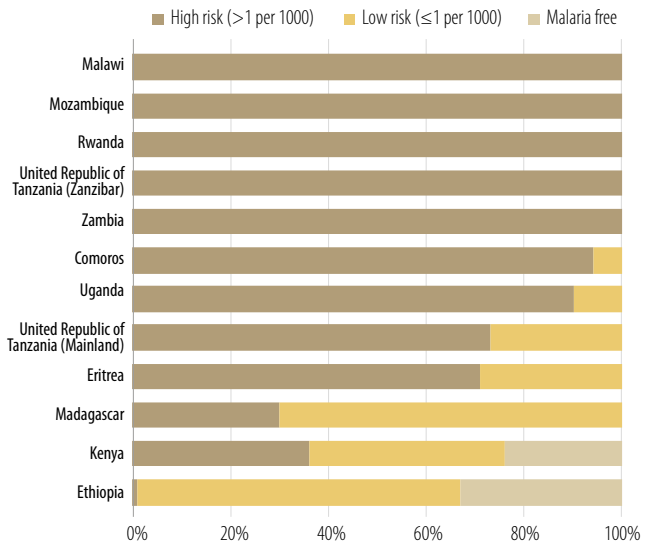
Trends in cases and deaths: In recent years, almost all the countries have expanded diagnostic testing with RDTs and microscopy, resulting in increases in the number of confirmed cases in most settings. Given the change in diagnostic practice it is necessary to use numbers of malaria admissions to examine changes in malaria incidence over time. Malaria admission rates decreased by >75% in United Republic of Tanzania (Zanzibar) and Rwanda between 2000 and 2012 (**Figure D**). Malaria case incidence and mortality rates also decreased in Rwanda between 2000 and 2010 (*9*), but the number of confirmed cases increased between 2011 and 2012 (with similar numbers of cases being tested), reflecting the fragility of the gains. Malaria admission rates are projected to decrease by 50%–75% in Eritrea and Zambia and by <50% in Madagascar by 2015. Decreases in malaria admission rates were also seen in Mozambique, but the earliest data available are from 2007.

In Ethiopia, nationally aggregated data show an increase in admissions, possibly due to an expansion of health services, with >70 hospitals, 2500 health centres, and 16 000 health posts being built since 2005. However, a review of data from 41 hospitals located at <2000 m altitude (malarious areas) indicated a >50% decrease in confirmed malaria cases, admissions and deaths in 2011 compared to 2001. For the other six countries, it was not possible to assess trends nationally, owing to changes in health service accessibility, increased testing or inconsistency of reporting (**Figures D, F**). Nonetheless, there is evidence of progress being made at least in some parts of some of these countries. In the United Republic of Tanzania, malaria incidence and admission rates decreased by >75% between 2000 and 2012 on the island of Zanzibar. Similar decreases in malaria incidence subnationally have been reported in Kenya (*10*), Uganda (*11*) and the United Republic of Tanzania (Mainland) (*12*). Variation in trends is known to occur within countries (*13*); hence, it is not possible to infer national trends from these studies.

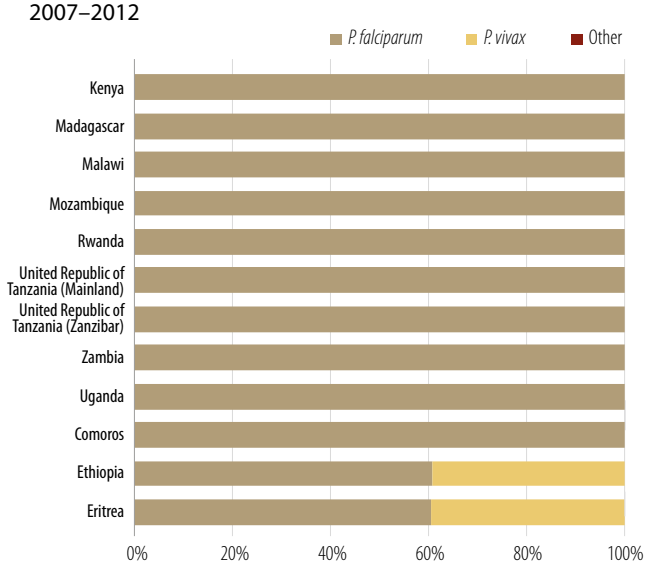
Links with antimalarial interventions: The proportion of the population with access to an ITN in their household was estimated to exceed 50% in nine countries (Eritrea, Ethiopia, Kenya, Madagascar, Mozambique, Rwanda, Uganda, United Republic of Tanzania and Zambia) (**Figure G**). All the countries except Mozambique distributed sufficient ACTs to treat all patients attending public health facilities in 2012 (Comoros did not report) (**Figure H**). The high coverage of malaria interventions in recent years may partly explain the progress reported in Eritrea, Ethiopia, Rwanda, Zambia and Zanzibar (United Republic of Tanzania).

Summary: Malaria admission rates decreased by >75% in Eritrea, Rwanda and Zanzibar (United Republic of Tanzania) between 2000 and 2012, and are projected to decrease by 50%–75% by 2015 in Ethiopia and Zambia, and by <50% in Madagascar. In the remaining countries, it was not possible to assess trends in case incidence or admissions owing to changes in health service accessibility, increased testing or inconsistency of reporting.

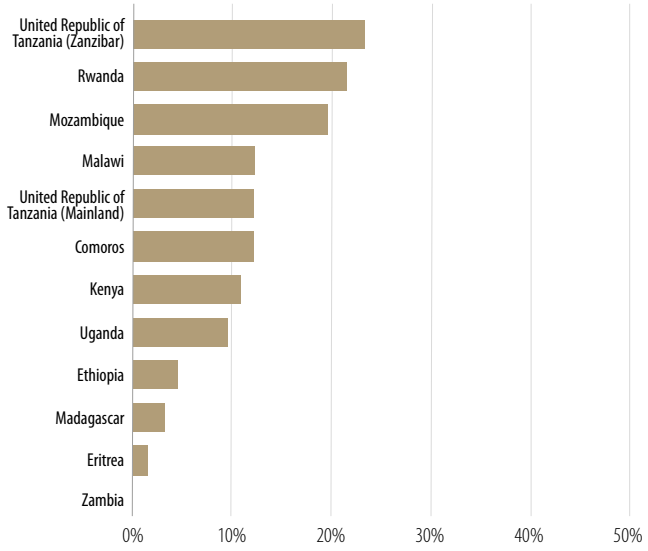
A – Population at risk, 2012



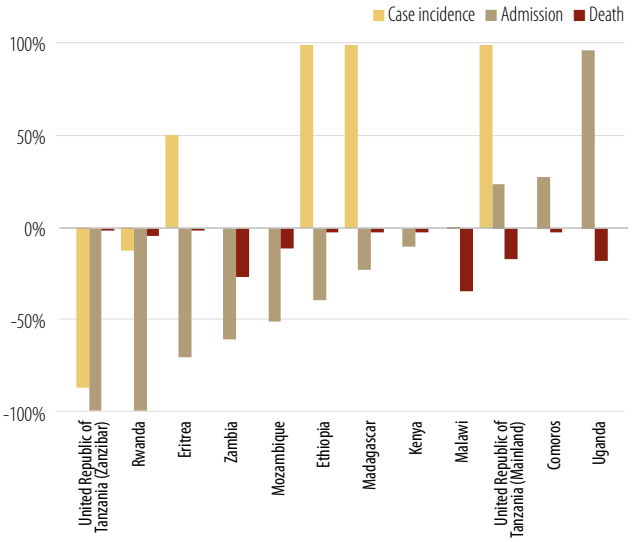
B – Percentage of cases due to *P. falciparum* and *P. vivax*, 2007–2012



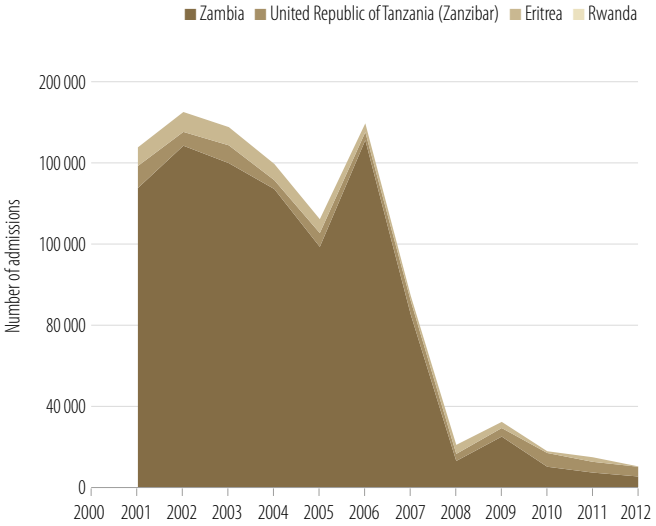
C – Annual blood examination rate, 2007–2012



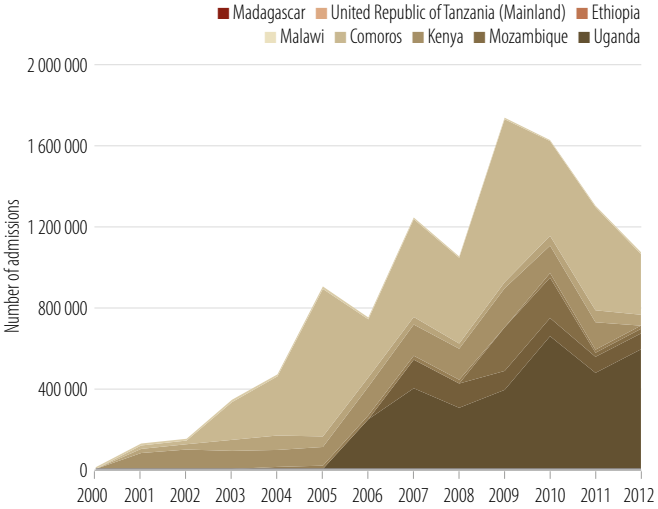
D – Percentage change in case incidence or admission and death rates, 2000–2012



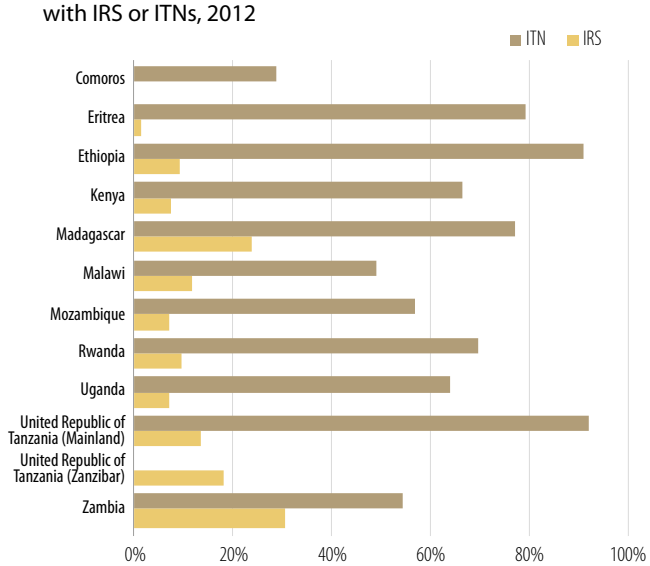
E – Countries projected to achieve >75% decrease in admission rates by 2015



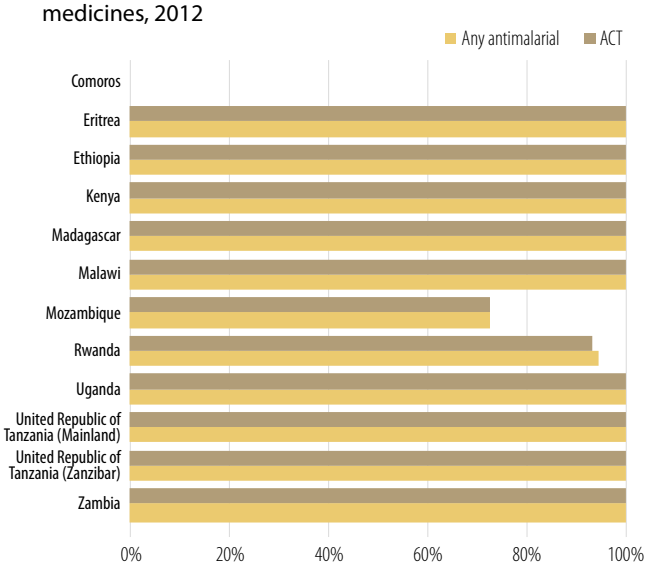
F – Countries projected to achieve ≤75% decrease in admission rates by 2015 or with insufficiently consistent data to assess trends



G – Estimated percentage of high risk population protected with IRS or ITNs, 2012



H – Percentage of cases potentially treated with antimalarial medicines, 2012



Low transmission southern African countries

Populations affected: Approximately 15 million people in the five countries of the low-transmission South African subregion are at some risk for malaria, and 10 million people are at high risk (**Figure A**). About 80%, or 55 million people, live in areas that are free of malaria. Malaria transmission is highly seasonal. Most malaria cases are caused by *P. falciparum* (**Figure B**).

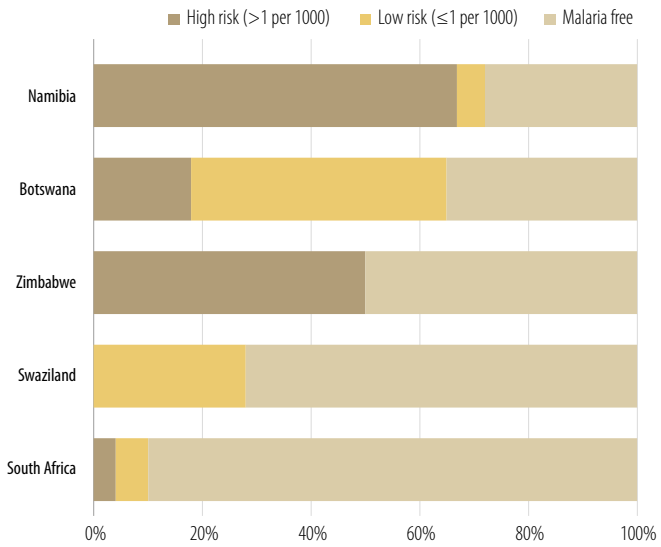
Trends in cases and deaths: In 2012, the number of confirmed malaria cases reported in the subregion was 283 000, of which 98% were from Zimbabwe. Four of the five countries in this subregion (Botswana, Namibia, Swaziland and South Africa) recorded a decrease of malaria case incidence of >75% between 2000 and 2012 (**Figure D**). The number of reported cases in these four countries decreased by 50% between 2011 and 2012, after some stagnation of their downward trends since 2007. For Zimbabwe, it was not possible to assess trends owing to inconsistent reporting and a change in diagnostic practice (**Figures D, F**). Reports on confirmed cases are not available from before 2004; the number of patients receiving a diagnostic test tripled between 2007 and 2012, with RDTs increasingly replacing the use of microscopy.

Reported malaria deaths in the subregion decreased from 3513 in 2002 (the earliest year for which data from all five countries are available) to 437 in 2012. Two countries accounted for 96% of reported deaths in 2012: Zimbabwe (80%) and South Africa (16%). Malaria mortality rates have decreased by >75% in each of the five countries between 2000 and 2012 but the number of malaria deaths has remained relatively stable in South Africa since 2007.

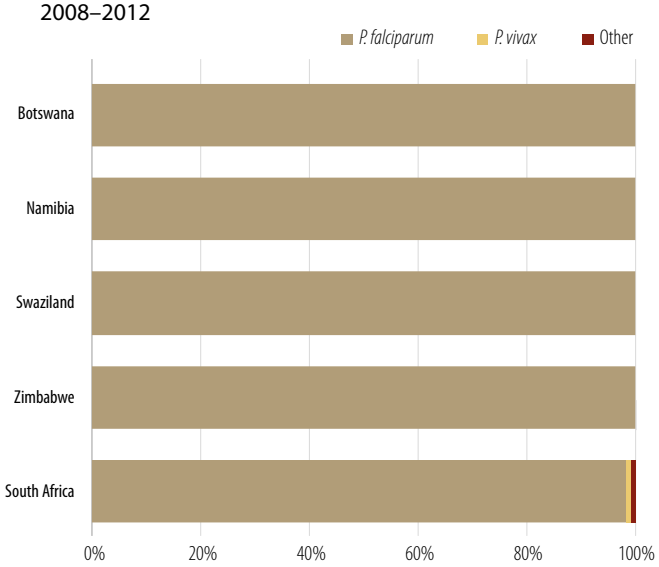
Links with antimalarial interventions: In South Africa, where IRS is the primary vector control measure, nearly all of the population at risk was protected in 2012 (**Figure G**). The number of people with access to an ITN in their household was estimated to exceed 50% in three countries in 2012 (Namibia, Swaziland and Zimbabwe). All of the countries except South Africa and Swaziland reported adequate access to antimalarial medicines (including ACT) in 2012 (**Figure H**).

Summary: Progress in reducing malaria in this subregion has been notable, with four of the five countries achieving a >75% reduction in case incidence since 2000. It was not possible to assess trends in case incidence in Zimbabwe, owing to inconsistency of reporting over time. All five countries in the subregion, together with Angola, Mozambique and Zambia, are signatories to the Elimination Eight (E8) regional initiative launched in March 2009, a goal of which is to achieve the eventual elimination of malaria in the region, and to achieve elimination in four countries – Botswana, Namibia, South Africa and Swaziland – by 2015.

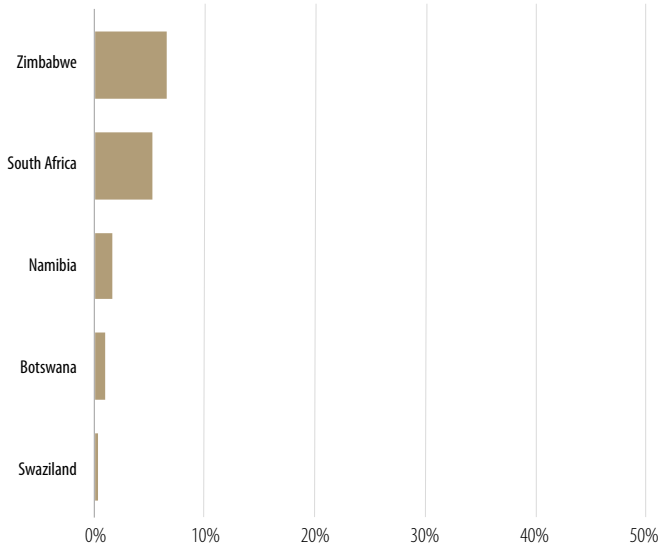
A – Population at risk, 2012



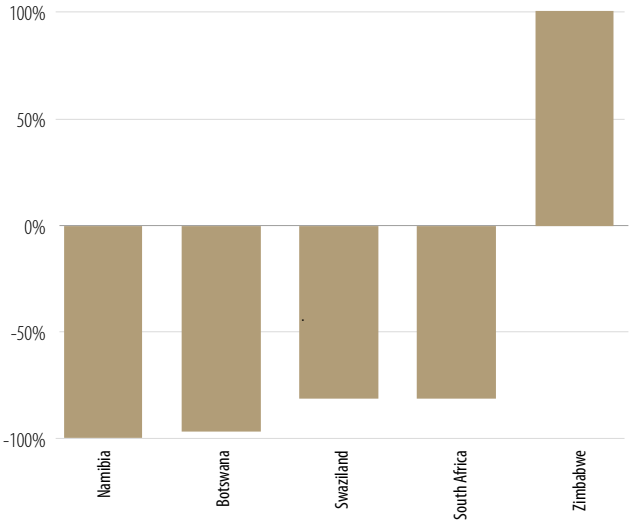
B – Percentage of cases due to *P. falciparum* and *P. vivax*, 2008–2012



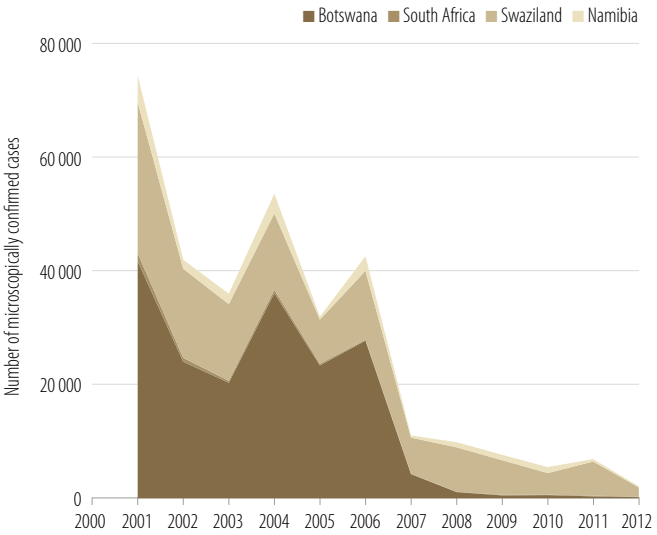
C – Annual blood examination rate, 2008–2012



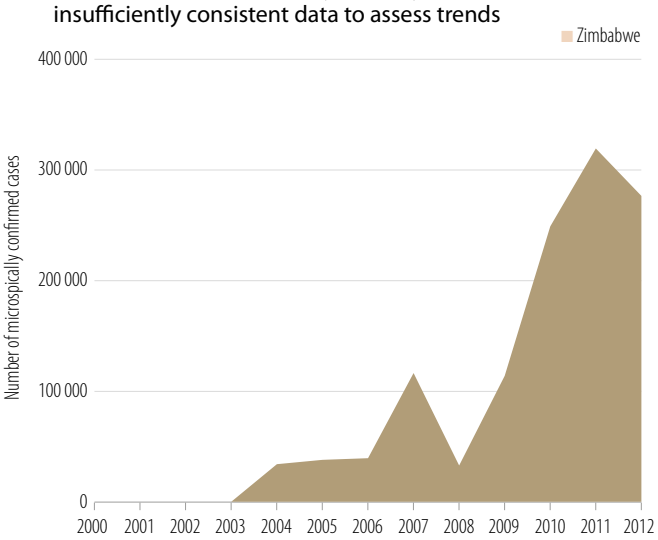
D – Percentage change in incidence of microscopically confirmed cases, 2000–2012



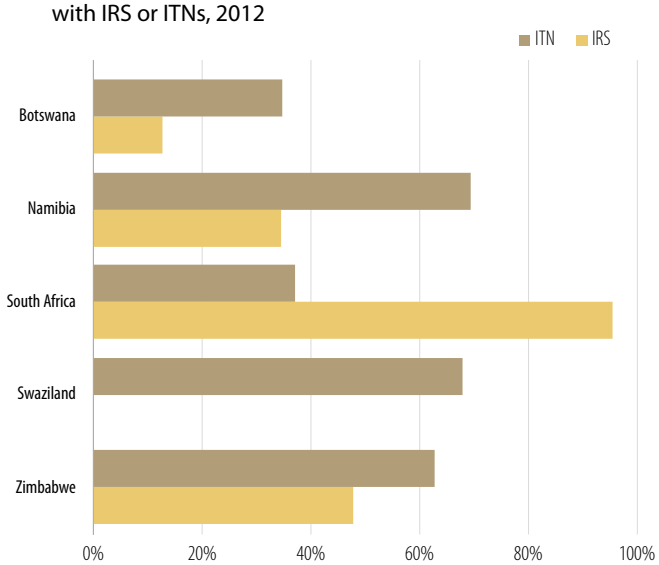
E – Countries projected to achieve >75% decrease in incidence of microscopically confirmed cases by 2015



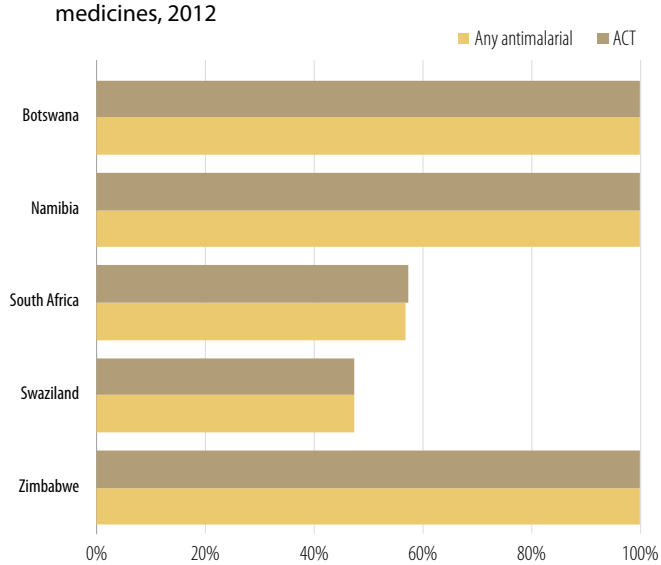
F – Countries projected to achieve ≤75% decrease in incidence of microscopically cases by 2015 or with insufficiently consistent data to assess trends



G – Estimated percentage of high risk population protected with IRS or ITNs, 2012



H – Percentage of cases potentially treated with antimalarial medicines, 2012



WHO Region of the Americas

Populations affected: In the WHO Region of the Americas, about 120 million people in 21 countries are estimated to be at some risk for malaria, of which 25 million people are considered at high risk (**Figure A**). *P. falciparum* is responsible for <30% of malaria cases overall in the region, although the proportion is more than 50% in Guyana and Suriname and almost 100% in the Dominican Republic and Haiti (**Figure B**).

Trends in cases and deaths: The number of confirmed malaria cases reported in the region decreased by almost 58%, from 1.1 million in 2000 to 469 000 in 2012. Three countries accounted for 76% of cases in 2012: Brazil (52%), Colombia (13%) and Venezuela (Bolivarian Republic of) (1%).

In 13 of the 21 countries (Argentina, Belize, Bolivia, Costa Rica, Ecuador, El Salvador, French Guiana, Guatemala, Honduras, Mexico, Nicaragua, Paraguay, Suriname) malaria case incidence fell by >75% between 2000 and 2012, and three countries (Brazil, Colombia and Peru) are projected to achieve a >75% decrease in case incidence by 2015 (**Figures D, E**). Two countries (Dominican Republic and Panama) are projected to achieve a decrease of <50% malaria case incidence by 2015 (**Figure F**). Two countries (Guyana and Venezuela) reported increases in malaria case incidence in 2012 compared to 2000. In Guyana, the number of cases decreased to less than 12 000 during 2007–2008 but increased to almost 29 000 in 2011 and to more than 32 000 in 2012. The number of cases reported in Venezuela in 2012, almost 53 000, is higher than in any year since the 1960s. In Haiti, the number of confirmed malaria cases reported increased from 17 000 in 2000 to 25 000 in 2012 but these numbers represent only a small proportion of cases that occur in the country.

The number of reported malaria deaths in the region fell from 390 in 2000 to 108 in 2012. Two countries accounted for 78% of reported deaths in 2012: Brazil (59%) and Colombia (19%). These countries registered decreases in malaria mortality rates of 74% and 59% between 2000 and 2012, respectively.

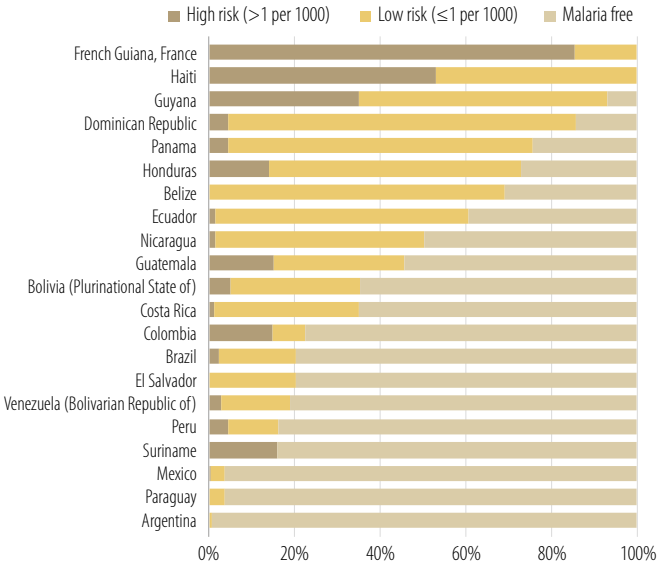
Countries in the pre-elimination phase

Argentina	El Salvador
Belize	Mexico
Costa Rica	Paraguay
Ecuador	

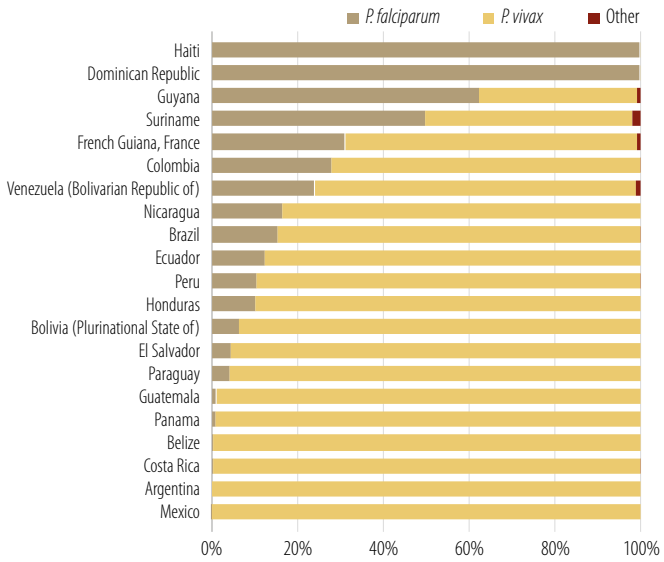
Links with antimalarial interventions: The decrease in case incidence in this region is not clearly associated with a scale-up of preventive interventions. Only six of the 13 countries (Bolivia, Mexico, Guatemala, Nicaragua, Ecuador and Costa Rica) with >75% decrease had distributed sufficient ITNs, or undertaken sufficient IRS, to cover >50% of the population at high risk in 2012 (**Figure E**). Venezuela, which saw an increased number of cases in 2012, reported undertaking sufficient IRS to cover 100% of the population at high risk in 2012. Annual blood examination rates exceed 10% in a further four countries (Belize, Paraguay, Peru and Suriname) that are on track to reduce malaria case incidence by 75% (**Figures E, G**), which may indicate that good access to malaria diagnosis and treatment has helped to reduce malaria case incidence.

Summary: The region has made substantial progress in reducing malaria case incidence in the past decade. Reductions in incidence of >75% in confirmed malaria cases were reported in 13 countries between 2000 and 2012, and a further 3 countries are projected to achieve reductions of >75% by 2015. Seven countries are now classified as being in the pre-elimination phase. However, increases in malaria incidence in Guyana and Venezuela indicate a need for intensification of control efforts in some parts of the region. It was not possible to accurately assess trends in Haiti, owing to incompleteness and inconsistencies in malaria surveillance over time and other factors, including those related to the earthquake in 2010.

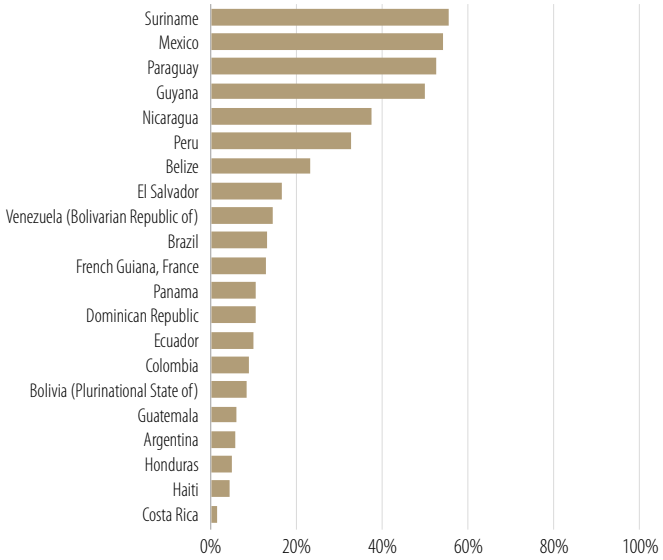
A – Population at risk, 2012



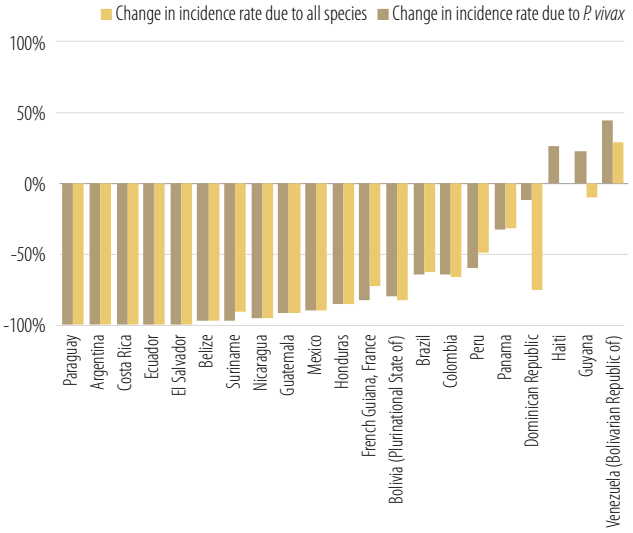
B – Percentage of cases due to *P. falciparum* and *P. vivax*, 2008–2012



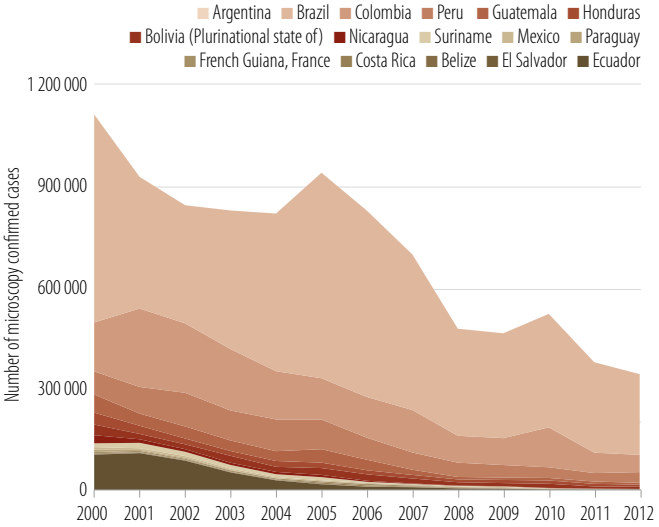
C – Annual blood examination rate, 2008–2012



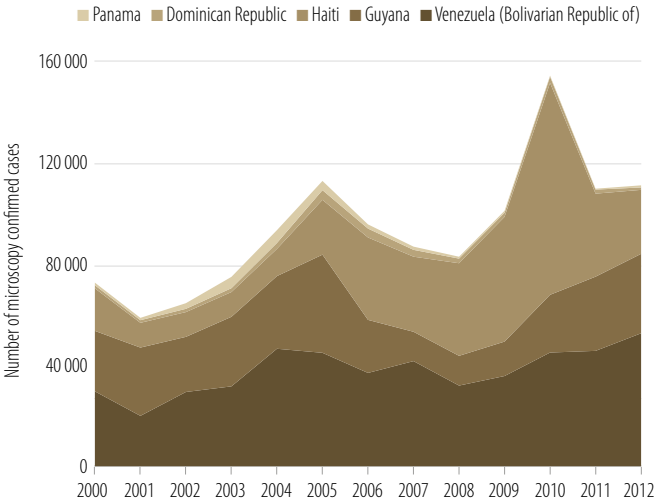
D – Percentage change in incidence of microscopically confirmed cases, 2000–2012



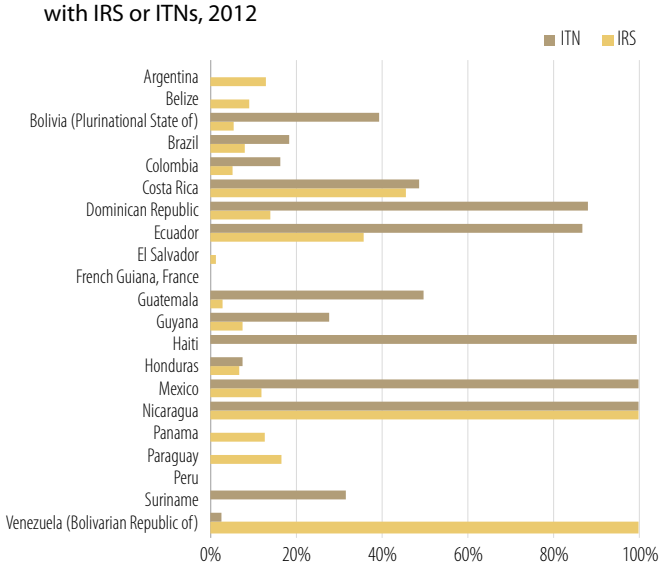
E – Countries projected to achieve >75% decrease in incidence of microscopically confirmed cases by 2015



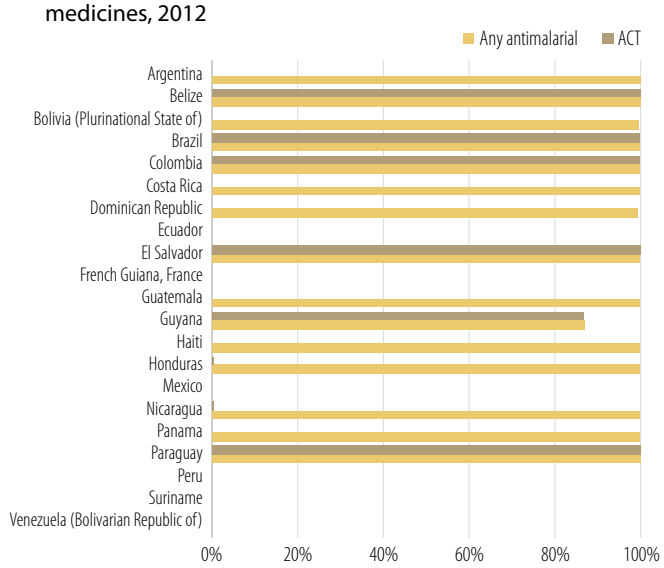
F – Countries projected to achieve ≤75% decrease in incidence of microscopically confirmed cases by 2015 or with insufficiently consistent data to assess trends



G – Percentage of high risk population potentially protected with IRS or ITNs, 2012



H – Percentage of cases potentially treated with antimalarial medicines, 2012



Eastern Mediterranean Region

Populations affected: In 2012, about 280 million people in nine countries in the Eastern Mediterranean Region were at some risk of malaria, and about 120 million people were at high risk (**Figure A**). Malaria endemicity varies considerably. Seven countries still have areas of high malaria transmission (Afghanistan, Djibouti, Pakistan, Somalia, South Sudan, Sudan and Yemen); transmission is spatially limited in Iran (Islamic Republic of) and Saudi Arabia; and the last locally acquired case in Iraq was reported in 2009. *P. falciparum* is the dominant malaria species except in Afghanistan, Iran (Islamic Republic of) and Pakistan, where most cases are due to *P. vivax* (**Figure B**).

Trends in cases and deaths: The number of confirmed malaria cases reported in the region decreased from 2 million in 2000 to 13 million in 2012. Three countries accounted for 86% of cases in 2012: the Sudan (47%), Pakistan (22%) and South Sudan (17%). Three countries reported >75% decrease in case incidence between 2000 and 2012 (Iran (Islamic Republic of), Iraq and Saudi Arabia). Iraq has reported zero locally acquired cases since 2009 (**Figures D, E**). Afghanistan is projected to achieve a >75% decrease in case incidence by 2015. The number of confirmed cases in Pakistan was higher in 2010–2012 than in previous years, particularly in the districts of Khyber Pakhtoon Khawa, Punjab and Sindh (**Figures D, F**). However, the increase was associated with increased diagnostic testing and health facility reporting, so the nature of the trend is unclear. Similarly in Djibouti, Somalia, South Sudan and the Sudan it was not possible to make an assessment of trends owing to inconsistent reporting of confirmed cases over time.

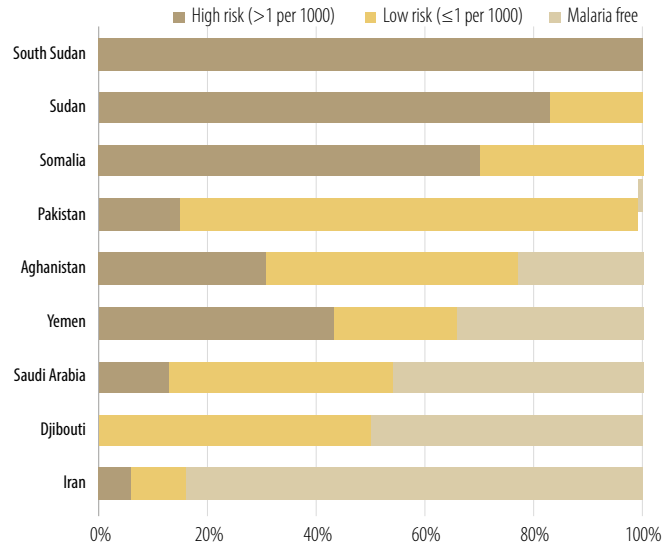
The reported number of deaths due to malaria has remained relatively stable, with 2166 reported in 2000 and 2307 in 2012 (Annex 6E). However, there are gaps in the data submitted to WHO. Three countries accounted for 95% of reported malaria deaths in 2012: South Sudan (57%), the Sudan (27%) and Pakistan (11%).

Links with antimalarial interventions: Four countries had distributed sufficient ITNs, or undertaken sufficient IRS, to cover >50% of the population at high risk in 2012 (**Figure G**). Two of these showed reductions in malaria case incidence (Afghanistan and Saudi Arabia), whereas in Djibouti and South Sudan it was not possible to assess trends. Five countries (Iran [Islamic Republic of], Iraq, Saudi Arabia, South Sudan and the Sudan) reported delivering sufficient antimalarial medicines, including ACTs, to treat all patients attending public health facilities, whereas quantities of antimalarial medicines distributed were insufficient in Pakistan, Somalia and Yemen. Afghanistan and Djibouti did not report (**Figure H**).

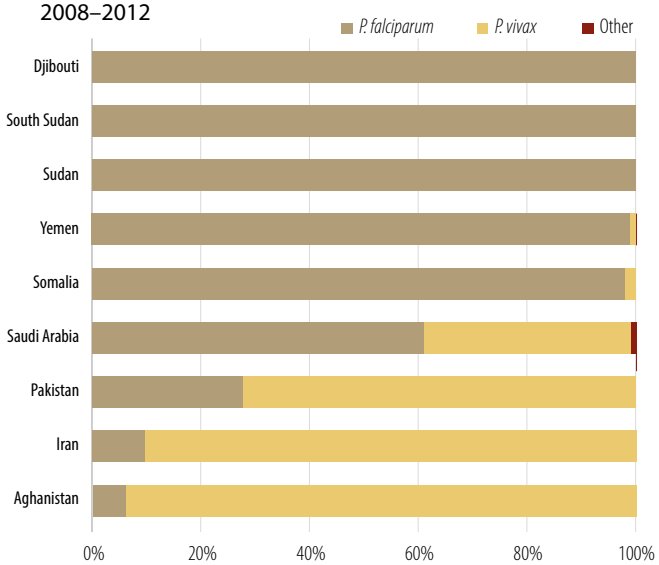
Summary: Three countries in the region (Iran (Islamic Republic of), Iraq and Saudi Arabia) have reduced malaria case incidence by >75% between 2000 and 2012. No locally acquired cases have been reported in Iraq since 2009 and the country is in the prevention of reintroduction phase. Iran (Islamic Republic of), Iraq and Saudi Arabia) are in the elimination phase. Afghanistan is projected to achieve a >75% decrease in case incidence by 2015. The number of reported confirmed cases has fluctuated from year to year in the other six countries (Djibouti, Pakistan, Somalia, South Sudan, Sudan and Yemen) and it is not possible to determine whether malaria case incidence is increasing, decreasing or constant.

Countries in the elimination phase	
Iran (Islamic Republic of)	Saudi Arabia
Countries in the prevention of re-introduction phase	
Iraq	Syrian Arab Republic
Oman	Egypt
Countries certified malaria free	
Morocco, 2010	United Arab Emirates, 2007

A – Population at risk, 2012

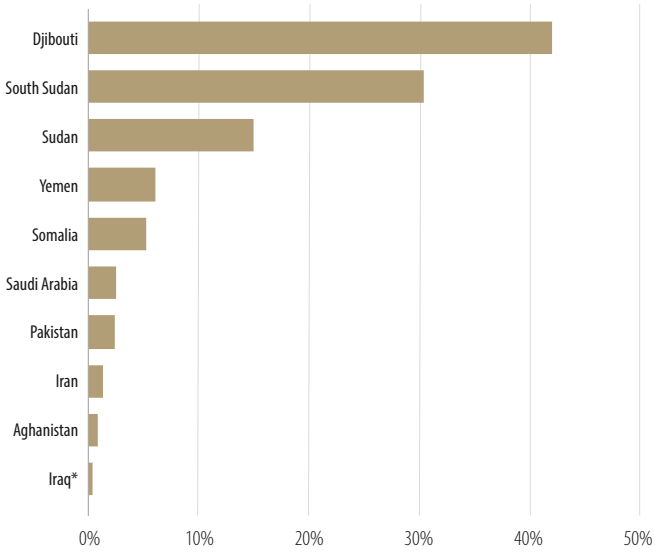


B – Percentage of cases due to *P. falciparum* and *P. vivax**, 2008–2012



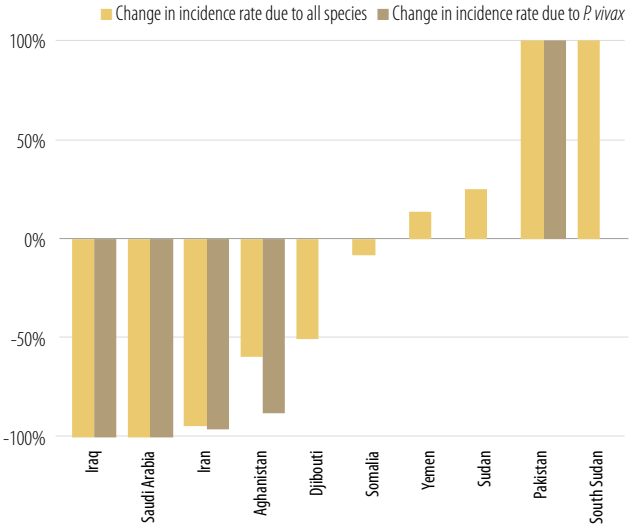
** Using locally reported cases*

C – Annual blood examination rate, 2008–2012

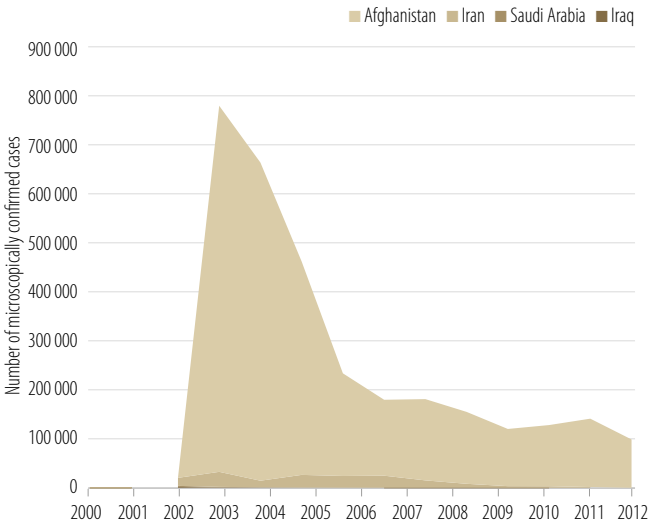


** Based on last reported cases, 2008-2009*

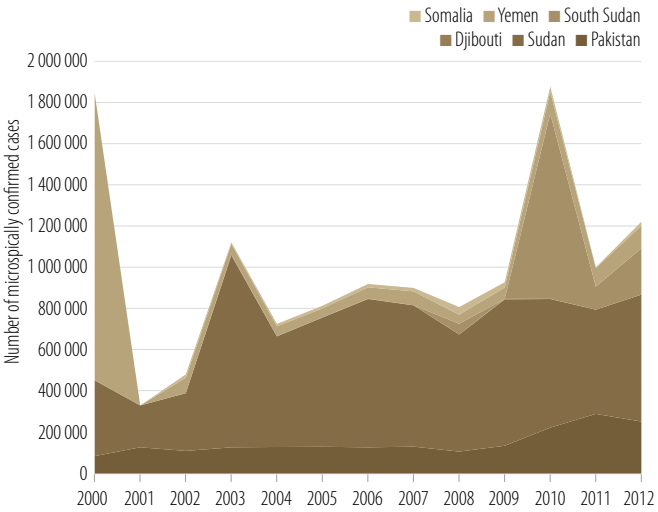
D – Percentage change in incidence of microscopically confirmed cases, 2000–2012



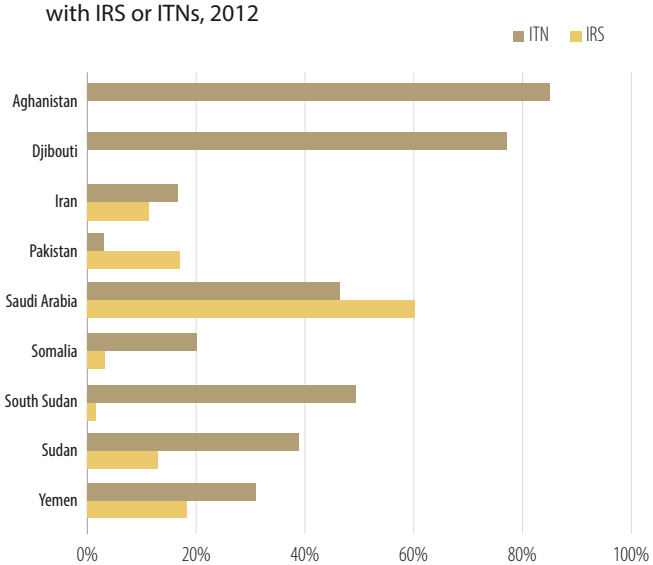
E – Countries projected to achieve >75% decrease in incidence of microscopically confirmed cases by 2015



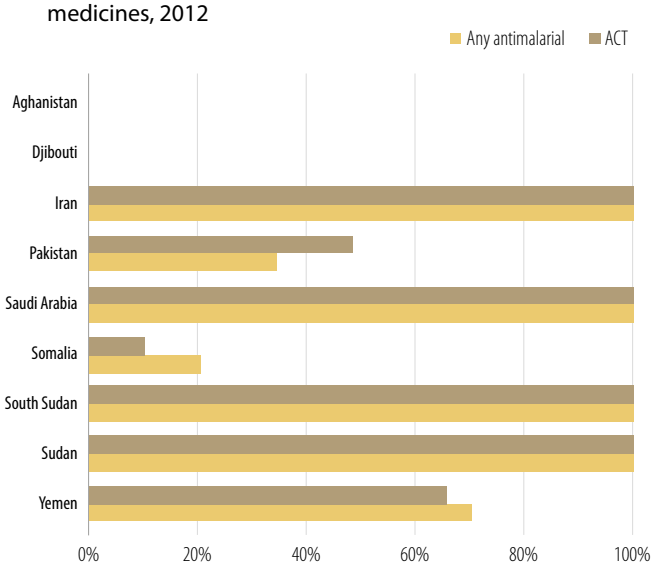
F – Countries projected to achieve ≤75% decrease in incidence of microscopically cases by 2015 or with insufficiently consistent data to assess trends



G – Estimated percentage of high risk population protected with IRS or ITNs, 2012



H – Percentage of cases potentially treated with antimalarial medicines, 2012



European Region

Population affected: In 2000, eight countries in the European Region had ongoing transmission of malaria; however, in 2013, local transmission was confined to just three countries (Azerbaijan, Tajikistan and Turkey) in which 2.9 million people were living in areas with some risk for malaria (**Figure A**). All locally acquired cases are due to *P. vivax* (**Figure B**).

Trends in cases and deaths: Among the 8 countries with ongoing transmission in 2000 the number of confirmed malaria cases decreased from 33 400 in 2000 to 235 in 2012. In 2012, 218 cases were from Turkey, while 16 locally acquired cases were reported from Tajikistan (*13*) and Azerbaijan (*3*). In addition, Georgia, which is in the prevention of reintroduction phase, reported one introduced case.

The 218 cases in Turkey primarily originated from an outbreak in a village in the south-east, which appears to have arisen after importation by international truck drivers. Despite this outbreak, all countries in the region with ongoing transmission (Azerbaijan, Tajikistan and Turkey) achieved >75% decrease in case incidence between 2000 and 2012 (**Figure D**). Kyrgyzstan and Uzbekistan have recorded zero locally acquired cases since 2011, and as of 2013 they are classified as in the prevention of reintroduction phase.

Greece, which is malaria free since 1974, reported 7 locally acquired *P. vivax* malaria cases in 2009, 4 cases in 2010, 42 in 2011 and 20 in 2012; these cases originated initially from migrant workers. Most of the cases were clustered in the prefecture of Lakonia in the south of mainland Greece. Following intensified control efforts, no locally acquired cases were reported from this area in 2013. However, two locally acquired *P. vivax* local cases were detected in the Municipality of Alexandroupolis, Evros and one from the Municipality of Sofades, Karditsa.

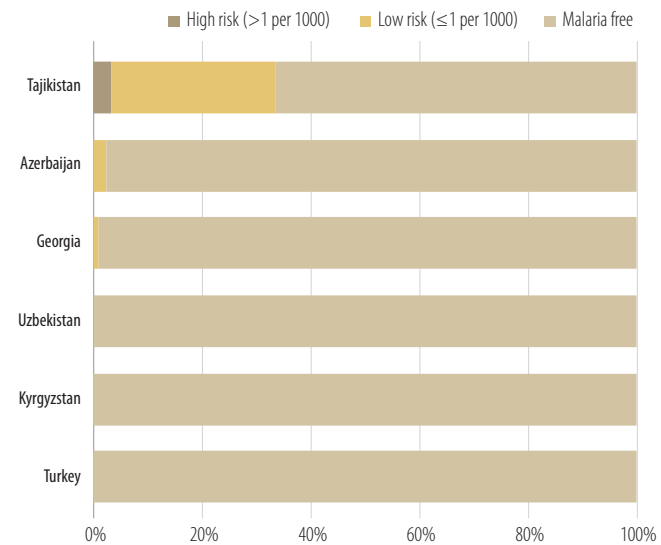
Links with antimalarial interventions: All countries in the region have high coverage of preventive interventions in malaria focal areas, with IRS and ITNs as appropriate, and they report adequate access to antimalarial medicines (**Figures G, H**). Countries also benefit from intensive surveillance, including case detection, investigation and quality assurance for laboratory diagnosis.

Countries in the elimination phase	
Azerbaijan	Turkey
Tajikistan	
Countries in the prevention of re-introduction phase	
Georgia	Uzbekistan
Kyrgyzstan	
Countries certified malaria free	
Armenia, 2011	Turkmenistan, 2010

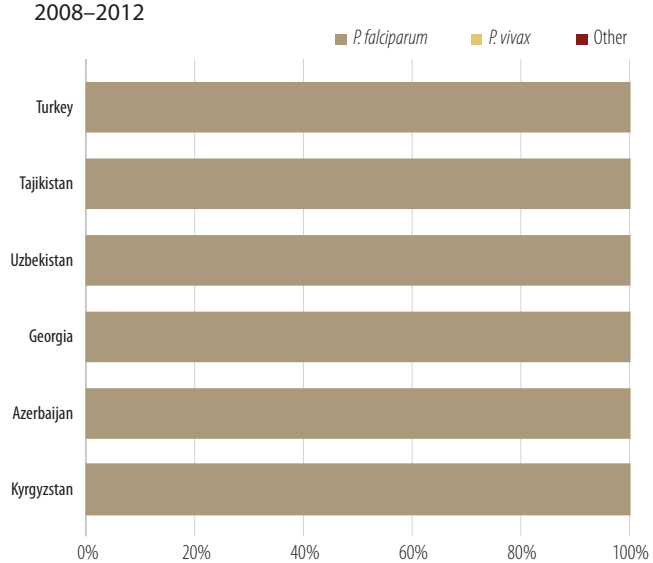
Summary: Of the nine malaria affected countries with ongoing transmission in 2000, two have been certified free of malaria (Armenia in 2011 and Turkmenistan in 2010), one was added to the supplementary list[1,2] (Russian Federation), and three have reported zero indigenous cases for the past 3 years or more, and are in the prevention of reintroduction phase (Georgia, Kyrgyzstan and Uzbekistan). The remaining three countries have each achieved >75% reduction in case incidence. The region is close to attaining the goal of eliminating malaria from the region by 2015, as set out in the 2005 Tashkent Declaration, which was endorsed by nine malaria-affected countries. Nonetheless, the experience of Greece and Turkey highlights the continual threat of reintroduction and the need for continued vigilance to ensure that any resurgence can be rapidly contained.

1. The supplementary list records countries where malaria has never existed or has disappeared without specific measures.
2. Kazakhstan, which was free of malaria in 2000, was also added to the supplementary list in 2012.

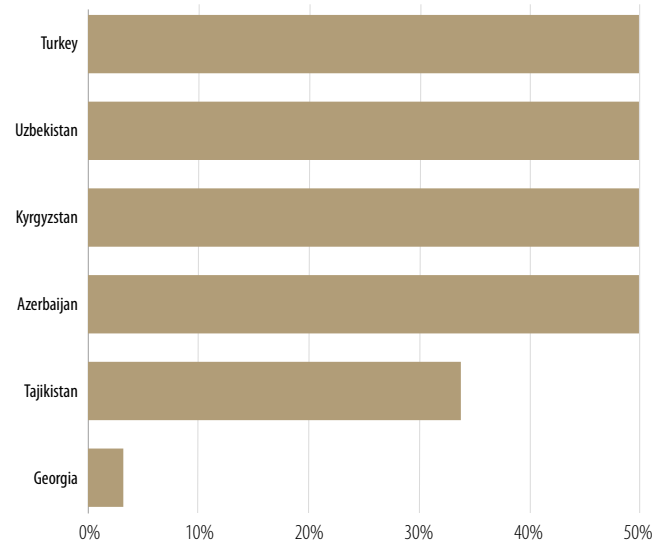
A – Population at risk, 2012



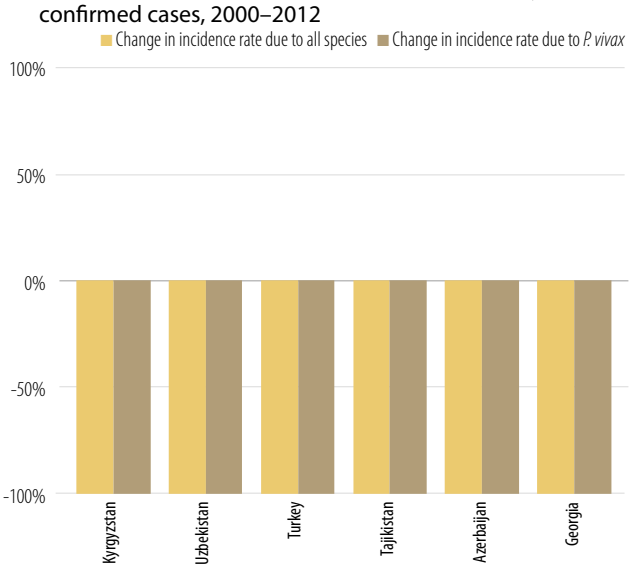
B – Percentage of cases due to *P. falciparum* and *P. vivax*, 2008–2012



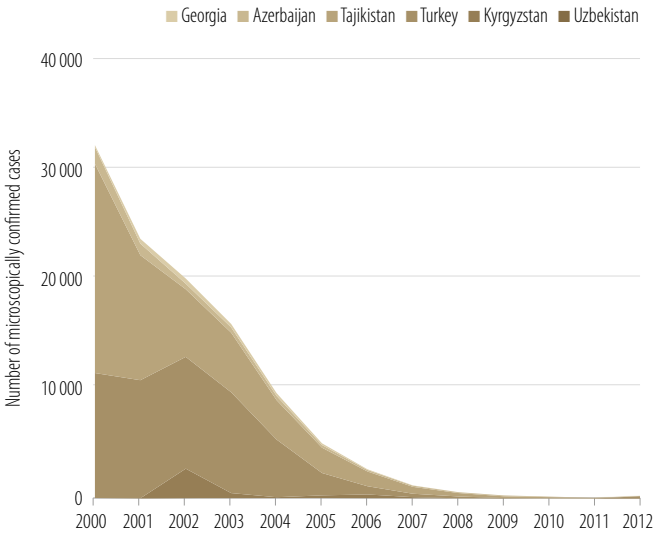
C – Annual blood examination rate, 2008–2012



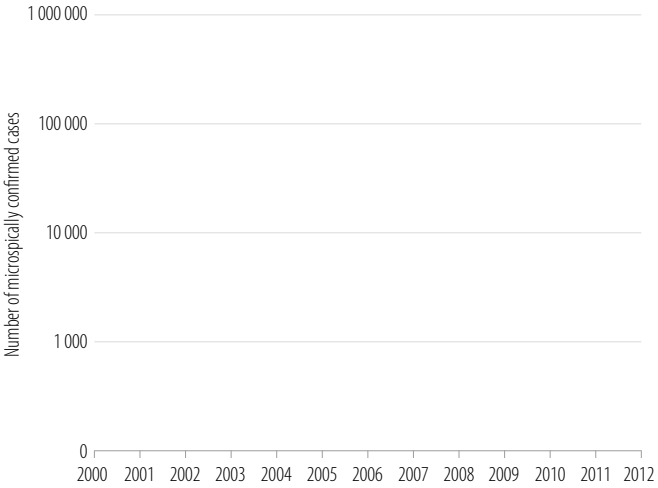
D – Percentage change in incidence of microscopically confirmed cases, 2000–2012



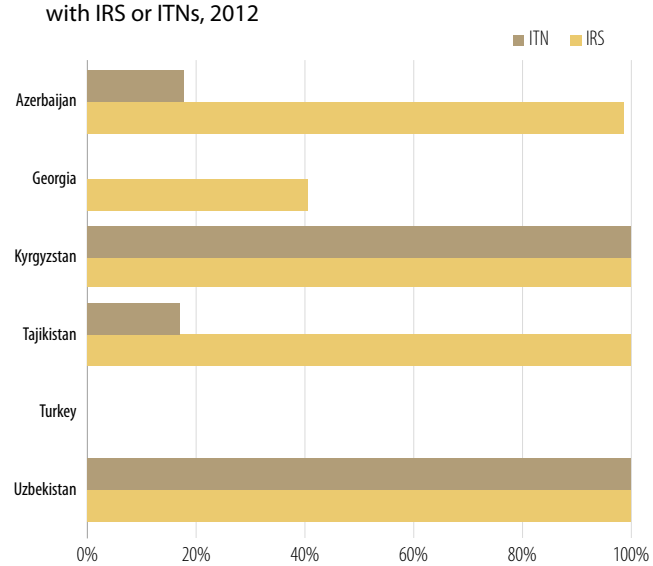
E – Countries projected to achieve >75% decrease in incidence of microscopically confirmed cases by 2015



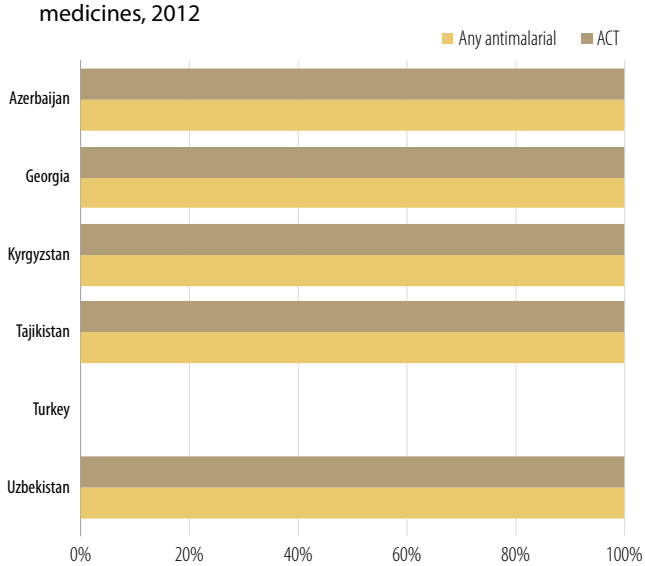
F – Countries projected to achieve ≤75% decrease in incidence of microscopically cases by 2015 or with insufficiently consistent data to assess trends



G – Estimated percentage of high risk population protected with IRS or ITNs, 2012



H – Percentage of cases potentially treated with antimalarial medicines, 2012



South-East Asia Region

Populations affected: About 1.6 billion people are at some risk for malaria in the 10 malaria-endemic countries, and 1 billion people are at high risk (**Figure A**). Most cases in the region are due to *P. falciparum*, but in Nepal and Sri Lanka, most cases are due to *P. vivax*, and exclusively so in the Democratic People's Republic of Korea (**Figure B**).

Trends in cases and deaths: The number of confirmed malaria cases reported in the region decreased from 2.9 to 2 million between 2000 and 2012. Three countries accounted for 96% of reported cases in 2012: India (52%), Myanmar (24%) and Indonesia (22%). Five countries achieved >75% decrease in case incidence between 2000 and 2012 (Bangladesh, Bhutan, Democratic People's Republic of Korea, Nepal, Sri Lanka) (**Figure D**). Thailand[1] and Timor-Leste are projected to achieve >75% decrease by 2015. The number of reported cases in India decreased from 2 million in 2000 to 1.1 million in 2011, whereas the number of slides examined increased from 87 million to 109 million; the country is on track to achieve a 50%–75% decrease in case incidence by 2015. It was not possible to discern the direction of trends in Indonesia and Myanmar, owing to changes in diagnostic testing or reporting over time (**Figures D, F**). Myanmar has seen large increases in the use of RDTs since 2007, whereas more reports have been received from eastern Indonesia (where malaria transmission is higher) since 2004.

Reported malaria deaths in the region decreased from 5500 to 1200 between 2000 and 2012. Myanmar, India and Indonesia accounted for 49%, 42% and 33% of reported deaths respectively in 2012 (Annex 6D). The reported malaria mortality rate fell by more than >75% in Bangladesh, Bhutan, Sri Lanka, Thailand and Timor-Leste[2] between 2000 and 2012. The reported malaria mortality rate in Myanmar decreased by 79%, but this is partly due to a change in reporting practices because only confirmed malaria deaths have been reported since 2007. A decrease of 51% was observed in India. The number of reported deaths in Democratic People's Republic of Korea and Nepal is too small to make an assessment of trends, and gaps in reporting prevent an assessment of trends in malaria mortality in Indonesia.

Countries in pre-elimination phase

Bhutan Democratic People's Republic of Korea

Countries in the elimination phase

Sri Lanka

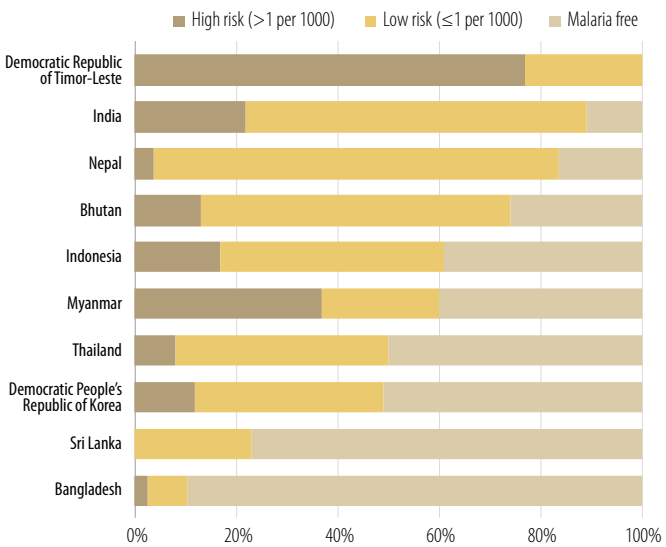
Links with antimalarial interventions: Five of the six countries with >75% decrease in case incidence had distributed sufficient ITNs, or undertaken sufficient IRS, to cover >50% of the population at high risk in 2012 (**Figure G**). All the countries except Indonesia reported delivering sufficient antimalarial medicines to treat all patients attending public health facilities in 2012 (**Figure H**).

Summary: Of the 10 countries with ongoing transmission in the region, five have reduced malaria case incidence by >75%, while two countries are on track to achieve >75% decrease by 2015 and one a decrease of 50%–75%. In the remaining two countries, progress is obscured by changes in diagnostic or reporting practices. Sri Lanka is in the elimination phase whereas Bhutan and Democratic People's Republic of Korea are in the pre-elimination phase.

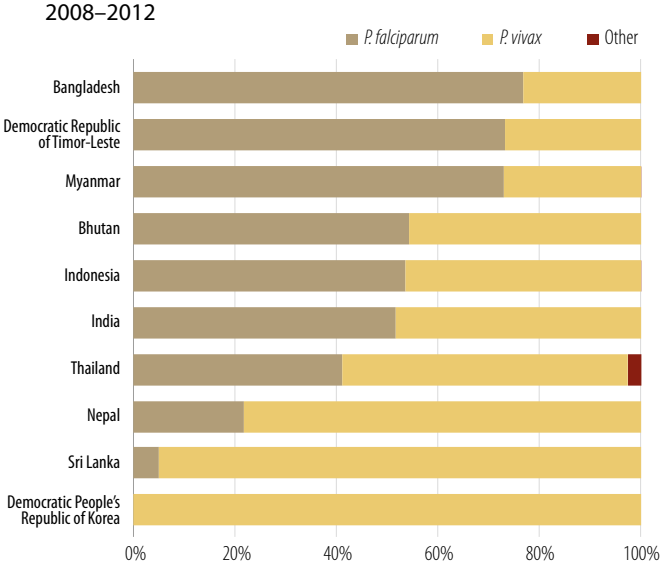
1. Totals for Thailand in 2012 are inflated compared to earlier years owing to the inclusion of data, for the first time, from NGOs working in areas bordering Myanmar.

2. In Timor-Leste the earliest that data are available is 2004.

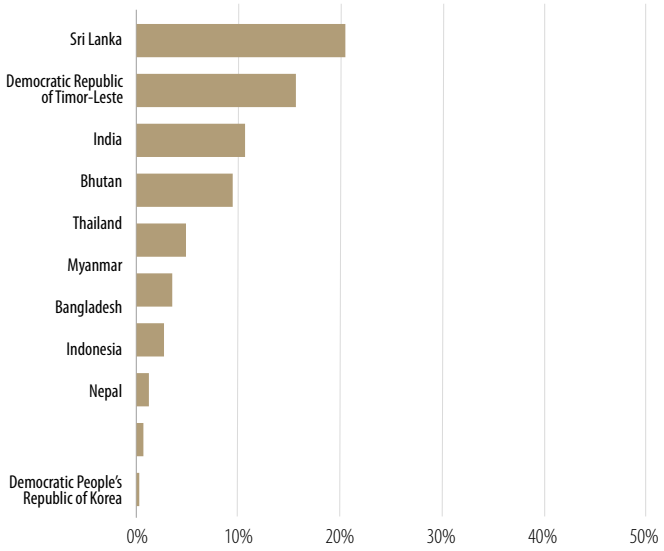
A – Population at risk, 2012



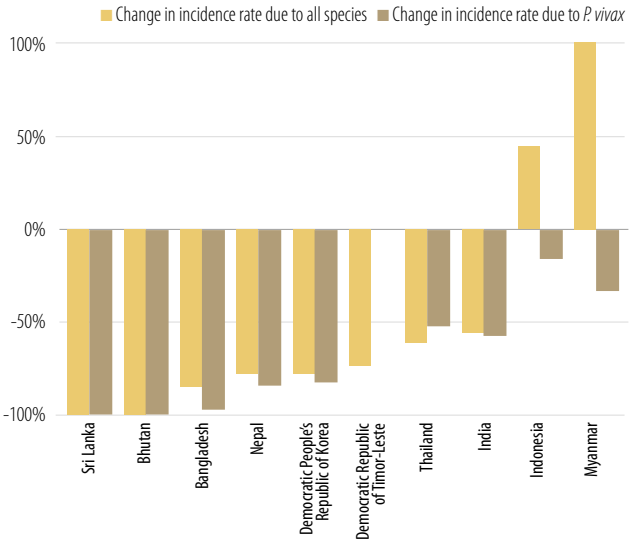
B – Percentage of cases due to *P. falciparum* and *P. vivax*, 2008–2012



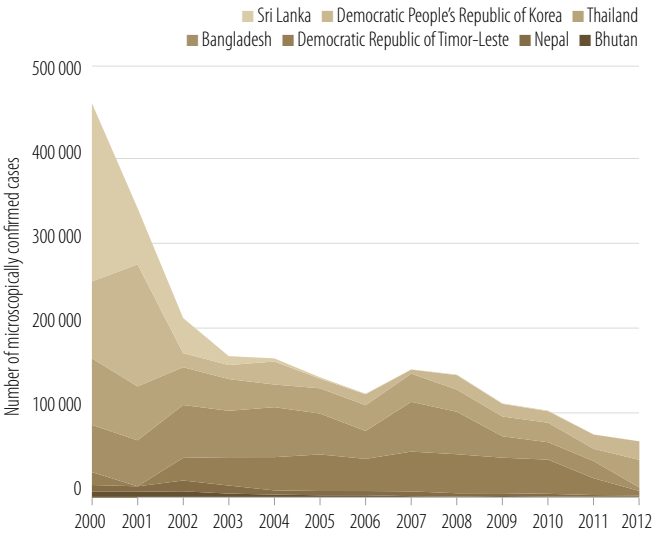
C – Annual blood examination rate, 2008–2012 (average)



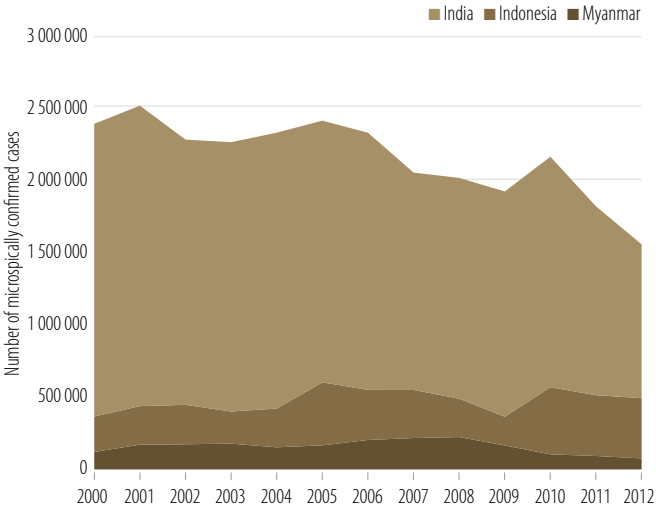
D – Percentage change in incidence of microscopically confirmed cases, 2000–2012



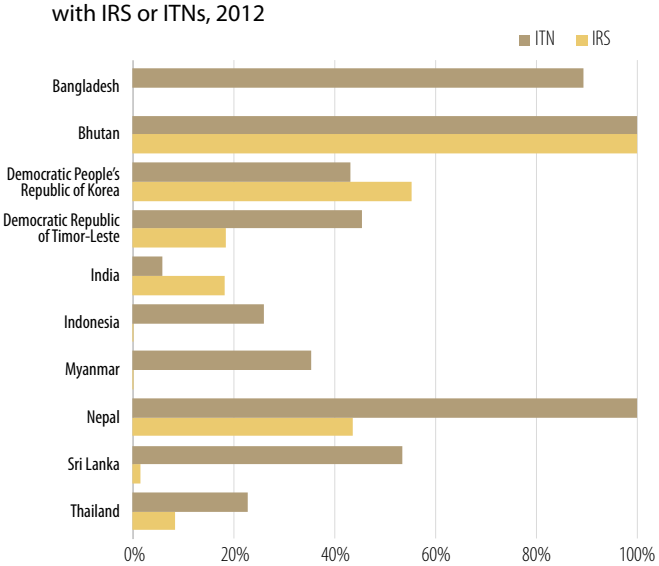
E – Countries projected to achieve >75% decrease in incidence of microscopically confirmed cases by 2015



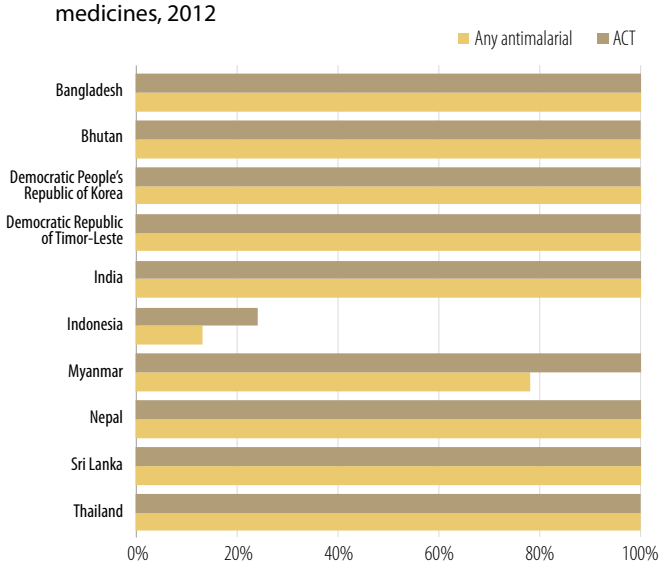
F – Countries projected to achieve ≤75% decrease in incidence of microscopically cases by 2015 or with insufficiently consistent data to assess trends



G – Estimated percentage of high risk population protected with IRS or ITNs, 2012



H – Percentage of cases potentially treated with antimalarial medicines, 2012



Western Pacific Region

Populations affected: In the Western Pacific Region, 711 million people in 10 countries are at some risk for malaria, and 70 million people are at high risk (**Figure A**). Malaria transmission is intense in most of Papua New Guinea, Solomon Islands and Vanuatu. It is highly focal in the Greater Mekong subregion, including Cambodia, Yunnan province (China), the Lao People's Democratic Republic and Viet Nam (where it is most intense in remote forested areas, and disproportionately affects ethnic minorities and migrants. Malaria is also restricted in distribution in Malaysia, the Philippines and the Republic of Korea. Most countries have both *P. falciparum* and *P. vivax*, but cases are entirely due to *P. vivax* in the Republic of Korea and in central areas of China (**Figure B**).

Trends in cases and deaths: The number of confirmed malaria cases reported between 2000 and 2012 decreased from 396 000 to 299 000. Three countries accounted for 79% of reported cases in 2012: Papua New Guinea (50%), the Lao People's Democratic Republic (15%) and Cambodia (14%). Eight countries (Cambodia, China, Malaysia, Philippines, Republic of Korea, Solomon Islands, Vanuatu and Viet Nam) achieved >75% decrease in the incidence of microscopically confirmed malaria cases between 2000 and 2012 (**Figures D, E**). The Lao People's Democratic Republic is projected to achieve a decrease of >75% by 2015, although it saw a twofold increase in malaria cases in 2012. This was primarily due to increased incidence in six southern provinces which associated with population movement related to economic development. Papua New Guinea reported an increase in confirmed cases in 2012 due to wide extension of diagnostic testing to health facilities that had not previously undertaken testing; otherwise it would have been on track to achieve a reduction in case incidence of more than 25% since 2000 (**Figures D, F**).

Country in pre-elimination phase

Malaysia

Country in elimination phase

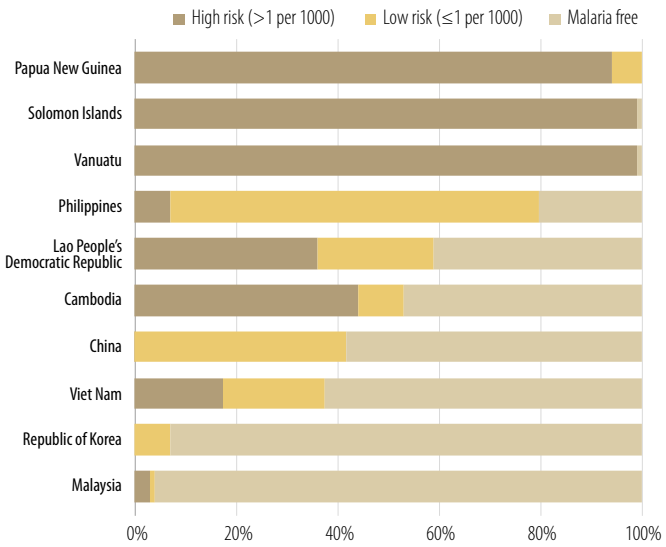
Republic of Korea

The number of reported malaria deaths in the region decreased from 2400 in 2000 to 460 in 2012. Three countries accounted for 86% of reported deaths in 2012: Papua New Guinea (66%), Cambodia (10%) and the Lao People's Democratic Republic (10%) (Annex 6D). Reported malaria mortality rates fell >75% in Cambodia, the Lao People's Democratic Republic, the Philippines and Solomon Islands, and by >50% in China, Malaysia and Papua New Guinea. The number of reported deaths in the Republic of Korea and Vanuatu was too small to make an assessment of trends.

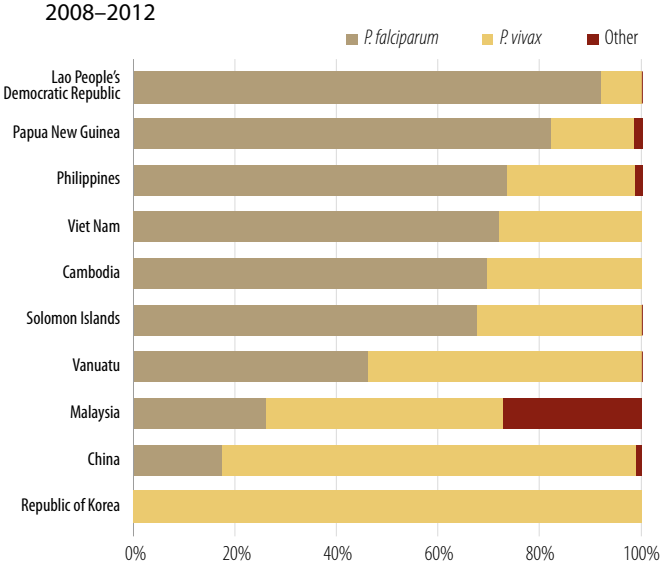
Links with antimalarial interventions: Eight countries had distributed sufficient ITNs, or undertaken sufficient IRS, to cover >50% of the population at high risk in 2012 (**Figure G**). All the countries in the region except China, Papua New Guinea and the Republic of Korea reported delivering sufficient antimalarial medicines to treat all patients attending public health facilities in 2012 (**Figure H**).

Summary: Of the 10 countries with ongoing transmission, eight have achieved >75% decrease in case incidence, while one country is projected to decrease malaria case incidence by 75% by 2015. Progress is slower in the country that accounts for the majority of cases and deaths in the region (Papua New Guinea).

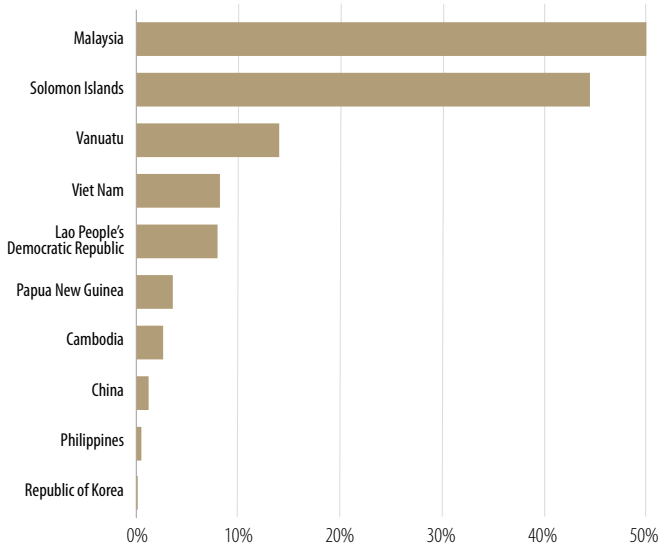
A – Population at risk, 2012



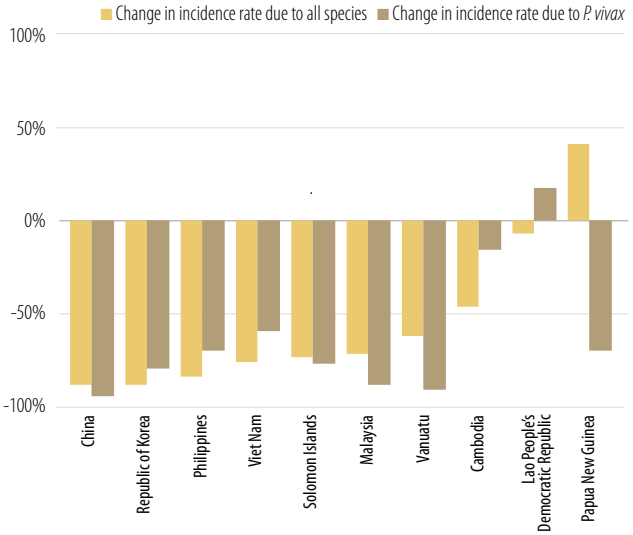
B – Percentage of cases due to *P. falciparum* and *P. vivax*, 2008–2012



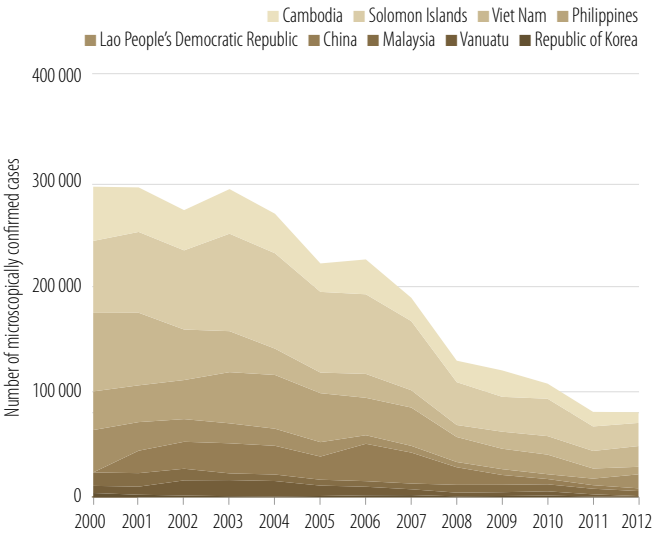
C – Annual blood examination rate, 2008–2012



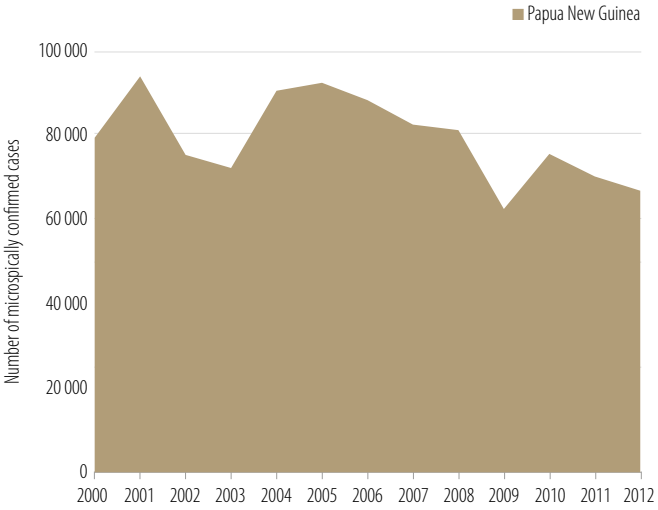
D – Percentage change in incidence of microscopically confirmed cases, 2000–2012



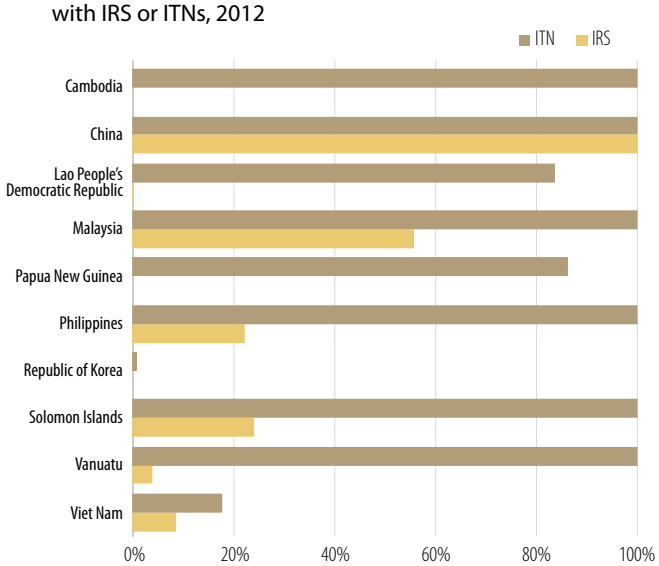
E – Countries projected to achieve >75% decrease in incidence of microscopically confirmed cases by 2015



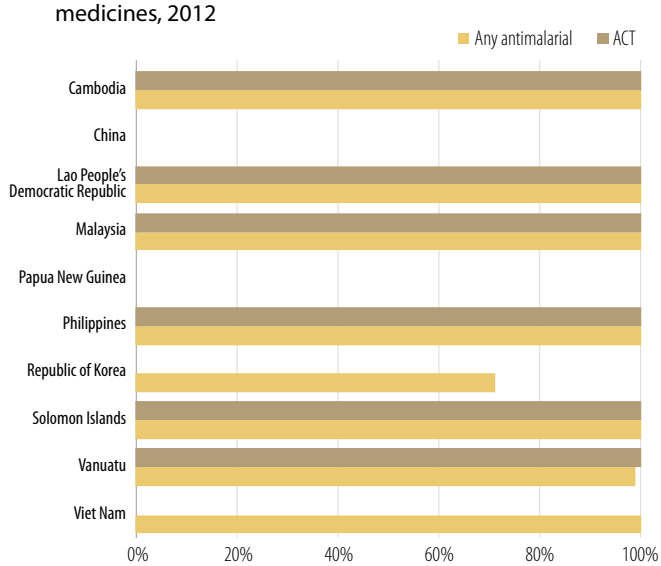
F – Countries projected to achieve ≤75% decrease in incidence of microscopically cases by 2015 or with insufficiently consistent data to assess trends



G – Estimated percentage of high risk population protected with IRS or ITNs, 2012



H – Percentage of cases potentially treated with antimalarial medicines, 2012



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Annexes

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Annex 1 – Data completeness, World Malaria Report form, 2013

WHO Region	Country/area	Country classification phase[1]	Completeness score %	Population at risk %	Reported cases, admissions and deaths %	Reporting completeness %	Confirmed laboratory cases %	Cases diagnosed in community %	Active case detection %	National policies %	Interventions %	Malaria financing %	Government contribution %
African	Algeria	Elimination	72	100	94	20	–	–	–	72	20	100	100
	Angola	Control	64	100	80	60	50	0	0	96	100	100	50
	Benin	Control	79	100	84	60	71	100	44	100	100	100	33
	Botswana	Control	66	100	38	80	25	0	28	100	100	93	100
	Burkina Faso	Control	86	100	98	80	63	100	22	100	100	100	100
	Burundi	Control	72	100	100	40	50	100	0	98	100	100	33
	Cameroon	Control	73	100	100	60	17	100	0	100	100	100	50
	Cabo Verde	Pre-elimination	77	67	45	100	–	–	–	89	100	58	–
	Central African Republic	Control	64	100	71	60	8	50	6	92	82	100	67
	Chad	Control	44	100	73	0	33	0	0	78	70	40	50
	Comoros	Control	76	100	80	40	100	100	33	91	100	87	33
	Congo	Control	60	100	73	80	42	33	33	91	100	27	17
	Côte d'Ivoire	Control	32	33	84	40	29	0	0	28	55	33	17
	Democratic Republic of the Congo	Control	86	100	100	60	100	100	0	100	100	100	100
	Equatorial Guinea	Control	56	100	96	60	83	0	17	80	100	27	0
	Eritrea	Control	74	100	100	60	100	50	33	98	100	100	0
	Ethiopia	Control	61	100	82	40	58	0	0	100	100	100	33
	Gabon	Control	51	33	78	60	50	0	67	100	52	33	33
	Gambia	Control	81	100	89	100	67	83	0	85	100	100	83
	Ghana	Control	98	100	100	80	100	100	100	100	100	100	100
	Guinea	Control	69	33	89	60	46	83	11	100	97	100	67
	Guinea–Bissau	Control	52	33	69	40	50	0	0	98	100	100	33
	Kenya	Control	57	100	64	100	54	0	0	94	100	40	17
	Liberia	Control	82	100	67	100	83	100	78	96	100	100	0
	Madagascar	Control	71	100	80	20	63	50	0	100	100	100	100
	Malawi	Control	66	100	67	80	42	0	0	100	100	100	67
	Mali	Control	72	100	69	40	38	100	22	100	100	100	50
	Mauritania	Control	58	100	71	0	54	0	0	77	79	100	100
	Mayotte, France	Elimination	42	100	88	0	–	–	–	63	0	0	–
	Mozambique	Control	49	67	73	80	75	50	0	48	100	0	0
	Namibia	Control	96	100	84	80	100	100	100	100	100	100	100
	Niger	Control	89	100	100	60	100	100	100	76	100	100	50
	Nigeria	Control	63	33	82	80	33	0	0	100	100	100	100
	Rwanda	Control	61	100	78	100	54	100	0	81	100	0	0
	Sao Tome and Principe	Control	92	100	100	40	100	100	100	84	100	100	100
	Senegal	Control	88	100	100	100	100	100	17	100	100	100	100
	Sierra Leone	Control	76	100	80	80	71	50	56	76	100	93	50
	South Africa	Control	75	100	49	80	100	17	67	96	45	100	100
	Swaziland	Control	90	100	80	80	75	100	67	100	100	100	100
	Togo	Control	85	100	100	40	100	100	11	98	100	100	100
	Uganda	Control	74	100	89	80	96	67	22	100	100	87	0
	United Republic of Tanzania	Control	–	–	–	–	–	–	–	–	–	–	–
	United Republic of Tanzania (Mainland)	Control	94	100	100	80	100	100	100	94	100	100	67
	United Republic of Tanzania (Zanzibar)	Control	100	–	–	–	–	–	–	100	–	–	100
	Zambia	Control	67	100	93	100	0	0	0	72	100	100	100
	Zimbabwe	Control	93	–	–	–	–	–	–	87	–	–	100
Region of the Americas	Argentina	Pre-elimination	65	100	91	60	–	–	–	68	60	25	50
	Belize	Pre-elimination	91	100	100	80	100	100	94	89	100	100	50
	Bolivia (Plurinational State of)	Control	84	100	100	40	100	0	100	100	100	100	100
	Brazil	Control	86	100	100	20	100	100	100	95	100	100	50
	Colombia	Control	73	100	100	20	100	0	61	94	100	100	50
	Costa Rica	Pre-elimination	68	100	100	20	–	–	–	85	20	100	50
	Dominican Republic	Control	83	100	71	60	100	50	56	98	100	100	100
	Ecuador	Pre-elimination	83	100	56	80	–	–	–	100	80	100	67

WHO Region	Country/area	Country classification phase[1]	Completeness score %	Population at risk %	Reported cases, admissions and deaths %	Reporting completeness %	Confirmed laboratory cases %	Cases diagnosed in community %	Active case detection %	National policies %	Interventions %	Malaria financing %	Government contribution %
Region of the Americas	El Salvador	Pre-elimination	87	100	100	80	–	–	–	100	80	83	67
	French Guiana, France	Control	38	100	44	0	100	0	0	66	6	60	0
	Guatemala	Control	92	100	73	100	100	100	100	84	100	100	67
	Guyana	Control	87	100	56	60	100	100	78	90	100	100	83
	Haiti	Control	71	100	96	20	100	100	100	93	100	0	0
	Honduras	Control	82	100	60	100	100	0	100	63	100	100	100
	Mexico	Pre-elimination	94	100	100	80	–	–	–	100	80	100	100
	Nicaragua	Control	83	100	87	40	100	100	72	82	100	100	50
	Panama	Control	88	100	60	40	100	100	100	79	100	100	100
	Paraguay	Pre-elimination	100	100	100	100	–	–	–	100	100	100	100
	Peru	Control	81	100	100	40	100	100	100	52	36	100	83
	Suriname	Control	68	100	73	20	92	100	83	100	36	80	0
	Venezuela (Bolivarian Republic of)	Control	68	100	31	20	88	0	100	90	100	100	50
Eastern Mediterranean	Afghanistan	Control	83	100	100	100	88	100	44	100	100	100	0
	Djibouti	Control	72	0	87	100	25	100	83	100	76	100	50
	Iran (Islamic Republic of)	Elimination	90	100	73	80	–	–	–	94	80	100	100
	Pakistan	Control	61	100	18	80	100	50	61	98	48	40	17
	Saudi Arabia	Elimination	91	100	86	80	–	–	–	92	80	100	100
	Somalia	Control	80	100	49	80	58	50	67	100	100	100	100
	South Sudan[2]	Control	64	100	36	100	17	67	11	100	91	100	17
	Sudan	Control	68	100	80	100	29	0	0	–	100	100	100
	Yemen	Control	81	100	76	80	100	33	39	84	100	100	100
European	Azerbaijan	Elimination	95	100	100	100	–	–	–	100	90	100	75
	Kyrgyzstan	Prevention of re-introduction	100	100	100	100	–	–	–	100	100	100	100
	Tajikistan	Elimination	96	100	100	100	–	–	–	100	100	100	75
	Turkey	Elimination	99	100	95	100	–	–	–	100	100	100	100
	Uzbekistan	Prevention of re-introduction	100	100	100	100	–	–	–	100	100	100	100
South-East Asia	Bangladesh	Control	95	100	100	80	100	100	100	100	100	100	67
	Bhutan	Pre-elimination	88	100	58	80	–	–	–	100	80	100	100
	Democratic People's Republic of Korea	Pre-elimination	89	100	61	80	–	–	–	100	80	100	100
	India	Control	72	100	13	80	92	50	0	85	100	100	100
	Indonesia	Control	79	100	100	80	100	100	0	77	100	100	33
	Myanmar	Control	66	100	87	0	100	50	0	82	94	100	50
	Nepal	Control	84	100	60	80	100	100	22	73	100	100	100
	Sri Lanka	Elimination	93	100	77	100	–	–	–	73	100	100	100
	Thailand	Control	91	100	58	80	92	100	78	100	100	100	100
	Timor–Leste	Control	91	100	80	80	100	100	50	100	100	100	100
Western Pacific	Cambodia	Control	89	100	96	80	100	100	11	100	100	100	100
	China	Control	76	100	64	80	96	50	61	100	85	87	33
	Lao People's Democratic Republic	Control	98	100	100	100	100	100	100	100	100	100	83
	Malaysia	Pre-elimination	88	100	83	80	–	–	–	73	80	100	100
	Papua New Guinea	Control	59	100	40	80	100	0	0	76	30	100	67
	Philippines	Control	90	100	69	100	83	100	100	100	100	100	50
	Republic of Korea	Elimination	68	100	83	0	–	–	–	96	0	100	100
	Solomon Islands	Control	87	100	84	100	100	50	39	100	100	100	100
	Vanuatu	Control	81	100	49	80	100	100	0	100	100	100	–
	Viet Nam	Control	84	100	67	80	96	100	17	100	94	100	–

[1] Country classification as of December 2013

[2] In May 2013 South Sudan was reassigned to the Who African Region (WHA resolution 66.21 http://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R21-en.pdf). Nonetheless, since most data in this report precede 2013, South Sudan is placed in Eastern Mediterranean Region

– Question does not appear on the form for that country

Egypt, Oman and the Arab Syrian Republic are in "Prevention of reintorduction" classification phase but do not appear in the list.

Annex 2A – Recommended policies and strategies for malaria control, 2012

WHO Region	Country/area	insecticide-treated mosquito nets			Indoor residual spraying		Treatment									Chemoprophylaxis	
		ITNs/ LLINs are distributed free of charge	ITNs/ LLINs are distributed to all age groups	ITNs/ LLINs distributed through mass campaigns to all age groups	IRS is the primary vector control intervention	DDT is used for IRS	ACT policy adopted	Patients of all ages should get diagnostic test	Malaria diagnosis is free of charge in the public sector	RDTs used at community level	Pre-referral treatment with quinine or artemether IM or artesunate suppositories	Single dose of primaquine (0.25mg base/ kg) is used as gametocidal medicine for *P. falciparum*	Primaquine is used for radical treatment of *P. vivax* cases	G6PD test is recommended before treatment with primaquine	Directly observed treatment with primaquine is undertaken	IPTp used to prevent malaria during pregnancy	Seasonal malaria chemo-prevention (SMC) is used
African	Algeria	N	N	–	Y	N	N/A	–	Y	–	–	Y	Y	N	Y	–	–
	Angola	Y	N	N	Y	N	Y	Y	Y	N	Y	–	Y	Y	N	Y	N
	Benin	Y	N	Y	Y	N	Y	Y	Y	Y	Y	N	N	–	N	Y	N
	Botswana	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	Y
	Burkina Faso	Y	Y	Y	Y	N	Y	Y	Y	N	Y	N	N	N	N	Y	N
	Burundi	Y	N	–	Y	N	Y	Y	N	Y	N	N	N	N	N	N	N
	Cabo Verde	–	–	N	Y	N	Y	Y	Y	Y	N	Y	Y	–	Y	N	–
	Cameroon	N	N	N	Y	N	Y	Y	Y	Y	Y	N	N	–	–	Y	N
	Central African Republic	Y	N	N	Y	N	Y	Y	N	Y	Y	N	N	N	N	Y	N
	Chad	Y	N	Y	Y	N	Y	Y	Y	N	Y	N	N	N	N	Y	Y
	Comoros	Y	Y	Y	Y	N	Y	Y	Y	N	Y	N	N	N	N	Y	N
	Congo	Y	Y	Y	Y	N	Y	Y	N	N	Y	N	N	N	N	Y	N
	Côte d'Ivoire	–	–	–	–	N	Y	–	–	Y	–	–	–	–	–	Y	–
	Democratic Republic of the Congo	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	Y	N
	Equatorial Guinea	Y	N	Y	Y	N	Y	Y	Y	N	N	N	N	N	N	–	N
	Eritrea	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	N	N	N	N
	Ethiopia	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	N	N	N	N
	Gabon	Y	Y	N	N	N	Y	Y	N	Y	Y	N	N	N	N	Y	N
	Gambia	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	–	–	–	–	Y	–
	Ghana	Y	Y	Y	Y	N	Y	Y	N	Y	Y	N	N	N	N	Y	N
	Guinea	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	N	N	–	N
	Guinea-Bissau	Y	N	Y	N	N	Y	Y	Y	N	Y	N	N	N	N	–	N
	Kenya	Y	Y	Y	Y	N	Y	Y	N	N	Y	–	–	–	–	Y	N
	Liberia	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	N	N	Y	N
	Madagascar	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N	N	N	N	–	N
	Malawi	Y	Y	Y	Y	N	Y	Y	N	N	Y	N	N	N	N	Y	N
	Mali	Y	N	Y	Y	N	Y	Y	Y	Y	Y	N	N	–	N	Y	Y
	Mauritania	Y	N	–	Y	N	Y	Y	Y	Y	Y	N	Y	Y	N	Y	N
	Mayotte	Y	Y	–	–	N	–	–	Y	–	–	Y	Y	Y	Y	–	–
	Mozambique	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	–	–	–	–	Y	–
	Namibia	Y	N	Y	Y	Y	Y	Y	Y	N	Y	N	Y	N	N	Y	N
	Niger	Y	N	N	Y	N	Y	Y	Y	N	–	–	–	–	–	Y	Y
	Nigeria	Y	Y	Y	Y	N	Y	Y	N	N	Y	N	N	N	N	Y	N
	Rwanda	Y	N	Y	Y	N	Y	Y	N	Y	Y	–	–	–	–	N	–
	Sao Tome and Principe	Y	N	Y	Y	N	Y	Y	Y	N	Y	–	–	–	–	Y	–
	Senegal	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	N	N	–	N
	Sierra Leone	Y	–	Y	Y	N	Y	Y	Y	Y	Y	–	–	–	–	Y	–
	South Africa	N	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N
	Swaziland	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N
	Togo	Y	Y	Y	Y	N	Y	Y	N	Y	Y	N	N	–	–	Y	Y
	Uganda	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	N	N	Y	N
	United Republic of Tanzania																–
	United Republic of Tanzania (Mainland)	N	N	N	Y	N	Y	Y	N	N	Y	N	N	N	N	Y	N
	United Republic of Tanzania (Zanzibar)	Y	Y	Y	Y	N	Y	Y	Y	N	Y	N	N	N	N	Y	N
	Zambia	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	N
	Zimbabwe	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y
Region of the Americas	Argentina	N	N	N	Y	N	N/A	Y	Y	N	–	–	Y	N	Y	N/A	N/A
	Belize	Y	Y	Y	Y	N	N/A	Y	Y	N	N	Y	Y	N	Y	N/A	N/A
	Bolivia (Plurinational State of)	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	Y	N	N	N/A	N/A
	Brazil	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	N	N/A	N/A
	Colombia	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	N	N	N/A	N/A
	Costa Rica	Y	Y	Y	Y	N	N/A	Y	Y	N	–	Y	Y	N	Y	N/A	N/A
	Dominican Republic	Y	Y	N	Y	N	N/A	Y	Y	N	N	Y	Y	N	Y	N/A	N/A
	Ecuador	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N	Y	N	Y	N/A	N/A
	El Salvador	N	N	N	Y	N	N/A	Y	Y	N	N	Y	Y	N	Y	N/A	N/A

WHO Region	Country/area	insecticide-treated mosquito nets			Indoor residual spraying		Treatment									Chemoprophylaxis	
		ITNs/ LLINs are distributed free of charge	ITNs/ LLINs are distributed to all age groups	ITNs/ LLINs distributed through mass campaigns to all age groups	IRS is the primary vector control intervention	DDT is used for IRS	ACT policy adopted	Patients of all ages should get diagnostic test	Malaria diagnosis is free of charge in the public sector	RDTs used at community level	Pre-referral treatment with quinine or artemether IM or artesunate suppositories	Single dose of primaquine (0.25mg base/ kg) is used as gametocidal medicine for *P. falciparum*	Primaquine is used for radical treatment of *P. vivax* cases	G6PD test is recommended before treatment with primaquine	Directly observed treatment with primaquine is undertaken	IPTp used to prevent malaria during pregnancy	Seasonal malaria chemo-prevention (SMC) is used
	French Guiana, France	N	Y	Y	Y	N	N/A	Y	Y	N	N	N	Y	N	–	N/A	N/A
	Guatemala	Y	Y	Y	Y	N	N/A	Y	Y	Y	N	Y	Y	N	N	N/A	N/A
	Guyana	Y	Y	N	Y	N	Y	Y	Y	N	N	Y	Y	N	N	N/A	N/A
	Haiti	Y	Y	Y	N	N	N/A	Y	Y	N	N	Y	Y	N	N	N/A	N/A
	Honduras	Y	Y	Y	Y	N	N/A	Y	Y	N	–	Y	Y	N	N	N/A	N/A
	Mexico	Y	Y	Y	N	N	N/A	Y	Y	N	N	Y	Y	N	Y	N/A	N/A
	Nicaragua	Y	Y	Y	Y	N	N/A	Y	Y	Y	N	Y	Y	N	Y	N/A	N/A
	Panama	N	N	N	Y	N	N/A	Y	Y	N	N	Y	Y	N	Y	N/A	N/A
	Paraguay	N	N	N	Y	N	Y	Y	Y	N	N	N	Y	N	Y	N/A	N/A
	Peru	Y	Y	–	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	N/A	N/A
	Suriname	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	N/A	N/A
	Venezuela (Bolivarian Republic of)	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	N	Y	N/A	N/A
Eastern Mediterranean	Afghanistan	Y	Y	Y	Y	N	Y	Y	Y	–	Y	N	Y	Y	N	N/A	–
	Djibouti	Y	N	Y	Y	N	Y	Y	Y	N	N	N	N	N	N	N	N
	Iran (Islamic Republic of)	Y	Y	–	Y	N	Y	Y	Y	–	–	Y	Y	N	Y	N/A	–
	Pakistan	Y	Y	N	Y	N	Y	Y	Y	N	Y	Y	Y	Y	N	N/A	–
	Saudi Arabia	Y	Y	–	Y	N	Y	Y	Y	–	–	Y	N	Y	N	N/A	–
	Somalia	Y	Y	Y	Y	N	Y	Y	Y	N	Y	N	N	N	N	–	N
	South Sudan[1]	Y	Y	Y	Y	N	Y	N	Y	N	Y	N	N	N	N	Y	N
	Sudan	Y	Y	Y	Y	N	Y	Y	N	Y	Y	N	Y	N	N	N	N
	Yemen	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	–	Y	–	–	N/A	–
European	Azerbaijan	Y	N	–	Y	N	N/A	–	Y	–	–	N	Y	N	Y	N/A	–
	Kyrgyzstan	Y	Y	–	Y	N	–	–	Y	–	–	Y	Y	N	Y	N/A	–
	Tajikistan	Y	Y	–	Y	N	Y	–	Y	–	–	Y	Y	N	Y	N/A	–
	Turkey	N	N	–	Y	N	N/A	–	Y	–	–	N	Y	N	Y	N/A	–
	Uzbekistan	Y	Y	–	Y	N	–	–	Y	–	–	Y	Y	N	Y	N/A	–
South-East Asia	Bangladesh	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	N	N	N/A	–
	Bhutan	Y	Y	Y	Y	N	Y	Y	Y	N	N	Y	Y	N	N	N/A	–
	Democratic People's Republic of Korea	Y	Y	–	Y	N	N/A	–	Y	–	–	N	Y	N	Y	N/A	–
	India	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N/A	–
	Indonesia	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	N	N/A	–
	Myanmar	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	N	N/A	–
	Nepal	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	–	–	–	–	N/A	–
	Sri Lanka	Y	Y	–	Y	N	Y	–	Y	–	–	Y	Y	Y	Y	N/A	–
	Thailand	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	Y	N	Y	N/A	–
	Timor-Leste	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	N	N	N/A	–
Western Pacific	Cambodia	Y	Y	Y	N	N	Y	Y	Y	Y	N	N	N	Y	N	N/A	–
	China	Y	Y	Y	Y	N	Y	Y	N	N	N	N	Y	N	Y	N/A	–
	Lao People's Democratic Republic	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N	N	Y	N	N/A	–
	Malaysia	Y	Y	–	–	N	Y	–	Y	–	–	N	Y	Y	Y	N/A	–
	Papua New Guinea	Y	Y	Y	Y	N	Y	Y	Y	N	Y	–	–	–	–	Y	–
	Philippines	Y	Y	N	Y	N	Y	Y	Y	Y	N	Y	Y	Y	Y	N/A	–
	Republic of Korea	Y	Y	–	–	N	N/A	–	Y	–	–	–	Y	N	N	N/A	–
	Solomon Islands	Y	Y	N	Y	N	Y	Y	Y	N	Y	N	Y	Y	N	N/A	–
	Vanuatu	Y	Y	Y	N	N	Y	Y	N	Y	Y	N	Y	Y	N	N/A	–
	Viet Nam	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	Y	N	Y	N/A	–
	Philippines	Y	Y	Y	N	–	Y	Y	Y	Y	Y	Y	–	–	–	N/A	N/A
	Republic of Korea	Y	N	–	N	Y	N/A	–	Y	–	–	–	Y	N	Y	N/A	N/A
	Solomon Islands	Y	Y	Y	N	–	Y	Y	Y	N	Y	Y	–	–	–	N/A	N/A
	Vanuatu	Y	Y	Y	N	–	Y	Y	Y	Y	Y	Y	–	–	–	N/A	N/A
	Viet Nam	Y	Y	Y	N	–	Y	Y	Y	Y	Y	Y	–	–	–	N/A	N/A

ACT, artemisinin-based combination therapy; DDT, dichlorodiphenyltrichloroethane; IM, intramuscular; IPTc, intermittent preventive treatment for children; IRS, indoor residual spraying; ITN, insecticide-treated mosquito net; LLIN, long-lasting insecticidal net; N/A, not applicable; RDT, rapid diagnostic test; SMC, seasonal malaria chemoprevention

(Y) = Actually implemented – (N) = Not implemented – (N/A) = Not applicable – (–) = Question not answered

[1] In May 2013 South Sudan was reassigned to the Who African Region (WHA resolution 66.21 http://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R21-en.pdf). Nonetheless, since most data in this report precede 2013, South Sudan is placed in Eastern Mediterranean Region

Annex 2B – Antimalarial drug policy, 2012

WHO Region	Country/area	Uncomplicated unconfirmed	*P. falciparum*			*P. vivax*
			Uncomplicated confirmed	Severe	Prevention during pregnancy	Treatment
African	Algeria	–	–	–	–	CQ
	Angola	AL	AL	QN	SP(IPT)	–
	Benin	AL	AL	QN	SP(IPT)	–
	Botswana	AL	AL	QN	CQ+PG	–
	Burkina Faso	AL;AS+AQ	AL;AS+AQ	QN	SP(IPT)	–
	Burundi	AS+AQ	AS+AQ	QN	–	–
	Cabo Verde	AL	AL	QN	CQ	–
	Cameroon	AS+AQ	AS+AQ	AM;QN	SP(IPT)	–
	Central African Republic	AL	AL	AM;QN	SP(IPT)	–
	Chad	AL;AS+AQ	AL;AS+AQ	AM;QN	SP(IPT)	–
	Comoros	AL	AL	QN	SP(IPT)	–
	Congo	AS+AQ	AS+AQ	QN	SP(IPT)	–
	Côte d'Ivoire	AS+AQ	AS+AQ	QN	SP(IPT)	–
	Democratic Republic of the Congo	AS+AQ	AS+AQ	QN	SP(IPT)	–
	Equatorial Guinea	AS+AQ	AS+AQ	QN	–	–
	Eritrea	AS+AQ	AS+AQ	QN	–	AS+AQ+PQ
	Ethiopia	AL	AL	QN	–	CQ
	Gabon	AS+AQ	AS+AQ	QN	SP(IPT)	–
	Gambia	AL	AL	QN	SP(IPT)	–
	Ghana	AS+AQ	AL;AS+AQ	QN	SP(IPT)	–
	Guinea	AS+AQ	AS+AQ	QN	SP(IPT)	–
	Guinea-Bissau	AL	AL	QN	SP(IPT)	–
	Kenya	AL	AL	QN	SP(IPT)	–
	Liberia	AS+AQ	AS+AQ	QN	SP(IPT)	–
	Madagascar	AS+AQ	AS+AQ	QN	SP(IPT)	–
	Malawi	AL	AL	QN	SP(IPT)	–
	Mali	AS+AQ	AL;AS+AQ	QN	SP(IPT)	–
	Mauritania	AS+AQ	AL;AS+AQ	QN	–	–
	Mayotte, France	–	–	–	–	–
	Mozambique	AL	AL	QN	SP(IPT)	–
	Namibia	AL	AL	QN	SP(IPT)	AL
	Niger	AL	AL	QN	SP(IPT)	–
	Nigeria	AL;AS+AQ	AL;AS+AQ	AM;AS;QN	SP(IPT)	–
	Rwanda	AL	AL	AS	SP(IPT)	–
	Sao Tome and Principe	AS+AQ	AS+AQ	QN	SP(IPT)	–
	Senegal	AS+AQ	AL;AS+AQ	QN	SP(IPT)	–
	Sierra Leone	AS+AQ	AL;AS+AQ	AM;QN	SP(IPT)	–
	South Africa	–	AL;QN+CL;QN+D	QN	CQ+PG	AL+PQ;CQ+PQ
	Swaziland	–	AL	QN	CQ+PG	–
	Togo	AL;AS+AQ	AL;AS+AQ	QN	SP(IPT)	–
	Uganda	AL	AL	QN	SP(IPT)	–
	United Republic of Tanzania					–
	Mainland	AL	AL	QN	SP(IPT)	–
	Zanzibar	AS+AQ	AS+AQ	QN	SP(IPT)	–
	Zambia	AL	AL	QN	SP(IPT)	–
	Zimbabwe	AL	AL	QN	SP(IPT)	–
Region of the Americas	Argentina	–	AL		–	CQ+PQ
	Belize	–	CQ+PQ	QN	–	CQ+PQ(14d)
	Bolivia (Plurinational State of)	–	AS+MQ+PQ	QN	–	CQ+PQ(14d)
	Brazil	–	AL+PQ(1d);AS+MQ+PQ(1d)	AM+CL;AS+CL	–	CQ+PQ(7d);CQ+PQ(14d)
	Colombia	–	AL	AS	–	CQ+PQ(14d)
	Costa Rica	–	CQ+PQ(1d)	–	–	CQ+PQ(7d);CQ+PQ(14d)
	Dominican Republic	–	CQ+PQ(3d)	CQ;QN	–	CQ+PQ(14d)
	Ecuador	–	AL	QN	–	CQ+PQ(14d)
	El Salvador	–	CQ+PQ(1d)	QN	–	CQ+PQ(14d)

WHO Region	Country/area	Uncomplicated unconfirmed	*P. falciparum*			*P. vivax*
			Uncomplicated confirmed	Severe	Prevention during pregnancy	Treatment
	French Guiana, France	–	AL;AT+PG	AS; QN+D	–	CQ+PQ
	Guatemala	–	CQ+PQ(3d)	CQ	–	CQ+PQ(14d)
	Guyana	–	AL+PQ(1d)	–	–	CQ+PQ(14d)
	Haiti	–	CQ+PQ(1d)	–	–	CQ+PQ(14d)
	Honduras	–	CQ+PQ(1d)	QN	–	CQ+PQ(14d)
	Mexico	–	CQ+PQ	–	–	CQ+PQ
	Nicaragua	–	CQ+PQ	QN+CL	–	CQ+PQ(7d)
	Panama	–	AL	MQ	–	CQ+PQ(7d);CQ+PQ(14d)
	Paraguay	–	AL	–	–	CQ+PQ
	Peru	–	AS+MQ	–	–	CQ+PQ
	Suriname	–	AL+PQ	AS	–	CQ+PQ(14d)
	Venezuela (Bolivarian Republic of)	–	AS+MQ+PQ	AM;QN	–	CQ+PQ(14d)
Eastern Mediterranean	Afghanistan	CQ	AS+SP	AM+QN	–	CQ+PQ(8w)
	Djibouti	AS+SP	AS+SP	QN	QN+D	–
	Iran (Islamic Republic of)	–	AS+SP	AS;QN+D	–	CQ+PQ(14d&8w)
	Pakistan	CQ	AS+SP	AS;QN	–	CQ+PQ(14d)
	Saudi Arabia	–	AS+SP	AM;AS;QN	–	CQ+PQ(14d)
	Somalia	AS+SP	AS+SP	AS;QN	SP(IPT)	CQ+PQ(14d)
	South Sudan	AS+AQ	AS+AQ	AM;AS;QN	SP(IPT)	AS+AQ+PQ
	Sudan	AS+SP	AS+SP	AM;QN	–	AL
	Yemen	AS+SP	AS+SP	AM;QN	–	CQ+PQ(14d)
European	Azerbaijan	AS+SP	AS+SP	AS;QN	–	CQ+PQ(14d)
	Kyrgyzstan	–	–	–	–	CQ+PQ(14d)
	Tajikistan	–	AL	QN	–	CQ+PQ(14d)
	Turkey	–	–	–	–	CQ+PQ(14d)
	Uzbekistan	–	–	–	–	CQ+PQ(14d)
South-East Asia	Bangladesh	–	AL	AM;QN	–	CQ+PQ(14d)
	Bhutan	–	AL	AM;QN	–	CQ+PQ(14d)
	Democratic People's Republic of Korea	–	–	–	–	CQ+PQ(14d)
	India	CQ	AS+SP+PQ	AM;AS;QN	–	CQ+PQ(14d)
	Indonesia	–	AS+AQ;DHA–PP+PQ	AM;AS;QN	–	AS+AQ;DHA–PP+PQ(14d)
	Myanmar	–	AL;AM;AS+MQ;DHA–PPQ;PQ	AM;AS;QN	–	CQ+PQ(14d)
	Nepal	CQ	AL+PQ	QN	–	CQ+PQ(14d)
	Sri Lanka	–	AL+PQ	QN	–	CQ+PQ(14d)
	Thailand	–	AS+MQ	AS;QN	–	CQ+PQ(14d)
	Timor-Leste	–	AL	AM;AS;QN	–	CQ+PQ(14d)
Western Pacific	Cambodia	–	AS+MQ;DHA–PPQ+PQ	AM;QN	–	DHA–PPQ
	China	–	ART+NQ;ART–PPQ;AS+AQ;DHA–PPQ	AM;AS;PYR	–	CQ+PQ(8d)
	Lao People's Democratic Republic	–	AL	AS+AL	SP(IPT)	CQ+PQ(14d)
	Malaysia	–	AS+MQ	QN+T	–	CQ+PQ(14d)
	Papua New Guinea	–	AL	AM;AS	SP(IPT)	AL+PQ
	Philippines	AL	AL+PQ	QN+T	SP(IPT)	CQ+PQ(14d)
	Republic of Korea	CQ	–	–	–	CQ+PQ(14d)
	Solomon Islands	AL	AL	AL;AS	CQ	AL+PQ(14d)
	Vanuatu	–	AL	QN	CQ(weekly)	AL+PQ(14d)

IPT, intermittent preventive treatment

AL=Artemether-lumefantrine
AM=Artemether
AQ=Amodiaquine
ART=Artemisinin
AS=Artesunate
AT= Atovaquone
CL=Clindamycline
CQ=Chloroquine
D=Doxycycline
DHA=Dihydroartemisinin
MQ=Mefloquine
NQ=Naphroquine
PG=Proguanil
PPQ=Piperaquine
PQ=Primaquine
PYR=Pyronaridine
QN=Quinine
SP=Sulphadoxine-pyrimethamine
T=Tetracycline

[1] In May 2013 South Sudan was reassigned to the Who African Region (WHA resolution 66.21 http://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R21-en.pdf). Nonetheless, since most data in this report precede 2013, South Sudan is placed in Eastern Mediterranean Region

Annex 3 – Funding for malaria control, 2008–2012

WHO Region	Country/area	Year	Contributions reported by donors				Contributions reported by countries								
			Global Fund[1]	PMI[2]/USAID	The World Bank[3]	DFID[3]	Government	Global Fund	The World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[5]	European Union
African	Algeria	2008	–	–	–	–	1 811 684	0	–	–	0	–	–	–	–
		2009	–	–	–	–	17 126 365	0	–	–	0	12 000	–	–	–
		2010	–	–	–	–	32 321 720	0	–	–	0	10 000	–	–	–
		2011	–	–	–	–	31 477 010	0	–	–	0	17 000	–	–	–
		2012	–	–	–	–	98 151 555	0	–	–	0	33 000	–	–	–
	Angola	2008	9 872 558	18 800 000	205 930	–	17 525 978 [4]	–	–	18 500 000	–	–	–	–	–
		2009	9 614 770	22 900 000	261 722	–	–	17 950 321	–	18 925 000	–	–	–	–	–
		2010	11 200 000	34 300 000	240 569	–	15 676 687 [4]	13 873 496	–	18 700 000	–	439 000	–	–	–
		2011	–	30 600 000	–	–	66 637 986 [4]	–	–	30 614 000	–	–	–	–	–
		2012	7 070 600	30 200 000	–	–	57 415 819 [4]	2 135 717	–	30 750 000	–	–	–	1 000 000	–
	Benin	2008	6 345 919	17 700 000	1 770 597	–	764 627	376 990	5 547 000	13 887 000	–	–	–	–	–
		2009	214 400	18 100 000	1 829 615	–	2 042 222	327 593	6 527 000	13 800 000	–	–	–	–	–
		2010	21 700 000	20 600 000	597 208	–	–	1 130 708	–	13 800 000	–	–	105 893	–	–
		2011	5 467 432	18 500 000	–	–	200 000 [4]	18 060 813	0	21 000 000	–	660 000	248 540	0	–
		2012	5 533 925	17 900 000	–	–	1 500 000 [4]	9 011 888	–	16 100 000	–	660 000	123 571	–	–
	Botswana	2008	–	–	–	–	1 308 890	–	–	–	–	–	–	–	–
		2009	–	–	–	–	876 647	–	–	–	–	–	–	–	–
		2010	–	–	–	–	709 607	–	–	–	–	–	–	–	–
		2011	–	–	–	–	2 250 933	–	–	–	1 171 250	–	–	–	–
		2012	–	–	–	–	1 921 908	–	–	–	250 000	–	–	–	–
	Burkina Faso	2008	7 283 872	1 500 000	3 662 724	–	58 662	813 399	–	–	–	–	–	–	–
		2009	14 800 000	4 500 000	4 170 093	–	554 094	67 991 119	5 073 238	0	33 879	108 966	75 895	–	–
		2010	43 800 000	–	1 880 016	–	4 508 617	1 458 620	0	4 210 524	64 530	16 940	1 816 055	0	–
		2011	10 500 000	–	–	–	6 482 938	2 546 429	0	2 072 216	34 903	99 027	140 253	0	–
		2012	38 000 000	–	–	–	11 380 472	4 834 000	0	2 698 000	16 600	29 500	14 000	0	–
	Burundi	2008	9 623 263	1 500 000	–	2 700 279	46 000 [4]	4 683 029	–	–	–	–	–	70 000	–
		2009	4 532 059	4 500 000	–	1 455 842	–	5 185 632	–	6 000 000	8 856 727	45 003	1 817 914	–	–
		2010	15 500 000	–	–	–	–	13 625 189	–	6 000 000	2 720 000	12 771	387 300	–	–
		2011	6 149 217	–	–	–	147 422 [4]	8 661 526	–	5 988 000	–	266 540	708 425	94 000	–
		2012	1 018 766	–	–	–	22 000 [4]	4 382 754	–	8 000 000	1 031 803	94 294	1 540 000	2 602 730	–
	Cabo Verde	2008	–	–	–	–	401 316 [4]	0	0	0	–	58 500	33 400	–	–
		2009	–	–	–	–	451 098 [4]	0	0	0	–	74 327	178 043	–	–
		2010	–	–	–	–	707 795 [4]	–	–	–	–	–	–	–	–
		2011	–	–	–	–	604 871 [4]	–	–	–	–	–	–	–	–
		2012	364 436	–	–	–	–	–	–	–	–	–	–	–	–
	Cameroon	2008	6 046 764	–	–	–	14 006 863	11 506 022	–	–	–	300 000	–	–	–
		2009	9 610 844	–	–	–	8 545 999 [4]	8 529 662	0	0	0	300 000	–	0	–
		2010	1 635 796	–	–	–	975 590 [4]	1 573 566	–	–	–	264 625	34 981	–	–
		2011	66 200 000	–	–	–	5 150 943 [4]	55 336 850	0	0	–	313 300	–	0	–
		2012	1 551 732	–	–	–	3 178 626 [4]	11 655 745	0	0	–	449 000	1 196 800	0	–
	Central African Republic	2008	2 294 055	–	–	–	45 000	2 294 055	600 000	0	3 300 000	100 000	1 000 644	0	0
		2009	–	–	–	–	42 000	0	600 000	0	0	100 000	10 000	0	–
		2010	962 051	–	–	–	34 000	962 050	600 000	0	4 500 000	100 000	550 000	0	–
		2011	723 324	–	–	–	34 000 [4]	481 345	0	0	–	100 000	–	0	–
		2012	3 578 002	–	–	–	371 463 [4]	–	0	0	74 535	–	219 747	0	–
	Chad	2008	–	–	–	–	–	–	–	–	–	–	30 000	–	–
		2009	4 644 509	–	–	–	–	5 262 314	–	–	–	77 083	–	3 958	–
		2010	22 700 000	–	–	–	953 930 000	5 215 000	–	–	–	–	–	6 682 000	–
		2011	4 208 387	–	–	–	600 000 000 [4]	–	–	–	–	–	–	–	–
	Comoros	2008	264 709	–	–	–	2 678	264 708	–	–	–	146 250	65 000	–	–
		2009	232 885	–	–	–	24 158 [4]	290 612	–	–	–	104 000	11 656	–	–
		2010	4 256 900	–	–	–	–	4 610 020	0	0	–	104 000	–	–	–
		2011	1 106 246	–	–	–	114 215 [4]	773 425	0	0	–	137 000	–	0	–
		2012	127 142	–	–	–	225 621 [4]	–	–	–	–	–	–	–	–
	Congo	2010	11 900 000	–	–	–	–	–	–	–	–	–	–	–	–
		2011	1 262 613	–	–	–	–	3 982 625	–	–	–	–	–	–	–
		2012	1 035 856	–	–	–	6 956 815 [4]	4 740 367	–	–	–	–	–	–	–
	Côte d'Ivoire	2009	16 200 000	–	–	–	–	–	–	–	–	–	–	–	–
		2010	58 300 000	–	–	–	–	–	–	–	–	–	–	–	–
		2011	14 300 000	–	–	–	34 964 064 [4]	27 941 028	–	–	307 748	2 605 303	69 012	–	–
		2012	17 900 000	–	–	–	–	–	–	–	–	–	–	–	–

WHO Region	Country/area	Year	Contributions reported by donors				Contributions reported by countries								
			Global Fund[1]	PMI[2]/USAID	The World Bank[3]	DFID[3]	Government	Global Fund	The World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[5]	European Union
African	Democratic Republic of the Congo	2008	18 200 000	9 325 000	5 525 751	–	2 000 000	18 188 352	43 000 000	7 240 000	–	45 104	5 662 078	–	–
		2009	70 900 000	16 200 000	10 900 000	–	2 000 000	4 071 980	11 101 283	15 580 000	–	86 895	5 365 009	–	–
		2010	44 300 000	22 200 000	11 800 000	–	296 443	23 044 824	10 262 916	15 580 000	596 182	–	2 271 712	–	–
		2011	2 106 190	35 700 000	–	25 900 000	296 443	33 775 293	58 805 836	18 000 000	36 765 988	–	2 389 964	–	–
		2012	105 000 000	37 000 000	–	–	303 835	64 140 129	73 719 913	34 930 000	45 000	520 000	5 584 965	12 575 325	–
	Equatorial Guinea	2008	6 305 881	–	–	–	300 000	8 245 229	–	165 000	4 759 000	15 000	–	4 759 000	–
		2009	3 445 774	–	–	–	–	4 756 207	–	–	–	–	–	6 787 000	–
		2010	5 371 664	–	–	–	–	5 031 797	–	–	5 673 954	–	–	–	–
		2011	2 599 520	–	–	–	–	3 425 062	–	–	8 047 523	–	–	–	–
	Eritrea	2008	4 754 718	–	880 201	–	–	4 792 642	300 000	0	–	100 000	254 037	–	–
		2009	206 600	–	349 947	–	–	3 312 520	0	0	0	–	105 000	0	–
		2010	21 400 000	–	165 641	–	–	19 155 845	0	0	0	0	0	0	–
		2011	4 908 106	–	–	–	–	10 722 859	0	0	0	0	0	0	–
		2012	8 229 050	–	–	–	–	11 157 713	0	0	0	0	0	0	–
	Ethiopia	2008	3 138 583	19 800 000	–	–	717 569	18 990 619	–	6 587 000	164 372	–	4 200 000	–	–
		2009	121 000 000	22 500 000	–	–	3 456 244	81 586 570	10 090 000	19 700 000	0	280 000	5 000 000	7 624 294	–
		2010	28 300 000	33 500 000	–	–	6 144 036	107 128 416	9 900 000	31 000 000	0	210 960	1 297 858	0	–
		2011	51 900 000	41 400 000	–	–	–	32 231 572	–	–	–	171 357	27 243	–	–
		2012	23 800 000	41 500 000	–	–	–	42 424 919	–	–	–	0	–	–	–
	Gabon	2008	1 338 162	–	–	–	1 293 523	450 693	–	–	–	–	–	–	–
		2009	3 891 808	–	–	–	–	–	–	–	–	–	–	–	–
		2010	871 083	–	–	–	1 400 769	–	–	–	45 000	–	–	–	–
	Gambia	2008	5 683 473	–	–	–	517 767 [4]	5 683 474	0	0	113 000	72 500	17 000	0	0
		2009	5 921 546	–	–	–	1 025 550 [4]	5 921 546	0	0	100 000	380 500	65 000	0	–
		2010	8 960 101	–	–	–	529 610	8 960 101	0	0	250 000	–	2 143	0	–
		2011	7 119 980	–	–	–	613 412	8 835 940	0	0	89 000	40 000	4 800	0	–
		2012	5 393 233	–	–	–	597 812	4 107 095	–	–	119 149	134 306	–	–	–
	Ghana	2008	10 500 000	17 000 000	2 379 226	361 860	269 583	10 544 980	4 000 000	16 900 000	1 000 000	200 000	1 200 000	300 000	–
		2009	27 000 000	21 500 000	708 817	–	6 214 286	18 363 180	1 283 389	17 300 000	0	290 000	939 300	300 000	–
		2010	30 600 000	33 000 000	655 112	15 600 000	6 533 333	30 649 705	0	34 000 000	0	150 000	101 053	98 733	–
		2011	–	30 400 000	–	8 566 783	6 663 582	53 169 328	400 000	34 000 000	250 000	300 000	2 000 000	16 100 000	–
		2012	24 600 000	30 800 000	–	–	7 700 154	34 668 998	0	27 010 000	581	200 000	79 490	7 911 545	–
	Guinea	2008	1 002 592	–	–	–	9 687	13 424 707	1 181 250	–	–	250 000	432 000	6 000 000	–
		2009	–	–	–	–	154 564	3 914 541	1 181 250	–	–	109 000	819 553	2 375 040	–
		2010	12 400 000	2 495 000	–	–	3 948	–	–	–	–	51 500	–	–	–
		2011	–	9 985 000	–	–	–	–	–	–	–	49 500	–	–	–
		2012	20 100 000	10 000 000	–	–	50 880	1 705 505	–	10 000 000	6 773 166	41 060	15 736	–	–
	Guinea-Bissau	2008	1 526 060	–	–	–	–	1 545 699	–	–	–	146 000	329 305	–	–
		2009	1 644 833	–	–	–	8 000	1 279 343	0	0	0	100 000	486 579	0	–
		2010	6 965 345	–	–	–	103 440 000 [4]	6 809 770	0	0	0	100 000	425 541	0	–
		2011	2 922 931	–	–	–	79 269 000 [4]	1 070 641	0	0	99 750	68 000	7 238	0	–
		2012	255 313	–	–	–	–	18 177	0	0	0	124 135	436 945	0	–
	Kenya	2008	19 000 000	19 800 000	–	15 500 000	32 566	37 543 798	–	19 838 000	500 000	–	–	–	–
		2009	26 400 000	24 800 000	–	19 900 000	822 742 [4]	25 921 567	–	37 652 822	17 975 039	87 584	30 000	500 000	–
		2010	39 100 000	39 100 000	–	11 300 000	2 741 417 [4]	–	3 400 000	30 829 000	–	–	–	11 131 200	–
		2011	12 200 000	36 400 000	–	17 400 000	–	–	–	–	–	–	–	–	–
		2012	10 900 000	35 900 000	–	–	–	–	–	–	–	–	–	–	–
	Liberia	2008	8 863 680	12 400 000	–	–	60 118	6 347 301	–	12 500 000	–	–	–	–	–
		2009	345 575	13 400 000	–	–	–	990 100	–	61 375	50 000	5 786 287	226 743	–	–
		2010	8 229 609	16 800 000	–	–	–	8 118 208	–	12 000 000	–	–	–	–	–
		2011	5 198 534	13 000 000	–	–	–	16 400 946	–	12 000 000	–	19 675	304 750	–	–
		2012	12 200 000	12 000 000	–	–	–	14 243 081	0	12 000 000	–	73 333	0	500 000	–
	Madagascar	2008	15 100 000	17 100 000	–	–	19 387	5 814 063	0	17 000 000	0	638 691	3 852 552	210 000	–
		2009	12 100 000	21 400 000	–	–	19 000	25 329 554	0	12 753 000	0	100 532	1 103 644	0	–
		2010	54 500 000	33 100 000	–	–	110 504	53 367 022	0	16 700 000	578 000	418 861	668 216	0	–
		2011	18 400 000	28 700 000	–	–	90 900	19 557 627	0	33 900 000	47 250	153 000	422 624	0	–
		2012	25 500 000	26 700 000	–	–	95 000	31 371 350	0	28 742 000	51 000	111 315	875 717	0	–
	Malawi	2008	15 000 000	20 100 000	–	–	5 985 915 [4]	–	–	16 000 000	–	100 000	500 000	–	–
		2009	3 721 540	20 800 000	–	–	4 482 759 [4]	–	–	18 000 000	–	50 000	50 000	–	–
		2010	5 492 126	27 900 000	–	–	8 453 947	5 492 126	–	27 000 000	–	70 000	50 000	–	–
		2011	45 000 000	26 500 000	–	–	–	–	–	–	–	–	–	–	–
		2012	2 473 270	24 200 000	–	–	720 000	9 720 000	–	21 600 000	3 240 000	–	–	720 000	–

Annex 3 – Funding, 2008–2012 (continued)

WHO Region	Country/area	Year	Contributions reported by donors				Contributions reported by countries								
			Global Fund[1]	PMI[2]/USAID	The World Bank[3]	DFID[3]	Government	Global Fund	The World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[5]	European Union
African	Mali	2008	4 233 040	16 500 000	–	–	–	6 703 715	1 749 540	8 932 000	2 806 479	–	–	6 550 000	–
		2009	–	21 300 000	–	–	–	5 214 224	–	8 932 000	965 774	292 000	–	3 116 725	–
		2010	4 330 851	31 600 000	–	–	–	7 120 975	847 617	11 184 211	291 162	50 535	1 575 926	894 577	–
		2011	–	33 000 000	–	–	2 737 186 [4]	2 858 296	0	4 737 692	–	92 000	0	319 404	–
		2012	–	26 500 000	–	–	1 259 872	0	–	5 298 930	–	52 584	–	–	–
	Mauritania	2008	1 342 027	–	–	–	–	–	–	–	–	–	–	–	–
		2009	541 854	–	–	–	–	–	–	–	–	–	–	–	–
		2010	500 223	–	–	–	33 941	350 000	0	0	0	1 000	25 000	1 000 000	–
		2011	–	–	–	–	11 000 000	0	0	0	–	–	–	0	–
		2012	–	–	–	–	170 000	0	0	0	–	–	–	0	–
	Mozambique	2008	11 600 000	24 400 000	–	2 956 531	–	–	–	–	–	–	–	–	–
		2009	520 865	38 800 000	–	2 573 946	–	–	–	–	–	–	–	–	–
		2010	23 000 000	39 100 000	46 600	1 378 107	–	–	–	–	–	–	–	–	–
		2011	7 683 006	33 000 000	–	2 526 054	–	–	–	–	–	–	–	–	–
		2012	29 700 000	29 800 000	–	–	–	–	–	–	–	–	–	–	–
	Namibia	2008	412 016	–	–	–	1 690 211	4 826 069	–	–	–	–	–	–	–
		2009	3 797 710	–	–	–	2 411 088	2 267 472	–	–	–	–	–	–	–
		2010	1 165 287	–	–	–	2 731 460	1 362 347	0	0	0	0	0	0	–
		2011	1 298 393	–	–	–	4 466 719	589 694	0	0	0	0	0	0	–
		2012	1 243 974	–	–	–	4 500 000	926 804	0	0	0	0	0	0	–
	Niger	2008	12 300 000	–	1 187 319	–	900 000 [4]	–	–	–	–	–	–	–	–
		2009	17 500 000	–	843 430	–	900 000 [4]	28 057 121	1 773 423 718	0	194 428	15 000	840 196	–	–
		2010	2 964 287	–	1 047 934	–	700 000 [4]	972 351 152	772 219 032	0	556 900	4 500	1 058 500 000	2 374 736	–
		2011	3 300 846	–	–	–	500 000 [4]	529 956	0	0	–	4 500	586 204	0	–
		2012	441 165	–	–	–	2 115 926 [4]	225 901	60 000	38 000	–	16 000	816 535	0	–
	Nigeria	2008	16 300 000	10 300 000	15 500 000	2 479 466	14 324 952	15 353 110	52 358 702	11 900 000	2 235 276	–	–	2 895 752	–
		2009	224 000 000	17 400 000	67 900 000	9 768 276	200 000	42 019 322	17 500 000	16 000 000	18 210 725	306 321	37 247 310	10 229 555	–
		2010	1 056 110	25 400 000	30 900 000	18 200 000	6 493 506	61 357 535	–	18 000 000	–	–	20 750 000	17 678 415	–
		2011	29 900 000	51 100 000	–	15 400 000	2 493 181	73 332 766	–	43 000	–	–	–	–	–
		2012	123 000 000	55 900 000	–	–	1 740 000	83 083 666	5 492 349	43 600 000	–	–	35 000	18 908 794	–
	Rwanda	2008	19 300 000	16 700 000	–	–	500 000 [4]	12 884 983	3 083 332	17 000 000	–	–	–	–	–
		2009	42 500 000	16 700 000	–	–	–	40 117 815	–	–	–	0	–	–	–
		2010	20 500 000	18 200 000	–	–	–	–	–	–	–	–	–	–	–
		2011	17 000 000	18 700 000	–	–	–	–	–	–	–	–	–	–	–
		2012	26 000 000	18 100 000	–	–	–	–	–	–	–	–	–	–	–
	Sao Tome and Principe	2008	2 424 782	–	97 700	–	54 267	514 393	40 000	0	1 700	63 165	10 000	1 000 000	–
		2009	75 857	–	17 716	–	303 802	1 699 172	126 000	0	1 717	59 965	5 000	1 000 000	–
		2010	1 060 100	–	4 030	–	74 583	782 254	350 000	0	30 315	38 163	3 000	1 172 611	–
		2011	1 571 589	–	–	–	52 941	1 521 822	0	0	0	54 428	3 000	0	–
		2012	–	–	–	–	128 502	926 494	459 294	0	2 000	47 962	3 000	1 022 740	–
	Senegal	2008	5 839 346	21 400 000	–	–	176 000	–	–	490 000	–	394 552	–	–	–
		2009	14 300 000	18 700 000	–	–	449 813	11 436 555	–	14 512 634	6 793 567	288 302	–	–	–
		2010	2 507 790	26 400 000	–	–	155 764	2 531 265	–	17 329 326	–	97 987	–	–	–
		2011	1 118 536	24 500 000	–	–	118 000	9 620 506	–	21 758 440	–	372 518	–	–	–
		2012	20 700 000	23 800 000	–	–	–	21 567 732	–	–	–	–	–	–	–
	Sierra Leone	2008	4 840 240	–	–	1 093 408	180 552 [4]	5 126 487	5 141	–	–	778 590	–	–	–
		2009	2 794 509	–	–	–	198 586 [4]	4 884 763	–	–	–	26 413	19 673	–	–
		2010	799 743	–	–	7 528 957	1 198 629 [4]	5 241 344	–	–	–	137 255	165 625	–	–
		2011	13 800 000	–	–	–	404 235 [4]	–	–	–	10 478	43 261	286 406	–	–
		2012	2 991 631	–	–	–	1 231 395 [4]	11 763 088	–	–	–	430 000	2 812	–	–
	South Africa	2008	–	–	–	–	24 757 142 [4]	–	–	–	–	–	–	–	–
		2009	–	–	–	–	27 142 857 [4]	–	–	–	–	100 000	–	50 000	–
		2010	–	–	–	–	25 064 907	–	–	–	–	0	–	–	–
		2011	–	–	–	–	13 162 365	–	–	–	8 571 428	–	–	–	–
		2012	–	–	–	–	24 291 216	–	–	–	254 869	–	–	–	–
	Swaziland	2008	294 218	–	–	–	–	–	0	0	0	0	0	0	–
		2009	2 607 294	–	–	–	–	–	0	0	0	0	0	0	–
		2010	1 377 144	–	–	–	964 009	2 197 637	0	0	0	0	0	0	–
		2011	–	–	–	–	1 002 947	1 924 448	0	0	0	0	0	0	–
		2012	1 116 084	–	–	–	685 739	1 376 584	–	–	–	–	–	–	–

WHO Region	Country/area	Year	Contributions reported by donors				Contributions reported by countries								
			Global Fund[1]	PMI[2]/USAID	The World Bank[3]	DFID[3]	Government	Global Fund	The World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[5]	European Union
African	Togo	2008	5 026 694	–	–	–	–	2 442 924	–	0	3 788 783	20 573	341 805	–	–
		2009	4 525 903	–	–	–	–	592 434	14 197 371	0	954 226	3 261	92 523	92 378	–
		2010	8 447 243	–	–	–	223 896	–	0	0	2 688	1 489	–	–	–
		2011	21 000 000	–	–	–	223 896	–	0	0	14 090	23 832	8 674	–	–
		2012	239 270	–	–	–	225 535	884 398	0	0	0	88 490	0	8 747	–
	Uganda	2008	6 335 768	26 400 000	–	653 644	7 267 857	–	–	21 752 000	–	–	–	–	–
		2009	41 000 000	30 700 000	–	407 279	–	–	–	21 600 000	–	–	–	–	–
		2010	31 100 000	29 300 000	–	–	–	155 963 673	–	35 000 000	–	–	–	–	–
		2011	9 465 369	35 300 000	–	914 725	–	56 141 986	–	34 366 813	40 000	317 816	2 545 396	–	–
		2012	83 100 000	34 600 000	–	–	–	83 701 649	–	33 000 000	–	–	–	–	–
	United Republic of Tanzania[6]	2008	–	42 500 000	–	–	838 226 415 [4]	–	–	–	–	–	–	–	–
		2009	–	59 900 000	–	1 249 609	616 085 000 [4]	46 300 000	25 000 000	34 000 000	1 000 000	50 000 000	–	–	–
		2010	–	57 600 000	–	2 333 036	–	–	–	–	–	–	–	–	–
		2011	–	49 900 000	–	59 400	–	–	–	–	–	–	–	–	–
		2012	–	48 000 000	–	–	–	–	–	–	–	–	–	–	–
	Mainland	2008	56 900 000	–	–	–	838 226 415 [4]	–	–	–	–	–	–	–	–
		2009	58 600 000	–	–	–	340 000 000 [4]	46 300 000	25 000 000	34 000 000	1 000 000	50 000 000	–	–	–
		2010	50 400 000	–	–	–	21 830 362	105 217 601	0	52 000 000	43 401 000	300 000	139 313	0	–
		2011	42 500 000	–	–	–	260 823	17 701 499	0	75 000	0	70 000	0	0	–
		2012	15 200 000	–	–	–	553 167	18 031 872	0	165 480	0	360 000	0	0	–
	Zanzibar	2008	1 770 569	–	–	–	29 467	1 705 252	0	3 020 800	0	0	108 552	0	–
		2009	1 397 265	–	–	–	29 333	2 401 665	0	2 937 375	0	30 000	198 000	21 564	–
		2010	1 530 146	–	–	–	29 267	1 311 590	0	3 133 000	0	67 743	221 000	19 372	–
		2011	1 363 902	–	–	–	0	808 088	0	5 104 000	43 953	52 388	4 898	–	–
		2012	–	–	–	–	1 250	0	0	4 123 200	138 140	130 000	–	2 281 500	–
	Zambia	2008	–	–	–	–	1 900 000	3 817 916	–	14 888 000	–	–	550 847	–	–
		2009	–	–	–	–	848 745	986 834	5 000 000	14 700 000	–	398 000	212 570	–	–
		2010	–	–	–	–	414 580	12 335 725	0	25 600 000	–	380 000	100 000	7 200 000	–
		2011	–	–	–	–	279 788	5 282 152	29 401 235	24 000 000	–	130 000	75 000	7 215 019	–
		2012	–	–	–	–	402 975	12 105 399	3 612 027	24 000 000	1 850 000	130 000	50 000	7 161 185	–
	Zimbabwe	2008	–	–	–	–	1 302 500	1 100 000	–	200 000	300 000	–	–	–	–
		2009	–	–	–	–	1 650 000	2 800 000	–	0	500 000	–	–	–	–
		2010	–	–	–	–	1 000 000	24 000 000	0	1 000 000	0	79 000	25 000	0	–
		2011	–	–	–	–	1 200 000	10 063 628	–	12 000 000	0	0	18 250	–	–
		2012	–	–	–	–	906 000	19 069 239	–	12 000 000	2 000	0	42 000	–	–
Region of the Americas	Argentina	2010	–	–	–	–	1 082 700 [4]	–	–	–	–	–	–	–	–
		2011	–	–	–	–	1 082 700 [4]	–	–	–	–	–	–	–	–
		2012	–	–	–	–	1 082 700 [4]	–	–	–	–	–	–	–	–
	Belize	2008	–	–	–	–	170 494 [4]	0	–	–	–	–	–	–	–
		2009	–	–	–	–	148 621 [4]	0	0	0	0	–	0	0	–
		2010	–	–	–	–	169 184 [4]	0	0	32 000	0	0	0	0	–
		2011	–	–	–	–	215 224 [4]	0	0	–	0	0	0	0	–
		2012	–	–	–	–	300 000 [4]	0	0	29 500	0	0	0	0	–
	Bolivia (Plurinational State of)	2008	–	–	–	–	1 593 484	–	–	200 000	–	–	40 000	–	70 000
		2009	2 116 856	–	–	–	1 699 130	550 000	0	200 000	0	0	25 000	0	–
		2010	1 773 184	–	–	–	1 700 145	2 482 576	0	200 000	0	0	50 000	0	–
		2011	1 525 890	–	–	–	1 110 097	1 400 635	0	177 000	0	0	0	0	–
		2012	3 423 745	–	–	–	787 966	1 909 295	0	72 000	0	0	0	0	–
	Brazil	2008	–	–	–	–	71 468 113 [4]	0	–	65 000	0	–	0	–	–
		2009	4 858 206	–	–	–	67 952 169 [4]	4 884 938	0	65 000	0	0	0	0	–
		2010	5 509 723	–	–	–	64 436 226 [4]	10 361 470	0	227 000	0	0	0	0	–
		2011	7 641 225	–	–	–	78 565 078 [4]	17 851 837	0	30 000	0	0	0	0	–
		2012	–	–	–	–	61 378 194 [4]	0	0	49 694	0	0	0	0	–
	Colombia	2008	–	–	–	–	17 800 000 [4]	2 000 000	0	120 000	0	0	0	0	0
		2009	–	–	–	–	20 500 000 [4]	1 000 000	0	120 000	0	–	0	0	0
		2010	10 800 000	–	–	–	21 788 036 [4]	9 175 784	0	120 000	0	52 000	0	0	0
		2011	4 615 661	–	–	–	20 157 754 [4]	5 347 470	0	120 000	0	52 000	0	0	–
		2012	3 133 235	–	–	–	22 898 987 [4]	5 959 287	0	120 000	0	45 000	0	0	–
	Costa Rica	2008	–	–	–	–	6 720 000 [4]	0	0	0	0	0	0	0	–
		2009	–	–	–	–	6 240 000 [4]	0	0	0	0	0	0	0	–
		2010	–	–	–	–	4 845 000 [4]	0	0	0	0	0	0	0	–
		2011	–	–	–	–	5 270 000 [4]	0	0	0	0	0	0	0	–
		2012	–	–	–	–	5 350 000 [4]	0	–	–	0	–	–	–	–

Annex 3 – Funding, 2008–2012 (continued)

WHO Region	Country/area	Year	Contributions reported by donors				Contributions reported by countries								
			Global Fund[1]	PMI[2]/USAID	The World Bank[3]	DFID[3]	Government	Global Fund	The World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[5]	European Union
Region of the Americas	Dominican Republic	2008	–	–	–	–	2 361 111	0	0	54 174	0	39 303	0	0	0
		2009	1 396 348	–	–	–	2 337 714	185 772	0	14 503	0	58 538	0	0	–
		2010	1 207 483	–	–	–	5 194 215	2 126 483	0	150 031	0	0	0	0	–
		2011	1 423 587	–	–	–	2 153 141	1 823 682	0	46 155	0	0	0	0	–
		2012	1 475 716	–	–	–	2 068 141	2 323 120	0	0	20 776	0	0	0	–
	Ecuador	2008	–	–	–	–	3 941 711	220 000	–	82 000	100 000	–	–	0	–
		2009	–	–	–	–	2 428 604	400 000	0	–	0	80 000	0	0	–
		2010	2 701 041	–	–	–	2 327 187 [4]	531 945	–	–	–	–	–	–	–
		2011	1 939 571	–	–	–	3 314 143 [4]	327 863	0	0	0	0	0	0	–
		2012	1 690 157	–	–	–	1 957 708	150 820	–	–	–	–	–	–	–
	El Salvador	2008	–	–	–	–	1 920 000 [4]	–	–	–	–	–	–	–	–
		2009	–	–	–	–	3 057 500	0	0	–	0	0	0	–	–
		2010	–	–	–	–	–	0	–	–	0	–	–	–	–
		2011	–	–	–	–	3 513 000	0	0	0	0	–	0	0	–
		2012	–	–	–	–	3 688 650	0	–	–	0	–	–	–	–
	French Guiana, France	2010	–	–	–	–	–	0	0	0	–	–	–	–	–
		2011	–	–	–	–	–	0	0	0	–	–	–	–	–
		2012	–	–	–	–	–	0	0	0	–	–	–	–	–
	Guatemala	2008	3 325 400	–	–	–	3 380 000	1 849 992	0	0	0	–	0	0	–
		2009	1 343 648	–	–	–	–	0	0	0	0	0	0	0	–
		2010	–	–	–	–	–	0	0	0	0	0	0	0	–
		2011	8 917 396	–	–	–	10 558 243	3 596 431	0	–	25 000	0	0	0	–
		2012	2 821 516	–	–	–	5 487 457	2 780 074	0	10 561	0	0	0	0	–
	Guyana	2008	141 763	–	–	–	320 840	337 620	0	119 000	0	25 000	0	0	14 000
		2009	1 329 110	–	–	–	341 775	–	0	140 000	34 000	10 000	0	0	–
		2010	573 070	–	–	–	661 500	–	0	110 000	10 000	10 000	0	0	–
		2011	612 352	–	–	–	62 840	–	0	120 000	4 000	14 000	0	0	–
		2012	425 717	–	–	–	1 075 952 [4]	799 527	0	150 000	0	20 000	0	0	–
	Haiti	2008	3 322 684	–	–	–	2 085 000	2 085 000	–	–	–	–	–	–	–
		2009	1 000 764	–	–	–	–	–	–	–	–	–	–	–	–
		2011	18 400 000	–	–	–	–	–	–	–	–	–	–	–	–
		2012	4 516 089	–	–	–	–	–	–	–	–	–	–	–	–
	Honduras	2008	968 258	–	–	–	576 434 [4]	316 567	0	82 383	0	19 522	0	0	–
		2009	956 414	–	–	–	649 579	1 100 908	0	55 000	0	22 522	0	0	–
		2010	1 425 920	–	–	–	939 438	1 158 468	0	90 964	0	29 670	0	0	–
		2011	572 711	–	–	–	990 876	842 438	0	80 278	0	11 856	0	0	–
		2012	1 288 990	–	–	–	295 570	970 940	0	58 936	0	14 546	0	0	–
	Mexico	2008	–	–	–	–	21 097 815	0	0	0	0	0	0	0	–
		2009	–	–	–	–	22 875 348	0	0	0	0	0	0	0	–
		2010	–	–	–	–	23 140 145	0	0	0	0	0	0	0	–
		2011	–	–	–	–	23 741 789	0	0	0	0	0	0	0	–
		2012	–	–	–	–	24 285 354	0	–	–	0	0	–	–	–
	Nicaragua	2008	793 799	–	–	–	457 751	600 000	–	–	–	–	–	–	–
		2009	2 505 734	–	–	–	–	2 015 344	–	–	–	–	16 173	–	–
		2010	2 086 863	–	–	–	429 381 [4]	731 600	0	33 674	–	35 000	–	0	–
		2011	2 331 302	–	–	–	320 053 [4]	2 032 089	0	43 163	–	5 433	–	–	–
		2012	803 339	–	–	–	439 258 [4]	1 747 908	0	41 663	–	6 001	0	–	–
	Panama	2008	–	–	–	–	1 300 000	0	0	0	0	0	0	0	–
		2009	–	–	–	–	1 459 724	0	0	0	0	0	0	0	–
		2010	–	–	–	–	2 152 435	0	0	0	0	36 640	0	0	–
		2011	–	–	–	–	3 798 322	0	0	0	0	–	0	0	–
		2012	–	–	–	–	911 621	0	0	23 951	0	15 209	0	0	–
	Paraguay	2008	–	–	–	–	3 944 353	0	–	–	–	–	–	–	–
		2009	–	–	–	–	4 263 661	0	–	–	–	10 000	–	–	–
		2010	–	–	–	–	3 245 670	0	0	0	0	13 000	0	0	–
		2011	–	–	–	–	1 813 409	0	–	–	–	–	–	–	–
		2012	–	–	–	–	2 115 436	0	–	–	0	5 635	–	–	–
	Peru	2008	–	–	–	–	–	–	–	125 000	–	–	–	–	–
		2010	–	–	–	–	13 000 000 [4]	0	0	200 000	0	–	0	0	–
		2011	–	–	–	–	70 768 247	0	0	–	0	–	0	0	–
		2012	–	–	–	–	109 318 163	0	0	–	0	–	0	0	–

WHO Region	Country/area	Year	Contributions reported by donors				Contributions reported by countries								
			Global Fund[1]	PMI[2]/USAID	The World Bank[3]	DFID[3]	Government	Global Fund	The World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[5]	European Union
Region of the Americas	Suriname	2008	875 248	–	–	–	–	–	–	100 000	–	–	–	–	–
		2009	1 736 185	–	–	–	–	–	–	–	–	–	–	–	–
		2010	835 305	–	–	–	–	–	0	–	0	–	0	–	–
		2011	710 949	–	–	–	–	–	0	–	0	–	0	–	–
		2012	355 313	–	–	–	–	547 672	0	–	0	–	0	–	–
	Venezuela (Bolivarian Republic of)	2008	–	–	–	–	2 446 124 [4]	–	–	–	–	–	–	–	–
		2009	–	–	–	–	–	0	0	0	0	0	0	0	–
		2010	–	–	–	–	12 089 014 [4]	0	0	0	104 109	0	0	0	–
		2011	–	–	–	–	1 938 592 [4]	0	0	0	–	–	–	–	–
		2012	–	–	–	–	790 292 [4]	0	0	0	–	–	–	–	–
Eastern Mediterranean	Afghanistan	2008	8 141 152	–	–	–	–	7 785 080	–	–	–	211 689	–	–	–
		2009	20 900 000	–	2 851 587	–	–	6 372 330	–	–	–	1 186 740	–	–	–
		2010	3 105 472	–	1 507 012	–	–	7 928 628	–	415 335	22 813	414 619	–	–	–
		2011	1 161 128	–	–	–	–	7 535 557	–	802 371	65 236	30 000	–	–	–
		2012	11 800 000	–	–	–	–	10 613 985	–	–	–	116 291	–	–	–
	Djibouti	2008	1 244 752	–	94 200	–	–	–	–	–	–	–	–	–	–
		2009	148 961	–	–	–	79 442 [4]	–	–	–	–	–	–	–	–
		2010	146 471	–	–	–	84 745 [4]	206 939	26 810	0	0	2 040	2 824	0	–
		2011	112 748	–	–	–	84 745 [4]	206 939	420 117	–	–	–	–	–	–
		2012	44 923	–	–	–	1 050 000 [4]	48 527	8 413	–	–	55 782	142 000	–	–
	Iran (Islamic Republic of)	2008	2 797 683	–	–	–	7 500 000	664 575	–	–	–	50 000	–	–	–
		2009	374 798	–	–	–	8 000 000	3 372 294	–	–	–	25 000	–	–	–
		2010	2 226 429	–	–	–	9 690 000	2 326 659	–	–	–	13 000	–	–	–
		2011	2 350 551	–	–	–	12 500 000	1 474 935	–	–	–	12 500	–	–	–
		2012	8 256 054	–	–	–	8 000 000	5 238 195	–	–	–	12 500	–	–	–
	Pakistan	2008	1 642 417	–	–	–	300 000	2 500 000	–	–	–	–	–	–	–
		2009	6 873 870	–	–	–	500 000	4 500 000	–	–	–	215 947	–	–	–
		2010	3 390 454	–	–	–	–	3 390 454	–	–	–	–	–	–	–
		2011	1 185 971	–	–	–	–	1 185 971	–	–	–	–	–	–	–
		2012	19 000 000	–	–	–	–	15 231 843	–	–	–	–	–	–	–
	Saudi Arabia	2008	–	–	–	–	28 203 753	0	–	–	–	–	–	–	–
		2009	–	–	–	–	28 850 000	0	–	–	0	31 000	–	–	–
		2010	–	–	–	–	28 000 000	0	–	–	–	36 000	–	–	–
		2011	–	–	–	–	26 357 710	0	–	–	–	99 000	–	–	–
		2012	–	–	–	–	29 000 000	–	–	–	0	99 000	–	–	–
	Somalia	2008	3 784 480	–	–	93 200	–	6 607 321	–	–	–	85 000	–	–	–
		2009	1 959 263	–	–	1 157 623	–	6 863 696	–	–	81 127	101 650	–	–	–
		2010	5 223 275	–	–	–	24 230	8 436 831	–	–	–	65 000	–	–	–
		2011	2 594 870	–	–	–	46 321	5 685 340	–	–	–	86 000	–	3 642 882	–
		2012	22 100 000	–	–	–	63 250	11 904 217	–	–	–	103 400	–	200 000	–
	South Sudan[7]	2008	22 100 000	–	–	–	120 000 [4]	–	–	–	–	–	–	–	–
		2009	13 400 000	–	–	–	–	17 395 819	–	–	–	350 000	–	–	–
		2010	7 790 017	–	–	–	–	16 117 077	–	–	–	400 000	–	–	–
		2011	21 800 000	69 200	–	–	530 000 [4]	15 361 962	–	3 000 000	–	750 000	–	1 300 000	–
		2012	27 000 000	–	–	–	–	38 496 269	–	9 600 000	–	2 934 000	842 791	1 300 000	–
	Sudan	2008	12 400 000	3 871 000	–	657 603	10 573 479	3 700 680	0	39 416	8 586 562	39 416	3 452 658	0	–
		2009	17 100 000	2 685 000	–	1 548 016	10 993 899	15 869 166	0	0	0	0	13 983 001	8 126 137	–
		2010	18 900 000	–	–	253 713	12 810 941	15 829 743	0	0	0	0	1 259 562	789 400	–
		2011	14 900 000	–	–	–	26 724 830	19 418 808	0	0	363 495	114 575	553 635	1 041 351	–
		2012	51 800 000	–	–	–	26 709 969	38 398 132	0	0	1 680 907	641 921	494 000	0	–
	Yemen	2008	–	–	–	–	2 465 870 [4]	4 185 533	41 360	0	250 000	200 000	0	104 387	–
		2009	–	–	–	–	1 806 742	4 401 240	0	0	1 199 999	475 000	0	126 000	–
		2010	–	–	–	–	1 594 698	3 482 712	0	0	4 564 902	474 037	0	446 159	–
		2011	–	–	–	–	1 012 076	880 150	–	–	9 084 589	240 000	–	80 000	–
		2012	–	–	–	–	1 136 852	8 908 540	–	–	5 807 093	–	–	–	–
European	Azerbaijan	2008	1 295 872	–	–	–	2 145 369	0	0	0	0	65 000	0	0	0
		2009	1 786 084	–	–	–	1 971 844	1 423 641	–	–	0	35 000	0	0	–
		2010	887 980	–	–	–	3 842 152	1 692 999	–	–	0	35 000	–	–	–
		2011	280 163	–	–	–	3 738 835	610 905	–	–	0	35 000	–	–	–
		2012	548 346	–	–	–	5 000 968	462 920	–	–	0	35 000	–	–	–
	Kyrgyzstan	2008	1 013 420	–	–	–	68 500	647 245	0	0	0	0	–	0	0
		2009	172 070	–	–	–	70 000	546 245	–	–	0	0	–	0	–
		2010	1 166 939	–	–	–	70 000	1 394 485	–	–	0	0	–	–	–
		2011	1 016 966	–	–	–	70 000	1 114 124	–	–	0	0	–	–	–
		2012	496 411	–	–	–	70 000	850 061	–	–	0	0	–	–	–

Annex 3 – Funding, 2008–2012 (continued)

WHO Region	Country/area	Year	Contributions reported by donors				Contributions reported by countries								
			Global Fund[1]	PMI[2]/USAID	The World Bank[3]	DFID[3]	Government	Global Fund	The World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[5]	European Union
European	Tajikistan	2008	1 822 811	–	–	–	–	1 464 503	–	–	–	75 000	–	–	–
		2009	3 905 035	–	–	–	363 439 [4]	1 332 959	–	–	0	13 000	–	–	–
		2010	1 819 594	–	–	–	393 734 [4]	3 353 900	–	–	0	13 000	–	–	–
		2011	3 305 782	–	–	–	412 825 [4]	3 403 673	–	–	0	15 000	–	–	–
		2012	2 114 927	–	–	–	416 753 [4]	2 068 376	–	–	0	20 000	–	–	–
	Turkey	2008	–	–	–	–	40 865 967	0	–	–	0	15 000	–	0	–
		2009	–	–	–	–	44 200 000	0	–	–	0	0	–	0	–
		2010	–	–	–	–	33 486 133	0	–	–	0	0	–	–	–
		2011	–	–	–	–	21 821 901	0	–	–	0	0	–	–	–
		2012	–	–	–	–	22 927 000	0	–	–	0	0	–	–	–
	Uzbekistan	2008	–	–	–	–	114 772	320 045	0	–	0	7 175	–	0	–
		2009	–	–	–	–	126 249	450 070	–	–	0	7 892	–	0	–
		2010	–	–	–	–	507 457	538 393	–	–	0	0	–	–	–
		2011	–	–	–	–	1 529 810	583 446	–	–	0	0	–	–	–
		2012	–	–	–	–	1 208 161	448 627	–	–	0	0	–	–	–
South-East Asia	Bangladesh	2008	8 370 698	–	–	–	528 209 [4]	9 580 687	700 000	–	–	220 000	–	–	–
		2009	3 521 417	–	–	–	642 129 [4]	7 769 852	887 995	–	–	230 000	–	–	–
		2010	10 300 000	–	–	–	1 094 385 [4]	5 369 344	–	–	–	135 790	–	–	–
		2011	8 873 006	–	–	–	8 686 483 [4]	8 890 744	–	–	–	118 000	–	–	–
		2012	3 304 342	–	–	–	4 761 717	7 505 444	439 490	–	–	98 000	–	–	–
	Bhutan	2008	1 059 849	–	–	–	191 000	579 000	0	0	173 913	22 000	0	0	–
		2009	726 894	–	–	–	172 826	1 163 706	0	0	173 913	17 192	0	0	–
		2010	478 376	–	–	–	211 189	1 315 911	0	0	188 222	23 622	0	0	–
		2011	260 267	–	–	–	222 222	–	–	–	22 600	22 600	–	–	–
		2012	440 259	–	–	–	213 595	292 324	–	–	146 759	27 898	–	–	–
	Democratic People's Republic of Korea	2008	–	–	–	–	1 000 000	–	–	–	0	1 100 000	–	1 200 000	–
		2009	–	–	–	–	1 200 000	0	–	–	0	1 300 000	–	1 200 000	–
		2010	7 942 321	–	–	–	1 800 000	8 913 265	–	–	–	42 467	–	–	–
		2011	4 756 310	–	–	–	1 875 000	2 500 899	–	–	–	23 000	–	–	–
		2012	3 163 494	–	–	–	1 882 000	6 568 434	–	–	–	5 000	–	–	–
	India	2008	34 300 000	–	–	–	53 360 000	13 863 557	28 619 974	–	–	–	–	–	–
		2009	–	–	1 503 849	–	60 222 222	9 184 373	9 480 000	–	–	–	–	–	–
		2010	8 519 368	–	17 000 000	–	91 551 356	13 179 273	10 265 300	–	–	–	–	–	–
		2011	3 260 689	–	–	–	99 525 920	6 496 121	30 898 403	–	–	–	–	–	–
		2012	11 500 000	–	–	–	47 240 020	7 863 868	16 696 978	–	–	–	–	–	–
	Indonesia	2008	20 800 000	–	–	–	2 135 753	13 199 217	0	0	–	406 000	2 800 000	0	–
		2009	34 300 000	–	–	–	5 594 019	17 661 982	0	0	–	103 000	3 300 000	0	–
		2010	36 700 000	–	–	–	5 787 267	31 659 696	0	0	26 311	200 000	2 027 122	0	–
		2011	18 800 000	–	–	–	–	40 573 846	0	0	–	222 222	3 111 111	0	–
		2012	18 800 000	–	–	–	–	11 072 851	0	0	0	51 141	471 362	0	–
	Myanmar	2008	–	–	–	–	314 000	–	–	–	2 400 000	300 000	4 167 142	2 425 633	–
		2009	–	–	–	–	375 000	–	–	–	2 000 000	300 000	1 607 882	3 815 436	–
		2010	13 200 000	–	–	–	2 250 000	–	–	–	2 294 000	300 000	1 300 000	–	–
		2011	–	–	–	1 814 419	1 259 002	5 900 000	–	–	–	–	–	–	–
		2012	19 800 000	–	–	–	1 000 000	10 513 382	–	5 500 000	1 757 475	142 500	948 890	870 441	–
	Nepal	2008	4 480 142	–	–	–	907 770	924 791	0	0	0	88 000	25 000	–	–
		2009	573 709	–	–	–	907 671	1 305 661	0	0	0	88 000	0	742 500	–
		2010	9 912 218	–	–	–	869 401	2 765 680	0	0	0	46 500	0	0	–
		2011	–	–	–	–	192 361	1 907 500	0	0	0	46 500	0	3 559 305	–
		2012	6 182 591	–	–	–	726 465	2 960 440	–	–	–	46 500	–	–	–
	Sri Lanka	2008	3 929 226	–	–	–	2 791 905	1 432 800	–	–	–	30 000	–	–	–
		2009	6 593 558	–	–	–	1 201 268	522 431	–	–	–	–	–	–	–
		2010	5 570 521	–	–	–	1 045 455	1 117 464	–	–	–	24 321	–	–	–
		2011	4 384 546	–	–	–	1 800 000	5 316 488	–	–	–	18 000	–	–	–
		2012	2 618 112	–	–	–	572 945	1 442 758	–	–	–	7 400	–	–	–
	Thailand	2008	5 977 700	–	–	–	2 827 000	3 513 961	–	–	–	–	–	–	–
		2009	5 718 652	–	–	–	509 557	5 087 163	–	–	–	58 118	–	2 061 759	–
		2010	2 967 189	–	–	–	439 376	3 279 977	–	–	–	73 824	–	–	–
		2011	13 800 000	–	–	–	15 252 969	3 002 074	–	77 541	–	61 408	–	566 115	–
		2012	7 152 655	–	–	–	7 098 780	16 246 556	–	–	–	104 979	–	79 772	–

WHO Region	Country/area	Year	Contributions reported by donors				Contributions reported by countries								
			Global Fund[1]	PMI[2]/USAID	The World Bank[3]	DFID[3]	Government	Global Fund	The World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[5]	European Union
South-East Asia	Timor-Leste	2008	–	–	–	–	300 816	0	0	0	0	100 000	0	0	–
		2009	3 006 874	–	–	–	46 572	4 698 114	0	0	0	145 000	0	0	–
		2010	2 688 525	–	–	–	1 858 476	2 367 459	0	0	0	12 500	239 928	526 500	–
		2011	774 076	–	–	–	2 278 680	3 902 662	0	0	0	41 920	0	0	–
		2012	5 040 394	–	–	–	2 687 572	5 375 143	0	0	80 000	25 000	0	0	–
Western Pacific	Cambodia	2008	10 600 000	–	–	–	495 155	4 327 529	0	1 000 000	0	590 000	0	0	0
		2009	11 300 000	–	–	–	1 019 923	5 534 038	0	1 000 000	0	650 000	0	0	–
		2010	35 400 000	–	–	–	1 355 728	7 157 939	0	0	0	1 446 616	0	0	–
		2011	15 300 000	–	–	–	3 127 120	39 422 203	0	0	0	380 347	0	60 000	–
		2012	1 441 288	–	–	–	3 427 795	22 685 407	0	456 796	640 741	201 718	0	0	–
	China	2008	5 473 763	–	–	–	–	9 133 011	–	–	–	–	–	–	–
		2009	12 800 000	–	–	–	–	9 901 385	–	–	–	–	–	–	–
		2010	51 300 000	–	–	–	–	50 874 137	–	–	–	–	–	–	–
		2011	4 782 175	–	–	–	–	24 430 525	–	–	–	–	–	–	–
		2012	12 800 000	–	–	–	–	33 697 258	–	–	–	–	–	–	–
	Lao People's Democratic Republic	2008	7 840 252	–	406 564	–	594 912 [4]	7 242 608	0	0	0	0	0	0	–
		2009	5 252 504	–	763 133	–	–	6 424 803	0	0	0	21 300	0	0	–
		2010	2 637 721	–	610 838	–	97 690 [4]	815 252	0	0	0	45 925	0	0	–
		2011	7 010 161	–	–	–	470 764	4 326 267	0	0	0	46 000	0	0	–
		2012	6 394 182	–	–	–	267 890	4 587 596	0	271 773	620 000	97 000	0	2 500	–
	Malaysia	2008	–	–	–	–	23 800 000	0	–	–	0	0	–	–	–
		2009	–	–	–	–	23 823 040	0	–	–	0	0	–	0	–
		2010	–	–	–	–	24 826 273	0	–	–	0	0	–	–	–
		2011	–	–	–	–	37 844 710	0	–	–	0	0	–	–	–
		2012	–	–	–	–	44 424 578	–	–	–	–	–	–	–	–
	Papua New Guinea	2008	6 385 835	–	–	–	64 336	6 385 835	–	–	–	–	–	–	–
		2009	26 400 000	–	–	–	156 [4]	4 417 383	–	–	–	2 179	–	–	–
		2010	2 535 493	–	–	–	320 580	1 028 735	–	–	–	321 338	–	3 260 803	–
		2011	10 600 000	–	–	–	190 200	23 842 245	0	0	0	200 000	0	8 968 127	–
		2012	22 900 000	–	–	–	584 290 [4]	–	–	–	–	–	–	–	–
	Philippines	2008	5 310 225	–	–	–	1 260 000 [4]	3 952 832	0	0	75 000	300 000	0	466 125	–
		2009	5 636 133	–	–	–	3 439 132	31 400 000	0	0	75 000	300 000	0	516 000	–
		2010	18 800 000	–	–	–	3 930 233 [4]	21 758 417	0	0	75 000	–	0	769 000	–
		2011	1 665 107	–	–	–	3 969 519 [4]	12 322 318	0	0	75 000	–	0	2 501 000	–
		2012	4 271 657	–	–	–	3 939 519 [4]	7 224 199	0	0	–	–	0	0	–
	Republic of Korea	2008	–	–	–	–	792 000	3 000 000	–	–	–	1 222 000	–	–	–
		2009	–	–	–	–	798 000	4 000 000	–	–	–	1 096 000	–	–	–
		2010	–	–	–	–	788 349	0	–	–	0	0	–	–	–
		2011	–	–	–	–	712 000	0	–	–	0	0	–	–	–
		2012	–	–	–	–	681 674	0	–	–	0	0	–	–	–
	Solomon Islands	2008	–	–	–	–	1 075 382	483 416	0	0	0	386 000	0	563 681	–
		2009	–	–	–	–	276 195	628 188	0	0	0	216 674	0	750 189	–
		2010	–	–	–	–	1 531 001	1 409 315	0	0	0	225 000	0	753 085	–
		2011	–	–	–	–	840 284	1 537 685	0	0	0	697 890	0	6 229 231	–
		2012	–	–	–	–	269 486	1 696 290	0	0	0	706 000	0	5 432 362	–
	Vanuatu	2008	–	–	–	–	846 280	264 300	0	0	0	267 615	0	1 282 500	0
		2009	–	–	–	–	754 651	1 581 816	0	0	0	287 615	0	1 282 500	–
		2010	–	–	–	–	812 377	683 607	0	0	0	287 615	0	1 432 500	–
		2011	–	–	–	–	943 619	2 052 359	0	0	0	287 615	0	2 050 753	–
		2012	–	–	–	–	812 377 [4]	2 446 418	0	0	0	287 615	0	1 178 215	–
	Viet Nam	2008	–	–	–	–	4 599 534	2 760 895	0	0	–	70 000	0	0	–
		2009	–	–	–	–	4 582 210	4 135 547	0	0	–	70 000	0	0	–
		2010	–	–	–	–	4 476 190	8 588 884	0	0	–	85 000	0	0	–
		2011	–	–	–	–	5 229 083	5 648 842	0	0	–	108 500	0	0	–
		2012	–	–	–	–	4 615 385	3 961 323	0	0	–	156 804	0	0	–
			–	–	–	–	–	–	–	–	–	–	–	–	–

1 Source: The Global Fund website (malaria specific grants)
2 Source: USAID internal database, The President's Malaria Initiative, Fifth Annual Report to Congress, April 2011; Sixth Annual Report to Congress, April 2012
3 Source: OECD Database
4 Budget not expenditure
5 Other contributions as reported by countries: NGOs, foundations, etc.
6 Where national totals for the United Republic of Tanzania are unavailable, refer to the sum of Mainland and Zanzibar.
7 South Sudan became a separate State on 10 July 2011 and a Member State of WHO on 27 September 2011. South Sudan and Sudan have distinct epidemiological profiles comprising high-transmission and low-transmission areas respectively. For this reason data up to June 2011 from the high-transmission areas of Sudan (10 southern states which correspond to South Sudan) and low-transmission areas (15 northern states which correspond to contemporary Sudan) are reported separately
* Negative disbursements reflect recovery of funds on behalf of the financing organization

DFID, Department for International Development; PMI, President's Malaria Initiative; UNICEF, United Nations Children's Fund; USAID, United States Agency for International Development

Annex 4 – Intervention coverage estimated from routinely collected data, 2010–2012

WHO Region	Country/area	Year	No. of ITN + LLIN sold or delivered	No. of LLIN sold or delivered	No. of ITN sold or delivered	% of population potentially protected by ITNs delivered	Modelled % of households ≥1 ITN	No. of people protected by IRS	% IRS coverage	Any first-line treatment courses delivered (including ACT)	ACT treatment courses delivered	% any antimalarial coverage[1]	% ACT coverage[2]
African	Algeria	2010	0	0	–	–	–	0	0	408	0	100	–
		2011	–	0	–	–	–	0	0	191	0	100	–
		2012	–	0	–	–	–	13 000	0	887	0	100	–
	Angola	2010	1 678 365	1 678 365	0	38	20	650 782	3	3 119 744	3 119 744	74	74
		2011	1 720 738	1 720 738	0	39	35	689 638	3	3 898 070	3 898 070	100	100
		2012	477 044	477 044	0	34	44	676 090	3	3 747 190	3 747 190	99	99
	Benin	2010	900 000	900 000	–	19	45	636 448	7	–	–	–	–
		2011	5 135 942	5 135 942	0	100	45	426 232	4	1 911 338	1 911 338	63	63
		2012	708 643	708 643	0	100	51	694 729	7	–	–	–	–
	Botswana	2010	84 000	84 000	–	22	30	250 961	20	27 593	27 593	100	100
		2011	12 000	12 000	–	18	33	207 991	16	10 149	10 149	100	100
		2012	52 500	52 500	–	21	35	163 647	13	4 606	4 606	100	100
	Burkina Faso	2010	6 892 018	6 892 018	–	100	54	113 163	1	7 989 808	7 989 808	100	100
		2011	774 344	774 344	–	99	55	116 708	1	5 918 783	5 703 335	100	100
		2012	264 432	264 432	–	87	50	115 638	1	5 720 987	5 720 987	100	100
	Burundi	2010	1 178 843	1 178 843	0	99	64	255 474	4	4 258 605	3 435 597	100	100
		2011	2 869 433	2 869 433	0	100	76	224 496	3	2 343 078	1 791 325	100	100
		2012	703 699	703 699	0	100	81	59 300	1	2 183 228	2 183 228	100	100
	Cabo Verde	2010	0	0	0	–	14	175 060	100	4 835	3 492	100	100
		2011	–	0	0	–	15	282 265	100	–	–	–	–
		2012	–	–	–	–	18	282 265	100	6 960	3 960	70	40
	Cameroon	2010	187 000	187 000	0	10	26	0	0	803 231	803 231	15	15
		2011	8 115 879	8 115 879	–	71	63	0	0	1 234 405	1 234 405	29	29
		2012	217 600	217 600	–	71	75	0	0	762 338	760 375	21	21
	Central African Republic	2010	948 274	948 274	0	74	44	–	–	–	–	–	–
		2011	–	0	0	38	48	–	–	–	–	–	–
		2012	30 000	30 000	0	39	44	0	0	–	–	–	–
	Chad	2010	353 495	353 495	–	5	39	–	–	309 927	447 000	9	12
		2011	3 495 086	3 495 086	–	58	56	–	–	122 879	122 879	4	4
		2012	–	–	–	56	59	–	–	–	–	–	–
	Comoros	2010	259 558	259 558	–	74	24	0	0	171 090	171 090	100	100
		2011	9 896	9 896	0	69	26	31 922	5	117 620	117 620	74	71
		2012	666	666	0	68	28	–	–	–	–	–	–
	Congo	2010	0	0	0	–	24	0	0	–	–	–	–
		2011	507 763	507 763	0	22	27	0	0	113 705	113 705	8	8
		2012	1 203 982	1 203 982	0	71	27	0	0	202 402	202 402	14	14
	Côte d'Ivoire	2010	148 804	148 804	–	21	55	–	–	1 721 461	1 721 461	34	34
		2011	8 135 784	8 135 784	–	86	68	–	–	2 349 795	2 349 795	56	56
		2012	–	–	–	75	68	–	–	–	–	–	–
	Democratic Republic of the Congo	2010	2 275 207	2 275 207	0	46	52	98 118	0	10 315 190	10 315 190	61	61
		2011	12 033 092	12 033 092	0	62	56	111 972	0	15 240 702	15 240 702	89	89
		2012	18 644 449	18 644 449	0	90	59	103 497	0	11 693 982	11 693 982	68	68
	Equatorial Guinea	2010	–	–	–	18	30	–	–	150 199	49 233	67	22
		2011	2 798	2 798	–	1	47	–	–	27 319	27 319	13	13
		2012	4 431	4 431	–	2	65	148 092	20	40 199	40 199	22	22
	Eritrea	2010	102 918	102 918	0	26	59	177 762	3	285 253	285 253	100	100
		2011	992 779	992 779	0	45	58	274 143	5	197 403	197 403	100	100
		2012	83 943	83 943	–	35	78	298 734	5	219 793	219 793	100	100
	Ethiopia	2010	13 798 161	13 798 161	0	59	81	27 029 473	46	9 205 141	9 205 141	100	100
		2011	4 279 165	4 279 165	0	60	86	20 865 542	35	5 058 582	5 058 582	100	64
		2012	6 260 000	6 260 000	0	71	87	5 721 331	9	9 000 000	9 000 000	100	100
	Gabon	2010	0	–	0	0	38	–	–	28 883	19 561	8	2
		2011	–	–	–	–	27	–	–	–	–	–	–
		2012	–	–	–	–	31	–	–	–	–	–	–
	Gambia	2010	0	0	0	48	51	387 274	23	427 903	427 903	88	88
		2011	734 063	734 063	0	93	47	747 485	43	549 830	549 830	100	100
		2012	275 042	275 042	0	100	53	484 086	27	484 901	484 901	93	93
	Ghana	2010	1 016 900	1 016 900	0	15	50	849 620	4	5 600 000	5 600 000	88	88
		2011	4 151 906	4 151 906	0	39	49	926 699	4	14 493 253	14 493 253	100	100
		2012	7 874 094	7 874 094	0	93	50	2 117 240	8	4 170 828	4 170 828	60	60
	Guinea	2010	73 862	73 862	–	5	10	35 333	0	851 811	851 811	20	20
		2011	48 942	48 942	–	2	10	–	–	924 025	924 025	21	21
		2012	90 188	90 188	–	3	11	–	–	902 516	802 110	21	18
	Guinea–Bissau	2010	68 108	68 108	0	40	63	–	–	–	–	–	–
		2011	170 442	170 442	0	26	55	–	–	–	–	–	–
		2012	73 819	73 819	0	34	63	–	–	–	–	–	–
	Kenya	2010	1 176 280	1 176 280	–	37	63	1 487 083	5	18 550 714	18 550 714	100	100
		2011	9 058 461	9 058 461	–	73	63	1 832 090	6	–	–	–	–
		2012	4 226 261	4 226 261	–	79	67	2 435 836	7	12 000 000	12 000 000	100	100
	Liberia	2010	883 400	883 400	0	75	45	420 532	11	–	–	–	–
		2011	830 000	830 000	–	100	45	834 671	20	6 059 525	4 581 525	100	100
		2012	–	–	0	74	49	960 000	23	6 507 544	5 064 014	100	100
	Madagascar	2010	4 986 868	4 986 868	0	67	63	9 805 575	47	422 536	422 536	64	64
		2011	510 275	510 275	0	62	81	10 012 822	46	256 452	256 452	31	31
		2012	3 939 740	3 939 740	0	76	77	5 319 060	24	2 026 100	2 026 100	100	100
	Malawi	2010	1 529 665	1 529 665	0	42	56	2 036 430	14	7 342 770	7 202 531	100	100
		2011	1 037 395	1 037 395	0	41	51	321 919	2	7 199 048	7 202 531	100	100
		2012	6 742 108	6 742 108	0	100	49	1 873 056	12	6 956 822	6 956 822	100	100
	Mali	2010	1 020 074	1 020 074	0	38	77	440 815	3	294 984	294 984	9	9
		2011	4 173 156	4 173 156	0	65	70	697 512	5	1 719 974	1 719 974	50	50
		2012	1 935 348	1 935 348	0	86	87	758 021	5	3 842 790	3 842 790	100	100

WHO Region	Country/area	Year	No. of ITN + LLIN sold or delivered	No. of LLIN sold or delivered	No. of ITN sold or delivered	% of population potentially protected by ITNs delivered	Modelled % of households ≥1 ITN	No. of people protected by IRS	% IRS coverage	Any first-line treatment courses delivered (including ACT)	ACT treatment courses delivered	% any antimalarial coverage[1]	% ACT coverage[2]
African	Mauritania	2010	872 268	872 268	0	51	11	–	–	126 162	126 162	20	20
		2011	139 690	139 690	0	55	12	–	–	64 078	64 078	10	10
		2012	13 000	13 000	0	54	13	–	–	–	–	–	–
	Mayotte, France	2010	2 197	2 197	–	9	–	40 560	90	–	–	–	–
		2011	2 543	2 543	–	18	–	23 559	51	–	–	–	–
		2012	40 988	40 988	–	100	–	4 339	9	–	–	–	–
	Mozambique	2010	1 525 979	1 525 979	–	37	32	7 513 172	31	7 671 350	7 671 350	96	96
		2011	3 244 164	3 244 164	–	44	46	8 532 525	35	9 391 810	9 391 810	100	100
		2012	2 669 244	2 669 244	–	53	57	1 789 110	7	5 106 570	5 106 570	72	72
	Namibia	2010	87 900	87 900	0	56	80	566 419	36	87 520	87 520	100	100
		2011	87 900	87 900	0	30	76	599 939	38	110 031	110 031	100	100
		2012	93 900	93 900	0	30	70	559 305	34	22 313	22 313	100	100
	Niger	2010	783 772	783 772	0	13	74	0	0	2 225 253	2 225 253	52	52
		2011	516 550	516 550	0	14	76	186 603	1	3 199 290	3 199 290	73	73
		2012	541 550	541 550	0	19	70	192 761	1	3 500 243	3 500 243	74	74
	Nigeria	2010	18 866 196	18 866 196	–	51	37	200 000	0	9 980 728	9 980 728	20	20
		2011	18 141 631	18 141 631	–	61	43	177 235	0	7 648 896	7 648 896	16	16
		2012	14 448 634	14 448 634	–	54	43	2 415 540	1	12 877 360	12 877 360	27	27
	Rwanda	2010	4 763 739	4 763 739	0	79	75	1 646 781	15	802 223	788 513	100	100
		2011	816 915	816 915	0	90	87	1 571 625	14	288 508	284 788	48	48
		2012	1 675 233	1 675 233	0	100	78	1 080 889	9	619 786	611 482	95	93
	Sao Tome and Principe	2010	47 403	47 403	0	87	47	65 442	37	6 111	6 111	100	100
		2011	4 985	4 985	0	80	50	115 610	63	11 546	11 546	100	100
		2012	105 312	105 312	0	100	52	146 773	78	10 703	10 703	100	100
	Senegal	2010	621 481	621 481	–	62	70	951 620	7	835 954	835 954	26	26
		2011	2 465 770	2 465 770	–	72	66	887 315	7	675 707	675 707	19	19
		2012	267 482	267 482	–	44	78	1 095 093	8	713 344	713 344	19	19
	Sierra Leone	2010	3 413 311	3 413 311	0	100	52	308 209	5	2 161 564	2 161 564	100	100
		2011	45 833	45 833	0	100	86	851 000	15	1 873 610	1 873 610	100	100
		2012	139 391	139 391	0	100	98	986 898	17	2 004 308	2 004 308	100	100
	South Africa	2010	–	–	–	–	28	5 000 000	97	–	–	–	–
		2011	–	–	–	–	32	5 000 000	96	7 620	7 620	77	81
		2012	–	–	–	–	37	5 000 000	95	3 897	3 897	57	57
	Swaziland	2010	71 336	71 336	–	49	47	–	–	3 320	3 320	100	100
		2011	47 857	47 857	–	63	61	–	–	1 750	1 750	100	100
		2012	40 612	40 612	–	83	69	–	–	350	350	47	47
	Togo	2010	247 263	247 263	–	55	66	0	0	–	–	–	–
		2011	2 547 606	2 547 606	0	78	56	0	0	659 800	–	39	–
		2012	329 999	329 999	0	84	65	0	0	812 911	914 218	52	58
	Uganda	2010	7 400 000	7 400 000	0	56	50	2 732 418	8	–	–	–	–
		2011	709 000	709 000	0	46	60	2 543 983	7	19 579 200	19 579 200	100	100
		2012	1 000 747	1 000 747	0	45	64	2 543 983	7	23 864 320	23 864 320	100	100
	United Republic of Tanzania	2010	8 614 613	8 614 613	0	34	65	7 530 944	–	16 651 795	16 651 795	100	100
		2011	14 481 950	14 481 950	0	30	80	7 628 362	–	16 775 381	16 775 381	100	100
		2012	2 208 293	2 208 293	0	–	92	6 596 263	–	10 175 160	10 175 160	100	100
	Mainland	2010	8 584 760	8 584 760	0	69	65	6 500 000	15	16 606 080	16 606 080	100	100
		2011	14 452 674	14 452 674	0	100	80	6 534 333	15	16 727 880	16 727 880	100	100
		2012	1 535 867	1 535 867	0	95	92	6 340 333	14	10 128 060	10 128 060	100	100
	Zanzibar	2010	29 853	29 853	0	70	–	1 030 944	76	45 715	45 715	100	100
		2011	29 276	29 276	0	45	–	1 094 029	78	47 501	47 501	100	100
		2012	672 426	672 426	0	93	–	255 930	18	47 100	47 100	100	100
	Zambia	2010	1 058 050	1 058 050	0	52	60	5 951 303	45	6 147 359	6 147 359	100	100
		2011	3 532 137	3 532 137	0	81	46	7 542 497	56	6 957 420	6 957 420	100	100
		2012	2 688 575	2 688 575	0	94	65	4 250 000	31	4 289 743	4 289 743	100	100
	Zimbabwe	2010	1 219 309	1 219 309	0	55	51	3 090 289	49	1 213 001	1 213 001	100	100
		2011	0	0	0	52	60	3 299 058	52	2 079 657	2 079 657	100	100
		2012	457 000	457 000	–	46	64	3 106 659	48	1 236 958	1 236 958	100	100
Region of the Americas	Argentina	2010	–	–	–	–	–	12 008	6	100	–	100	100
		2011	–	–	–	–	–	23 068	11	100	–	100	100
		2012	–	–	–	–	–	26 712	13	50	–	100	100
	Belize	2010	0	0	0	2	–	50 121	24	150	0	100	–
		2011	0	0	0	2	–	31 363	14	79	1	100	100
		2012	–	0	0	–	–	20 052	9	37	1	100	100
	Bolivia (Plurinational State of)	2010	42 950	42 950	0	20	–	35 365	7	13 796	1 200	100	100
		2011	42 800	42 800	0	33	–	45 214	9	7 200	923	100	100
		2012	24 526	24 526	0	39	–	28 000	6	7 400	350	100	99
	Brazil	2010	94 611	94 611	0	6	–	508 667	11	515 015	78 965	100	100
		2011	13 739	13 739	0	6	–	714 128	16	445 531	114 081	100	100
		2012	361 241	361 241	0	18	–	369 103	8	905 010	141 410	100	100
	Colombia	2010	73 500	70 000	3 500	6	–	260 000	4	209 473	42 688	100	100
		2011	274 682	262 732	11 950	11	–	1 032 000	15	92 518	27 698	100	100
		2012	313 398	313 398	–	16	–	359 100	5	171 342	50 398	100	100
	Costa Rica	2010	6 000	6 000	0	32	–	16 400	35	1 140	0	100	100
		2011	4 000	4 000	0	47	–	48 000	100	170	0	100	100
		2012	3 000	3 000	–	49	–	22 000	46	50	0	100	–
	Dominican Republic	2010	83 918	83 918	0	38	–	53 057	12	2 479	3	100	–
		2011	70 437	70 437	0	64	–	78 236	18	1 608	8	100	–
		2012	62 095	62 095	0	88	–	61 557	14	947	5	99	–
	Ecuador	2010	68 860	68 860	0	100	–	163 572	73	1 753	500	100	100
		2011	30 022	30 022	0	100	–	105 234	46	–	–	100	100
		2012	13 502	13 502	–	87	–	83 357	36	–	–	100	100

Annex 4 – Intervention coverage estimated from routinely collected data, 2010–2012 (continued)

WHO Region	Country/area	Year	No. of ITN + LLIN sold or delivered	No. of LLIN sold or delivered	No. of ITN sold or delivered	% of population potentially protected by ITNs delivered	Modelled % of households ≥1 ITN	No. of people protected by IRS	% IRS coverage	Any first-line treatment courses delivered (including ACT)	ACT treatment courses delivered	% any antimalarial coverage[1]	% ACT coverage[2]
Region of the Americas	El Salvador	2010	–	0	–	–	–	30 772	2	115 256	0	100	100
		2011	–	0	0	–	–	26 167	2	109 635	0	100	–
		2012	–	0	–	–	–	16 905	1	124 753	0	100	100
	French Guiana, France	2010	2 565	–	–	6	–	40 784	21	–	–	–	–
		2011	–	–	–	–	–	–	–	–	–	–	–
		2012	–	–	–	–	–	–	–	–	–	–	–
	Guatemala	2010	8 077	8 077	0	6	–	148 855	7	0	0	–	–
		2011	0	0	0	1	–	42 555	2	6 822	0	100	–
		2012	618 803	618 803	0	50	–	65 390	3	7 966	0	100	–
	Guyana	2010	11 430	11 430	0	11	–	0	0	22 935	14 383	100	100
		2011	14 550	14 550	0	18	–	19 320	7	29 471	20 299	100	100
		2012	16 800	16 800	0	28	–	20 700	7	31 601	20 291	100	100
	Haiti	2010	0	0	0	4	–	0	0	168 985	0	100	–
		2011	0	0	0	–	–	0	0	113 958	0	100	–
		2012	2 987 653	2 987 653	0	100	–	0	0	117 293	0	100	–
	Honduras	2010	6 378	6 378	0	1	–	65 187	6	93 845	1	100	–
		2011	8 798	8 798	0	3	–	83 858	8	74 533	1	100	–
		2012	30 630	30 630	0	7	–	75 777	7	36 431	1	100	–
	Mexico	2010	350 000	350 000	0	100	–	106 875	30	–	3	100	100
		2011	0	0	0	100	–	69 331	19	–	3	100	100
		2012	52 766	52 766	–	100	–	42 985	12	–	2	100	100
	Nicaragua	2010	22 800	22 800	0	100	–	262 373	100	59 600	1	100	–
		2011	14 300	14 300	0	100	–	200 448	100	206 511	1	100	–
		2012	18 350	18 350	0	100	–	87 446	100	218 419	1	100	–
	Panama	2010	0	0	0	–	–	82 041	51	836	0	100	–
		2011	0	0	0	–	–	23 766	14	420	0	100	–
		2012	0	0	0	–	–	21 071	13	920	0	100	–
	Paraguay	2010	0	0	0	1	–	36 035	15	27	0	100	100
		2011	0	0	0	–	–	34 736	15	10	0	100	100
		2012	–	0	–	–	–	40 126	17	15	0	100	100
	Peru	2010	–	–	–	–	–	–	–	–	–	–	–
		2011	–	–	–	–	–	–	–	–	–	–	–
		2012	–	–	–	–	–	–	–	–	–	–	–
	Suriname	2010	14 073	14 073	0	63	–	–	–	–	–	–	–
		2011	712	712	0	33	–	–	–	–	–	–	–
		2012	–	–	0	32	–	–	–	–	–	–	–
	Venezuela (Bolivarian Republic of)	2010	9 267	9 267	–	6	–	5 244 247	100	45 155	10 629	95	81
		2011	1 665	1 665	–	4	–	3 589 089	100	–	–	–	–
		2012	515	515	–	3	–	3 637 795	100	–	–	–	–
Eastern Mediterranean	Afghanistan	2010	922 956	922 956	0	51	–	–	–	–	–	–	–
		2011	3 352 326	3 352 326	0	100	–	0	0	–	–	–	–
		2012	37 551	37 551	0	98	–	0	0	–	–	–	–
	Djibouti	2010	28 300	28 300	0	96	57	–	–	–	–	–	–
		2011	100	100	0	37	64	–	–	–	–	–	–
		2012	26 400	26 400	0	23	78	0	–	–	–	–	–
	Iran (Islamic Republic of)	2010	120 000	120 000	–	10	–	222 470	5	11 358	7 245	100	100
		2011	60 000	60 000	–	10	–	84 484	2	5 976	3 417	100	100
		2012	243 728	243 728	0	17	–	512 991	11	5 670	3 100	100	100
	Pakistan	2010	–	–	–	2	–	–	–	–	–	–	–
		2011	–	–	–	1	–	–	–	–	–	–	–
		2012	439 181	439 181	0	2	–	4 584 426	9	2 280 000	596 600	65	4
	Saudi Arabia	2010	81 050	81 050	–	30	–	2 500 000	71	3 000	1 600	100	100
		2011	100 000	100 000	0	21	–	2 600 000	72	2 724	2 724	100	100
		2012	767 000	767 000	–	46	–	2 210 000	60	1 283	1 283	100	100
	Somalia	2010	131 467	131 467	0	20	18	16 261	0	95 000	95 000	26	26
		2011	210 231	210 231	0	21	19	429 514	7	–	–	–	–
		2012	455 000	455 000	0	20	20	240 558	3	18 868	9 268	3	1
	South Sudan[3]	2010	2 203 040	2 203 040	–	100	50	–	–	–	–	–	–
		2011	386 563	386 563	0	100	44	–	–	–	–	–	–
		2012	1 036 109	1 036 109	0	60	46	170 440	2	4 333 150	4 333 150	100	100
	Sudan	2010	1 166 240	1 166 240	0	39	58	2 480 360	8	2 339 473	2 285 901	61	57
		2011	882 901	882 901	0	33	53	2 947 155	10	2 546 884	2 512 852	64	60
		2012	1 643 518	1 643 518	0	22	38	3 967 730	13	2 478 038	2 462 470	65	62
	Yemen	2010	538 577	538 577	0	17	–	1 099 627	11	183 177	177 517	60	59
		2011	21 831	21 831	0	11	–	1 480 416	15	273 180	273 180	100	100
		2012	1 209 215	1 209 215	0	31	–	1 886 500	18	179 000	166 500	70	66
European	Azerbaijan	2010	10 000	10 000	–	26	–	1 250 000	100	54	2	100	100
		2011	10 000	10 000	–	34	–	309 162	100	10	2	100	100
		2012	1 000	1 000	–	18	–	211 500	99	4	1	100	100
	Kyrgyzstan	2010	70 000	70 000	–	100	–	335 000	100	6	0	100	100
		2011	48 600	48 600	–	100	–	223 000	100	5	0	100	100
		2012	35 000	35 000	–	100	–	146 466	100	3	0	100	100
	Tajikistan	2010	38 778	38 778	–	69	–	814 500	100	112	1	100	100
		2011	117 041	117 041	–	100	–	644 136	100	78	5	100	100
		2012	100 000	100 000	–	100	–	503 156	100	31	2	100	100
	Turkey	2010	0	0	–	–	–	390 460	100	250	100	100	100
		2011	–	0	–	–	–	221 225	100	205	105	100	100
		2012	–	0	–	–	–	50	0	600	235	100	100
	Uzbekistan	2010	0	0	–	65	–	244 821	100	5	0	100	100
		2011	50 000	50 000	–	100	–	300 543	100	1	0	100	100
		2012	20 000	20 000	–	100	–	375 605	100	1	1	100	100

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South-East Asia	Bangladesh	2010	1 696 943	500 000	1 196 943	100	–	0	0	68 802	58 135	75	78
		2011	2 890 013	1 391 953	1 498 060	100	–	0	0	68 540	48 540	100	100
		2012	85 976	20 052	65 924	89	–	0	0	94 810	71 040	100	100
	Bhutan	2010	100 671	99 697	974	100	–	140 503	100	780	266	100	100
		2011	8 942	8 942	0	100	–	148 318	100	125	125	53	100
		2012	10 000	10 000	–	100	–	141 322	100	82	35	100	100
	Democratic People's Republic of Korea	2010	300 000	300 000	–	21	–	2 000 000	68	15 392	0	100	100
		2011	79 960	79 960	–	26	–	2 013 084	68	18 104	0	100	100
		2012	332 000	332 000	–	43	–	1 646 580	55	23 537	0	100	100
	India	2010	2 570 000	2 570 000	0	3	–	53 432 930	20	1 599 986	2 875 000	100	100
		2011	6 580 000	6 580 000	0	8	–	53 348 697	20	330 000 000	2 920 000	100	100
		2012	0	0	0	6	–	49 942 758	18	30 523 925	3 147 400	100	100
	Indonesia	2010	2 402 610	2 402 610	0	23	–	60 000	0	671 681	671 681	27	52
		2011	2 829 748	2 829 748	0	28	–	527 535	1	479 850	479 850	16	29
		2012	845 712	845 712	0	26	–	110 000	0	341 697	341 697	13	24
	Myanmar	2010	778 264	329 421	448 843	10	–	12 709	0	266 769	266 769	31	43
		2011	1 613 830	551 107	1 062 723	20	–	1 036	0	594 756	569 607	96	100
		2012	2 964 812	1 042 244	1 922 568	35	–	56 414	0	546 060	546 060	78	100
	Nepal	2010	438 186	438 186	0	100	–	768 350	77	150 000	3 200	100	13
		2011	934 476	934 476	0	100	–	256 070	25	71 140	612	91	6
		2012	499 166	499 166	0	100	–	443 229	44	669 152	53 252	100	100
	Sri Lanka	2010	166 600	166 600	–	45	–	314 146	7	736	34	100	100
		2011	1 274 000	–	–	83	–	80 499	2	175	17	100	100
		2012	637 250	637 250	–	53	–	75 354	2	70	48	100	100
	Thailand	2010	597 497	201 566	395 931	44	–	568 799	11	51 161	26 471	100	100
		2011	232 150	100 343	131 807	32	–	423 638	8	5 642	5 642	100	100
		2012	264 806	139 000	125 806	23	–	451 730	8	3 298	3 298	100	100
	Timor–Leste	2010	166 605	166 605	0	53	–	58 425	7	40 250	28 718	33	33
		2011	24 613	24 613	0	41	–	102 858	12	19 739	15 981	54	54
		2012	25 148	25 148	–	45	–	159 743	19	5 211	2 923	100	100
Western Pacific	Cambodia	2010	239 603	217 351	22 252	36	–	0	0	198 390	182 046	100	100
		2011	1 212 490	1 203 321	9 169	69	–	0	0	206 529	120 529	100	100
		2012	2 177 808	2 177 808	0	100	–	0	0	422 024	422 024	100	100
	China	2010	692 126	114 529	577 597	100	–	24 561 489	100	–	–	–	–
		2011	656 674	149 394	507 280	100	–	1 043 963	100	–	–	–	–
		2012	257 935	0	257 935	100	–	1 096 877	100	–	–	–	–
	Lao People's Democratic Republic	2010	231 192	230 292	900	100	–	0	0	51 425	51 425	100	100
		2011	241 935	241 935	0	42	–	0	0	56 340	56 340	100	100
		2012	30 396	30 396	0	84	–	1 856	0	80 412	80 412	100	100
	Malaysia	2010	221 911	221 911	–	100	–	365 340	43	6 650	–	100	–
		2011	260 487	260 487	–	100	–	307 769	36	5 306	2 218	100	100
		2012	220 703	220 703	–	100	–	489 988	56	4 725	2 088	100	100
	Papua New Guinea	2010	878 831	878 831	–	46	–	–	–	–	–	–	–
		2011	1 268 939	1 268 939	–	68	–	–	–	–	–	–	–
		2012	1 080 806	1 080 806	–	86	–	–	–	–	–	–	–
	Philippines	2010	1 437 327	1 437 327	0	87	–	1 063 275	16	36 298	36 298	100	100
		2011	3 037 404	3 037 404	0	100	–	1 052 050	15	34 080	34 080	100	100
		2012	783 463	783 463	0	100	–	1 541 860	22	13 469	13 469	100	100
	Republic of Korea	2010	10 000	10 000	–	1	–	–	–	1 772	–	67	–
		2011	10 000	10 000	–	1	–	–	–	838	–	70	–
		2012	–	0	–	1	–	–	–	555	–	71	–
	Solomon Islands	2010	314 478	314 478	0	100	–	166 053	32	271 946	271 946	100	100
		2011	46 574	46 574	0	100	–	175 265	33	236 665	236 665	100	100
		2012	31 781	31 781	0	100	–	131 752	24	190 255	190 255	100	100
	Vanuatu	2010	91 281	91 281	0	100	–	16 204	7	49 600	49 600	100	100
		2011	92 385	92 385	0	100	–	18 490	8	–	–	–	–
		2012	35 863	35 863	0	100	–	9 705	4	52 010	52 010	99	100
	Viet Nam	2010	1 181 438	500 000	681 438	14	–	1 602 475	10	346 887	–	100	–
		2011	766 606	100 000	666 606	14	–	1 555 892	10	274 852	110 576	100	100
		2012	968 413	0	968 413	18	–	1 364 815	9	266 351	–	100	–

[1] Based on Probable and confirmed cases adjusting for reporting completeness and any first-line treatment courses distributed as proxy indicator for treated cases

[2] Based on Probable and confirmed cases adjusting for reporting completeness and % of *P. falciparum* using ACT distributed as proxy indicator for treated cases

[3] South Sudan became a separate State on 9 July 2011 and a Member State of WHO on 27 September 2011. South Sudan and Sudan have distinct epidemiological profiles comprising high-transmission and low-transmission areas respectively. For this reason data up to June 2011 from the high-transmission areas of Sudan (10 southern states which correspond to South Sudan) and low-transmission areas (15 northern states which correspond to contemporary Sudan) are reported separately.

Annex 5 – Household Surveys, 2008–2012

WHO Region	Country/area	Year	Source	Subgroup	% of HH that have at least ITN	% of HH with enough ITNs for individuals who slept in the house the previous night	% of population with access to an ITN in their household	% of existing ITNs in HH used the previous night	% of the population who slept under an ITN the previous night
African	Angola	2011	MIS 2011	Total	35	6	19	84	19
		2011	MIS 2011	Urban	39	7	22	81	19
		2011	MIS 2011	Rural	32	5	17	86	18
	Burkina Faso	2010	DHS 2010	Total	57	17	36	82	31
		2010	DHS 2010	Urban	60	24	40	76	31
		2010	DHS 2010	Rural	56	15	35	84	31
	Burundi	2010	DHS 2010	Total	52	22	39	74	37
		2010	DHS 2010	Urban	68	28	51	85	50
		2010	DHS 2010	Rural	50	21	38	72	35
		2012	MIS 2012	Total	63	23	46	83	47
	Cameroon	2011	DHS 2011	Total	18	4	11	62	7
	Congo	2012	DHS 2012	Total	33	9	23	90	25
	Côte d'Ivoire	2012	DHS 2012	Total	67	30	49	62	32
	Democratic Republic of the Congo	2010	MICS 2010	Total	98	–	–	–	–
		2010	MICS 2010	Urban	99	–	–	–	–
		2010	MICS 2010	Rural	98	–	–	–	–
	Ethiopia	2011	DHS 2011	Total	–	–	–	–	–
		2011	DHS 2011	Urban	–	–	–	–	–
		2011	DHS 2011	Rural	–	–	–	–	–
	Gabon	2012	DHS 2012	Total	36	14	27	87	26
	Ghana	2008	DHS 2008	Total	42	16	30	63	20
		2008	DHS 2008	Urban	35	14	26	54	14
		2008	DHS 2008	Rural	48	18	34	69	25
	Kenya	2009	DHS 2009	Total	56	27	42	77	35
		2009	DHS 2009	Urban	58	38	52	80	46
		2009	DHS 2009	Rural	55	23	40	76	32
	Lesotho	2009	DHS 2009	Total	–	–	–	–	–
		2009	DHS 2009	Urban	–	–	–	–	–
		2009	DHS 2009	Rural	–	–	–	–	–
	Liberia	2009	MIS 2009	Total	47	10	25	76	22
		2009	MIS 2009	Urban	42	9	22	79	19
		2009	MIS 2009	Rural	52	11	28	75	24
		2011	MIS 2011	Total	50	16	31	83	31
		2011	MIS 2011	Urban	52	18	34	82	33
		2011	MIS 2011	Rural	47	13	28	84	29
	Madagascar	2009	DHS 2009	Total	57	17	35	83	36
		2009	DHS 2009	Urban	60	25	43	86	42
		2009	DHS 2009	Rural	56	15	33	82	34
		2011	MIS 2011	Total	81	31	57	88	66
		2011	MIS 2011	Urban	87	43	67	89	70
		2011	MIS 2011	Rural	80	29	56	88	66
	Malawi	2010	DHS 2010	Total	57	19	38	65	28
		2010	DHS 2010	Urban	64	29	47	72	37
		2010	DHS 2010	Rural	55	17	36	63	27
		2012	MIS 2012	Total	55	18	37	91	40
	Mali	2010	DHS 2010	Total	86	31	62	88	55
		2010	DHS 2010	Urban	87	37	62	87	54
		2010	DHS 2010	Rural	86	29	61	88	55
	Mozambique	2008	MICS 2008	Total	–	–	–	–	–
		2008	MICS 2008	Urban	–	–	–	–	–
		2008	MICS 2008	Rural	–	–	–	–	–
		2011	DHS 2011	Total	51	22	37	70	29
	Nigeria	2008	DHS 2008	Total	8	2	5	68	3
		2008	DHS 2008	Urban	9	2	5	64	3
		2008	DHS 2008	Rural	8	2	5	70	3
		2010	MIS 2010	Total	42	14	28	77	23
		2010	MIS 2010	Urban	33	11	23	66	16
		2010	MIS 2010	Rural	45	15	30	80	25
	Rwanda	2008	DHS 2008	Total	56	15	38	84	39
		2008	DHS 2008	Urban	65	24	49	84	45
		2008	DHS 2008	Rural	54	13	36	84	38
		2010	DHS 2010	Total	82	39	64	71	57
		2010	DHS 2010	Urban	84	50	71	74	62
		2010	DHS 2010	Rural	82	37	63	71	56
	Sao Tome and Principe	2009	DHS 2009	Total	61	31	51	82	46
		2009	DHS 2009	Urban	69	38	58	90	56
		2009	DHS 2009	Rural	52	25	43	71	34
	Senegal	2009	MIS 2009	Total	60	11	35	64	22
		2009	MIS 2009	Urban	50	10	29	71	22
		2009	MIS 2009	Rural	70	12	39	60	23
		2011	DHS 2011	Total	63	15	38	69	28
		2011	DHS 2011	Urban	52	12	30	74	25
		2011	DHS 2011	Rural	73	18	45	66	31
	Sierra Leone	2008	DHS 2008	Total	37	6	19	89	19
		2008	DHS 2008	Urban	36	6	19	84	17
		2008	DHS 2008	Rural	37	5	19	92	19

% of the children <5 years who slept under an ITN the previous night	% of pregnant women who slept under an ITN the previous night	% of HH sprayed by IRS within last 12 months	% of HH with = 1 ITN for 2 pers. and/or sprayed by IRS within last 12 months	% of children aged 6-59 months with a hemoglobin measurement <8g/dL	% of children <5 years with fever in the last 2 weeks who had a finger or heel stick	% of children aged 6-59 months with a positive microscopy blood smear	% children <5 years with fever in last 2 weeks for whom advice or treatment was sought	% of children <5 years with fever in last 2 weeks who received an ACT among those who received any antimalarial	% of women who received at least 2 doses of IPT during ANC visits during their last pregnancy
26	26	–	–	3	–	10	59	77	19
29	28	–	–	2	–	1	71	81	33
24	24	–	–	3	–	14	54	72	12
47	44	1	18	26	5	66	66	25	39
45	38	2	25	15	8	30	74	31	41
47	46	1	16	28	5	73	64	23	39
44	49	0	22	3	27	–	66	69	0
62	64	2	29	2	48	–	72	44	0
43	48	0	22	3	26	–	66	70	0
53	55	6	27	–	48	17	59	71	–
11	10	3	11	6	–	–	59	26	–
31	26	–	–	4	29	–	67	40	–
37	40	2	31	12	11	17	67	18	–
–	–	–	–	–	18	–	44	–	26
–	–	–	–	–	33	–	39	–	28
–	–	–	–	–	13	–	46	–	25
–	–	–	–	5	–	–	27	37	–
–	–	–	–	5	–	–	42	–	–
–	–	–	–	6	–	–	25	–	–
39	28	6	20	5	15	–	71	37	–
38	27	–	–	19	–	–	71	50	47
32	17	–	–	13	–	–	82	59	51
42	34	–	–	23	–	–	64	43	44
46	48	–	–	–	–	–	64	33	17
61	51	–	–	–	–	–	63	51	20
43	47	–	–	–	–	–	64	28	17
–	–	–	–	4	–	–	66	–	–
–	–	–	–	7	–	–	60	–	–
–	–	–	–	3	–	–	67	–	–
26	32	–	–	5	–	33	80	45	48
23	28	–	–	6	–	23	82	36	51
27	34	–	–	5	–	40	78	52	47
36	39	12	26	8	33	28	77	70	51
39	38	8	25	8	38	17	81	60	44
34	39	16	27	8	30	35	74	76	56
45	46	–	–	3	–	–	49	6	7
55	50	–	–	3	–	–	65	14	7
44	45	–	–	2	–	–	47	5	7
75	70	41	62	1	6	7	44	0	20
79	73	12	51	2	9	1	56	27	29
75	70	44	64	1	6	7	43	19	20
39	35	–	–	9	–	–	74	82	55
47	43	–	–	7	–	–	73	80	56
37	34	–	–	9	–	–	74	82	55
56	51	9	25	9	36	28	59	91	–
70	–	–	–	–	–	38	–	–	–
66	–	–	–	–	–	5	–	–	–
71	–	–	–	–	–	45	–	–	–
–	–	–	–	–	–	–	68	–	53
–	–	–	–	–	–	–	73	–	67
–	–	–	–	–	–	–	66	–	47
35	34	19	37	10	30	35	63	60	–
5	5	–	–	–	–	–	72	7	7
7	5	–	–	–	–	–	77	10	10
5	5	–	–	–	–	–	70	6	5
29	34	1	15	–	6	42	84	12	15
22	16	1	12	–	5	23	86	21	22
31	39	1	16	–	6	48	84	9	13
56	60	–	–	2	–	–	46	90	18
61	63	–	–	2	–	–	50	84	22
55	60	–	–	2	–	–	46	91	17
69	72	–	–	1	21	1	52	95	–
74	78	–	–	2	40	0	66	92	–
68	70	–	–	1	18	1	50	95	–
56	56	–	–	3	–	–	74	34	65
66	69	–	–	2	–	–	65	23	70
46	42	–	–	3	–	–	82	60	59
29	29	–	–	17	–	–	52	50	57
29	26	–	–	13	–	–	61	43	55
29	31	–	–	20	–	–	46	57	57
34	36	11	24	14	10	3	54	41	40
31	32	9	20	10	10	2	62	48	46
36	38	12	28	16	9	4	45	32	37
25	27	–	–	10	–	–	57	23	13
29	22	–	–	8	–	–	72	16	16
24	30	–	–	11	–	–	52	27	12

Annex 5 – Household Surveys, 2008–2012 (continued)

WHO Region	Country/area	Year	Source	Subgroup	% of HH that have at least ITN	% of HH with enough ITNs for individuals who slept in the house the previous night	% of population with access to an ITN in their household	% of existing ITNs in HH used the previous night	% of the population who slept under an ITN the previous night
African	Swaziland	2010	MICS 2010	Total	99	–	–	–	–
		2010	MICS 2010	Urban	95	–	–	–	–
		2010	MICS 2010	Rural	100	–	–	–	–
	Uganda	2009	MIS 2009	Total	47	15	32	79	25
		2009	MIS 2009	Urban	46	22	37	85	30
		2009	MIS 2009	Rural	47	14	31	78	24
		2011	DHS 2011	Total	60	26	45	75	34
		2011	DHS 2011	Urban	59	37	52	81	41
		2011	DHS 2011	Rural	60	24	44	74	33
	United Republic of Tanzania	2008	DHS 2008	Total	39	13	25	70	20
		2008	DHS 2008	Urban	59	27	45	84	41
		2008	DHS 2008	Rural	33	8	20	61	14
		2010	DHS 2010	Total	64	20	47	82	43
		2010	DHS 2010	Urban	65	28	51	87	47
		2010	DHS 2010	Rural	63	17	45	80	42
		2012	DHS 2012	Total	91	52	74	77	65
	United Republic of Tanzania (Mainland)	2008	DHS 2008	Total	39	13	25	70	20
		2008	DHS 2008	Urban	59	27	45	84	41
		2008	DHS 2008	Rural	33	8	20	61	14
		2010	DHS 2010	Total	64	20	47	82	43
		2010	DHS 2010	Urban	65	28	51	87	47
		2010	DHS 2010	Rural	63	17	45	80	42
		2012	DHS 2012	Total	91	52	74	77	65
		2012	DHS 2012	Urban	87	59	77	80	69
		2012	DHS 2012	Rural	92	50	74	76	65
	Zimbabwe	2009	MICS 2009	Total	87	–	–	–	–
		2009	MICS 2009	Urban	78	–	–	–	–
		2009	MICS 2009	Rural	91	–	–	–	–
		2011	DHS 2011	Total	29	12	20	39	8
		2011	DHS 2011	Urban	23	9	16	45	7
		2011	DHS 2011	Rural	32	13	22	37	9
Region of the Americas	Bolivia (Plurinational State of)	2008	DHS 2008	Total	–	–	–	–	–
		2008	DHS 2008	Urban	–	–	–	–	–
		2008	DHS 2008	Rural	–	–	–	–	–
	Colombia	2010	DHS 2010	Total	–	–	–	–	–
		2010	DHS 2010	Urban	–	–	–	–	–
		2010	DHS 2010	Rural	–	–	–	–	–
	Guyana	2009	DHS 2009	Total	26	18	22	88	21
		2009	DHS 2009	Urban	13	9	11	87	10
		2009	DHS 2009	Rural	31	22	27	89	25
	Haiti	2012	DHS 2012	Total	19	5	11	64	7
	Honduras	2012	DHS 2012	Total	–	–	–	–	–
	Peru	2008	DHS 2008	Total	–	–	–	–	–
		2008	DHS 2008	Urban	–	–	–	–	–
		2008	DHS 2008	Rural	–	–	–	–	–
Eastern Mediterranean	Egypt	2008	DHS 2008	Total	–	–	–	–	–
		2008	DHS 2008	Urban	–	–	–	–	–
		2008	DHS 2008	Rural	–	–	–	–	–
	Jordan	2009	DHS 2009	Total	–	–	–	–	–
		2009	DHS 2009	Urban	–	–	–	–	–
		2009	DHS 2009	Rural	–	–	–	–	–
European	Albania	2009	DHS 2009	Total	–	–	–	–	–
		2009	DHS 2009	Urban	–	–	–	–	–
		2009	DHS 2009	Rural	–	–	–	–	–
South-East Asia	Bangladesh	2011	DHS 2011	Total	–	–	–	–	–
	Indonesia	2012	DHS 2012	Total	–	–	–	–	–
	Maldives	2009	DHS 2009	Total	–	–	–	–	–
		2009	DHS 2009	Urban	–	–	–	–	–
		2009	DHS 2009	Rural	–	–	–	–	–
	Nepal	2011	DHS 2011	Total	–	–	–	–	–
		2011	DHS 2011	Urban	–	–	–	–	–
		2011	DHS 2011	Rural	–	–	–	–	–
	Timor-Leste	2010	DHS 2010	Total	41	10	26	92	29
		2010	DHS 2010	Urban	51	14	33	94	37
		2010	DHS 2010	Rural	38	9	23	91	26
Western Pacific	Cambodia	2010	DHS 2010	Total	–	–	–	–	–
		2010	DHS 2010	Urban	–	–	–	–	–
		2010	DHS 2010	Rural	–	–	–	–	–
	Philippines	2008	DHS 2008	Total	–	–	–	–	–
		2008	DHS 2008	Urban	–	–	–	–	–
		2008	DHS 2008	Rural	–	–	–	–	–

DHS = Demographic and Health Survey
MICS = Multiple Indicator Cluster Survey
MIS = Malaria Indicator Survey
HH = Households
IPTp = intermittent preventive treatment in pregnancy
IRS = indoor residual spraying
ITN = insecticide-treated mosquito net

% of the children <5 years who slept under an ITN the previous night	% of pregnant women who slept under an ITN the previous night	% of HH sprayed by IRS within last 12 months	% of HH with = 1 ITN for 2 pers. and/or sprayed by IRS within last 12 months	% of children aged 6-59 months with a hemoglobin measurement <8g/dL	% of children <5 years with fever in the last 2 weeks who had a finger or heel stick	% of children aged 6-59 months with a positive microscopy blood smear	% children <5 years with fever in last 2 weeks for whom advice or treatment was sought	% of children <5 years with fever in last 2 weeks who received an ACT among those who received any antimalarial	% of women who received at least 2 doses of IPT during ANC visits during their last pregnancy
–	–	–	–	–	14	–	55	24	1
–	–	–	–	–	14	–	56	–	1
–	–	–	–	–	14	–	54	24	2
32	44	–	–	10	–	43	83	39	34
32	45	–	–	3	–	17	69	50	46
32	43	–	–	11	–	46	85	37	33
42	46	8	32	5	26	–	85	68	27
48	55	6	41	2	53	–	93	70	31
41	45	8	30	5	23	–	84	68	27
25	27	–	–	8	–	–	75	38	31
47	47	–	–	9	–	–	87	39	44
20	22	–	–	7	–	–	72	37	29
62	56	61	67	6	–	–	85	62	28
61	46	76	82	6	–	–	89	50	32
62	59	56	62	6	–	–	84	67	27
70	74	15	61	6	25	4	79	61	–
25	27	–	–	8	–	–	75	38	–
47	47	–	–	9	–	–	87	39	–
20	22	–	–	7	–	–	72	37	–
62	56	61	67	6	–	–	85	62	–
61	46	76	82	6	–	–	89	50	–
62	59	56	62	6	–	–	84	67	–
70	74	15	61	6	25	4	79	61	–
71	74	13	65	6	61	1	83	45	–
70	74	15	60	6	17	5	78	65	–
91	27	–	–	–	–	–	52	–	15
85	35	–	–	–	–	–	46	–	8
94	24	–	–	–	–	–	53	–	18
10	10	19	26	4	7	–	44	43	8
10	8	5	13	4	5	–	44	38	6
9	10	26	32	4	8	–	44	45	8
–	–	–	–	7	–	–	56	–	–
–	–	–	–	7	–	–	65	–	–
–	–	–	–	7	–	–	47	–	–
–	–	–	–	–	–	–	60	–	–
–	–	–	–	–	–	–	62	–	–
–	–	–	–	–	–	–	55	–	–
24	30	–	–	2	–	–	67	–	0
12	13	–	–	2	–	–	67	–	–
28	35	–	–	2	–	–	67	–	0
12	8	2	7	4	12	–	49	–	–
–	–	–	–	1	–	–	64	–	–
–	–	–	–	2	–	–	74	–	–
–	–	–	–	2	–	–	77	–	–
–	–	–	–	3	–	–	72	–	–
–	–	–	–	–	–	–	72	–	–
–	–	–	–	–	–	–	73	–	–
–	–	–	–	–	–	–	71	–	–
–	–	–	–	1	–	–	–	–	–
–	–	–	–	1	–	–	–	–	–
–	–	–	–	2	–	–	–	–	–
–	–	–	–	1	–	–	78	–	–
–	–	–	–	0	–	–	79	–	–
–	–	–	–	1	–	–	78	–	–
–	–	–	–	2	–	–	75	2	–
–	–	–	–	–	–	–	90	27	–
–	–	–	–	–	–	–	86	–	–
–	–	–	–	–	–	–	87	–	–
–	–	–	–	–	–	–	85	–	–
–	–	–	–	2	–	–	72	–	–
–	–	–	–	2	–	–	81	–	–
–	–	–	–	2	–	–	70	–	–
41	41	–	–	1	–	–	73	6	–
50	49	–	–	1	–	–	78	1	–
38	38	–	–	1	–	–	71	9	–
–	–	–	–	3	–	–	83	7	–
–	–	–	–	1	–	–	87	7	–
–	–	–	–	3	–	–	82	–	–
–	–	–	–	–	–	–	49	–	–
–	–	–	–	–	–	–	53	–	–
–	–	–	–	–	–	–	46	–	–

Annex 6A – Reported malaria cases and deaths, 2012

WHO Region	Country/area	Population				Reported malaria cases			
		UN population	At risk (low + high)	At risk (high)	Number of people living in active foci	Suspected malaria cases	Presumed and confirmed malaria cases	Malaria case definition	Mic. slides/ RDTs performed
African	Algeria	38 481 705	N/A	N/A	22 799 649	15 790	887	P+C	15 790
	Angola	20 820 525	20 820 525	20 820 525	N/A	3 314 706	1 496 834	S	3 314 706
	Benin	10 050 702	10 050 702	10 050 702	N/A	1 513 212	1 151 038	S	1 068 013
	Botswana	2 003 910	1 302 542	360 704	N/A	308	308	P+C	81
	Burkina Faso	16 460 141	16 460 141	16 460 141	N/A	6 970 700	6 089 101	S	4 739 645
	Burundi	9 849 569	7 682 664	2 363 897	N/A	3 808 337	2 151 076	S	3 808 337
	Cabo Verde[3]	494 401	N/A	N/A	283 206	8 715	36	P+C	8 715
	Cameroon	21 699 631	21 699 631	15 406 738	N/A	1 589 317	313 315	S	1 276 002
	Central African Republic	4 525 209	4 525 209	4 525 209	N/A	459 999	451 012	S	55 746
	Chad	12 448 175	12 323 693	9 958 540	N/A	660 575	590 786	S	69 789
	Comoros	717 503	717 503	674 453	N/A	152 744	49 840	S	152 744
	Congo	4 337 051	4 337 051	4 337 051	N/A	117 640	117 640	S	0
	Côte d'Ivoire	19 839 750	19 839 750	19 839 750	N/A	2 795 919	2 168 215	S	1 768 331
	Democratic Republic of the Congo	65 705 093	65 705 093	63 733 940	N/A	9 128 398	6 263 607	S	7 656 389
	Equatorial Guinea	736 296	736 296	736 296	N/A	40 071	15 169	S	40 071
	Eritrea	6 130 922	6 130 922	4 352 955	N/A	138 982	42 178	P+C	118 619
	Ethiopia	91 728 849	61 458 329	917 288	N/A	5 962 647	3 876 745	P+C	3 778 480
	Gabon	1 632 572	1 632 572	1 632 572	N/A	188 089	137 695	S	70 147
	Gambia	1 791 225	1 791 225	1 791 225	N/A	862 442	271 038	S	862 442
	Ghana	25 366 462	25 366 462	25 366 462	N/A	10 676 731	8 774 516	S	5 657 381
	Guinea	11 451 273	11 451 273	11 451 273	N/A	1 220 574	1 220 574	S	–
	Guinea-Bissau	1 663 558	1 663 558	1 663 558	N/A	158 095	50 381	S	158 095
	Kenya	43 178 141	32 815 387	15 544 131	N/A	9 335 951	5 788 381	S	5 001 041
	Liberia	4 190 435	4 190 435	4 190 435	N/A	2 048 883	1 407 455	S	2 048 883
	Madagascar	22 293 914	22 293 914	6 688 174	N/A	944 533	359 420	S	944 533
	Malawi	15 906 483	15 906 483	15 906 483	N/A	5 265 474	3 659 565	S	3 170 893
	Mali	14 853 572	14 853 572	13 368 215	N/A	2 171 739	2 171 739	S	0
	Mauritania	3 796 141	3 416 527	2 239 723	N/A	169 104	165 834	S	5 158
	Mayotte, France	216 230	N/A	N/A	3 477	1 463	72	#N/A	1 463
	Mozambique	25 203 395	25 203 395	25 203 395	N/A	4 781 207	1 813 984	S	4 781 207
	Namibia	2 259 393	1 626 763	1 513 793	N/A	10 844	3 163	P+C	7 875
	Niger	17 157 042	17 157 042	11 838 359	N/A	3 888 044	3 525 112	S	1 205 275
	Nigeria	168 833 776	168 833 776	168 833 776	N/A	6 938 519	2 087 068	S	4 851 451
	Rwanda	11 457 801	11 457 801	11 457 801	N/A	3 095 386	483 470	P+C	3 095 386
	Sao Tome and Principe	188 098	188 098	188 098	N/A	126 897	12 550	P+C	126 897
	Senegal	13 726 021	13 726 021	13 176 980	N/A	637 594	366 912	S	552 640
	Sierra Leone	5 978 727	5 978 727	5 978 727	N/A	2 170 759	1 537 322	S	2 170 759
	South Africa	52 385 920	5 238 592	2 095 437	N/A	152 561	6 846	P+C	151 344
	Swaziland	1 230 985	344 676	0	N/A	1 401	626	P+C	1 070
	Togo	6 642 928	6 642 928	6 642 928	N/A	1 240 134	697 374	S	1 240 134
	Uganda	36 345 860	36 345 860	32 711 274	N/A	13 591 932	10 338 093	S	5 916 097
	United Republic of Tanzania	47 783 107	47 783 107	34 881 668	N/A	8 477 435	2 441 750	S	8 022 640
	Mainland	46 444 390	46 444 390	33 904 405	N/A	8 474 278	2 972 186	S	7 486 116
	Zanzibar	1 409 845	1 409 845	1 409 845	N/A	536 524	2 931	S	536 524
	Zambia	13 883 577	13 883 577	13 883 577	N/A	4 695 400	4 695 400	S	–
	Zimbabwe	13 013 678	6 506 839	6 506 839	N/A	727 174	276 963	P+C	727 174
Region of the Americas	Argentina	41 086 927	N/A	N/A	0	7 027	4	C	7 027
	Belize	324 060	223 601	0	N/A	20 789	37	C	20 789
	Bolivia (Plurinational State of)	10 496 285	3 705 189	503 822	N/A	132 904	7 415	C	132 904
	Brazil	198 656 019	40 327 172	4 569 088	N/A	2 349 341	242 758	C	2 349 341
	Colombia	47 704 427	10 733 496	7 060 255	N/A	416 767	60 179	C	416 767
	Costa Rica	4 805 295	N/A	N/A	2 500	7 485	8	C	7 485
	Dominican Republic	10 276 621	8 796 788	441 895	N/A	506 583	952	C	506 583
	Ecuador	15 492 264	N/A	N/A	231 908	459 157	558	C	459 157
	El Salvador	6 297 394	N/A	N/A	7 958	124 885	19	C	124 885
	French Guiana, France	243 076	243 076	207 830	N/A	13 638	900	C	13 638
	Guatemala	15 082 831	6 862 688	2 262 425	N/A	186 645	5 346	C	186 645
	Guyana	795 369	739 693	278 379	N/A	196 622	31 601	C	196 622
	Haiti	10 173 775	10 173 775	5 392 101	N/A	161 236	25 423	C	161 236
	Honduras	7 935 846	5 777 296	1 111 018	N/A	141 165	6 434	C	141 165
	Mexico	120 847 477	N/A	N/A	4 159 043	1 025 659	833	C	1 025 659
	Nicaragua	5 991 733	3 007 850	77 893	N/A	552 722	1 235	C	552 722
	Panama	3 802 281	2 874 524	167 300	N/A	107 711	844	C	107 711
	Paraguay	6 687 361	N/A	N/A	497 042	31 499	15	C	31 499
	Peru	29 987 800	4 798 048	1 349 451	N/A	759 285	31 436	C	759 285
	Suriname	534 541	83 923	83 923	N/A	17 464	569	C	20 810
	Venezuela (Bolivarian Republic of)	29 954 782	5 631 499	778 824	N/A	410 663	52 803	C	410 663

Reported malaria cases					Inpatient malaria cases and deaths		Method used to calculate[1]		Estimates, 2012					
									Cases			Deaths		
Mic. slides/ RDTs positive	Mic. slides/ RDTs *P. falciparum*	Mic. slides/ RDTs *P. vivax*	Imported cases / (Introduced cases)	Cases at community level	Inpatient malaria cases	Malaria attributed deaths	Cases	Deaths	Lower	Point	Upper	Lower	Point	Upper
887	860	24	828 /(3)	–	–	0	(1)	(1)	80	90	120	0	0	0
1 496 834	–	–	–	–	152 666	5 736	(2)	(2)	2 200 000	3 800 000	5 400 000	11 000	21 000	29 000
705 839	–	–	–	556 516	78 769	2 261	(2)	(2)	1 600 000	2 900 000	4 600 000	5 100	8 000	11 000
193	193	–	–	–	68	3	(1)	(1)	300	600	1 200	1	3	6
3 858 046	–	–	–	344 280	393 195	7 963	(2)	(2)	2 500 000	5 600 000	8 900 000	12 000	17 000	21 000
2 151 076	–	–	–	29 532	113 820	2 263	(2)	(2)	500 000	840 000	1 200 000	1 400	3 200	5 400
36	36	0	35	–	36	0	(1)	(1)	60	110	220	0	0	1
–	–	–	–	139 406	364 451	3 209	(2)	(2)	2 100 000	3 700 000	5 200 000	8 400	12 000	16 000
46 759	–	–	–	40 807	73 083	1 442	(2)	(2)	860 000	1 600 000	2 400 000	4 000	5 200	6 300
–	–	–	–	–	16 841	1 359	(2)	(2)	1 500 000	3 300 000	5 700 000	11 000	17 000	23 000
49 840	43 681	637	–	0	15 930	17	(2)	(2)	100 000	160 000	230 000	340	490	630
0	–	–	–	–	47 822	623	(2)	(2)	830 000	1 500 000	2 200 000	2 600	4 500	6 300
1 140 627	–	–	–	–	157 332	1 534	(2)	(2)	1 100 000	4 100 000	8 000 000	10 000	14 000	17 000
4 791 598	–	–	–	140 781	851 094	21 601	(2)	(2)	9 000 000	17 000 000	26 000 000	43 000	69 000	92 000
15 169	15 169	–	–	–	5 440	77	(2)	(2)	92 000	180 000	290 000	360	510	630
21 815	12 121	9 204	–	39 853	4 802	30	(1)	(1)	49 000	79 000	120 000	90	190	340
1 692 578	946 595	745 983	–	–	54 021	1 621	(2)	(2)	2 100 000	4 200 000	6 800 000	3 100	15 000	36 000
19 753	–	–	–	–	11 001	134	(2)	(2)	210 000	410 000	620 000	620	1 100	1 500
300 363	271 038	–	–	13 106	9 830	289	(2)	(2)	280 000	520 000	780 000	1 100	1 500	1 800
3 755 166	3 755 166	0	–	77 589	438 284	2 855	(2)	(2)	3 900 000	6 900 000	10 000 000	13 000	17 000	22 000
317 200	191 421	–	–	41 377	27 814	979	(2)	(2)	2 300 000	4 400 000	6 600 000	9 400	12 000	14 000
50 381	–	–	–	–	15 002	370	(2)	(2)	230 000	470 000	730 000	1 200	1 600	1 900
1 453 471	1 453 471	–	–	–	22 854	785	(2)	(2)	2 200 000	3 500 000	5 200 000	4 700	12 000	22 000
1 407 455	1 407 455	–	–	5 174	62 936	1 725	(2)	(2)	640 000	1 200 000	1 700 000	2 300	2 900	3 500
359 420	–	–	–	61 646	9 380	552	(1)	(1)	820 000	1 300 000	2 000 000	2 700	6 000	11 000
1 564 984	–	–	–	–	–	5 516	(2)	(2)	2 200 000	4 400 000	6 800 000	7 200	10 000	13 000
886 482	–	–	–	114 639	31 209	1 894	(2)	(2)	1 600 000	3 000 000	4 600 000	9 600	13 000	16 000
1 888	–	–	–	–	18 130	106	(2)	(2)	420 000	670 000	940 000	980	1 900	2 800
72	66	2	47	–	23	0	–	–	–	–	–	–	–	–
1 813 984	927 841	–	–	92 994	78 657	2 818	(2)	(2)	3 700 000	7 000 000	11 000 000	14 000	18 000	22 000
194	194	0	–	0	50	4	(1)	(1)	400	520	660	1	2	4
842 343	817 073	0	–	1 806 424	233 283	2 825	(2)	(2)	2 200 000	4 800 000	7 700 000	14 000	19 000	24 000
–	–	–	–	–	843 187	7 734	(2)	(2)	27 000 000	48 000 000	71 000 000	140 000	180 000	220 000
483 470	483 470	–	–	80 382	5 306	459	(2)	(2)	410 000	650 000	890 000	1 400	3 800	7 100
12 550	10 700	1	–	0	2 354	7	(2)	(2)	16 000	23 000	32 000	40	80	120
281 958	281 958	–	–	17 198	11 905	649	(2)	(2)	2 200 000	3 800 000	5 600 000	6 000	8 000	10 000
1 537 322	1 537 322	–	–	1 315 465	81 053	3 611	(2)	(2)	590 000	1 100 000	1 700 000	4 500	6 500	8 300
5 629	3 109	5	–	–	645	72	(1)	(1)	8 800	17 000	34 000	30	80	170
295	78	0	–	0	109	7	(1)	(1)	440	530	630	1	2	4
697 374	260 526	0	–	211 755	30 068	1 197	(2)	(2)	890 000	1 600 000	2 300 000	4 200	5 500	6 800
2 662 258	1 413 149	0	–	–	592 264	6 585	(2)	(2)	4 300 000	8 900 000	15 000 000	15 000	20 000	26 000
1 986 955	2 730	0	–	–	300 884	7 820	(2)	(2)	4 100 000	8 300 000	13 000 000	15 000	21 000	27 000
1 984 024	–	–	–	–	300 690	7 812	(2)	(2)	–	–	–	–	–	–
2 931	2 730	0	–	–	194	8	(2)	(2)	–	–	–	–	–	–
–	–	–	–	–	161 385	3 705	(2)	(2)	2 000 000	3 700 000	5 600 000	8 400	11 000	14 000
276 963	–	–	–	0	7 820	351	(1)	(1)	720 000	1 100 000	1 500 000	180	1 200	2 600
4	–	–	4	–	0	0	(1)	(1)	4	5	5	0	0	0
37	1	36	–	0	0	0	(1)	(1)	40	40	50	0	0	0
7 415	396	7 067	–	–	0	0	(1)	(1)	8 000	11 000	17 000	1	2	3
242 758	35 903	203 018	–	0	3 328	64	(1)	(1)	280 000	310 000	350 000	80	140	210
60 179	17 612	44 283	–	–	324	20	(1)	(1)	71 000	97 000	130 000	40	80	130
8	–	–	1	–	0	0	(1)	(1)	7	8	9	0	0	0
952	950	2	349	–	–	8	(1)	(1)	1 100	1 300	1 600	2	4	6
558	80	478	14	–	–	0	(1)	(1)	580	640	690	0	0	0
19	3	16	6	–	6	0	(1)	(1)	10	20	20	0	0	0
900	386	257	–	–	110	2	–	–	1 000	1 500	2 300	1	2	3
5 346	68	5 278	1	5 272	–	0	(1)	(1)	5 900	8 700	14 000	0	0	1
31 601	20 320	11 225	48	31 546	525	3	(1)	(1)	50 000	63 000	78 000	60	120	190
25 423	25 423	0	–	0	713	0	(1)	(1)	78 000	130 000	200 000	170	400	700
6 444	582	5 862	2	–	–	1	(1)	(1)	10 000	13 000	17 000	2	4	6
833	–	–	9	–	0	0	(1)	(1)	900	1 000	1 000	0	0	0
1 235	236	999	0	0	236	2	(1)	(1)	1 900	2 300	2 700	1	1	2
844	1	843	8	0	36	0	(1)	(1)	900	1 000	1 100	0	0	0
15	11	4	15	–	1	0	(1)	(1)	0	0	0	0	0	0
31 570	3 399	28 164	–	134	71	2	(1)	(1)	47 000	57 000	66 000	10	20	30
345	126	167	–	248	10	0	(1)	(1)	320	420	680	0	1	1
52 803	13 302	39 478	1539	–	–	6	(1)	(1)	59 000	86 000	140 000	30	70	100

Annex 6A – Reported malaria cases and deaths, 2012 (continued)

WHO Region	Country/area	Population				Reported malaria cases			
		UN population	At risk (low + high)	At risk (high)	Number of people living in active foci	Suspected malaria cases	Presumed and confirmed malaria cases	Malaria case definition	Mic. slides/ RDTs performed
Eastern Mediterranean	Afghanistan	29 824 536	23 099 103	7 960 169	N/A	847 933	391 365	P+C	511 408
	Djibouti	859 652	429 826	0	N/A	1 410	25	P+C	1 410
	Iran (Islamic Republic of)	76 424 443	N/A	N/A	764 315	–	1 629	C	479 655
	Iraq	32 778 030	N/A	N/A	0	–	8	C	1 963 638
	Pakistan	179 160 111	176 132 305	51 813 104	–	8 902 947	4 285 449	P+C	4 908 279
	Saudi Arabia	28 287 855	N/A	N/A	2 299 447	–	3 406	C	1 186 179
	Somalia	10 195 134	10 195 134	7 136 594	N/A	–	59 709	P+C	68
	South Sudan[2]	10 837 527	10 837 527	10 837 527	N/A	–	1 125 039	S	–
	Sudan	37 195 349	37 195 349	30 872 140	N/A	2 475 340	1 001 571	P+C	2 000 700
	Yemen	23 852 409	15 675 803	10 330 478	N/A	891 394	165 678	P+C	835 624
European	Azerbaijan	9 308 959	N/A	N/A	11 780	497 040	4	C	497 040
	Georgia	4 358 242	N/A	N/A	5 000	1 046	5	C	1 046
	Kyrgyzstan	5 474 213	N/A	N/A	22 900	18 268	3	C	18 268
	Tajikistan[3]	8 008 990	N/A	N/A	2 153 560	209 239	33	C	209 239
	Turkey	73 997 128	N/A	N/A	2 500	337 830	376	C	337 830
	Uzbekistan	28 541 423	N/A	N/A	0	805 761	1	C	805 761
South-East Asia	Bangladesh	154 695 368	16 026 440	4 114 897	N/A	309 179	29 518	P+C	289 562
	Bhutan	741 822	N/A	N/A	518 453	42 512	82	P+C	42 512
	Democratic People's Republic of Korea	24 763 188	N/A	N/A	18 695 170	39 238	21 850	P+C	39 238
	India	1 236 686 732	1 100 651 191	272 071 081	N/A	122 159 270	1 067 824	C	122 159 270
	Indonesia	246 864 191	150 587 157	41 966 912	N/A	3 534 331	2 051 425	P+C	1 900 725
	Myanmar	52 797 319	31 678 391	19 535 008	N/A	1 423 966	480 586	P+C	1 423 966
	Nepal	27 474 377	22 968 579	1 016 552	N/A	243 432	70 272	P+C	175 252
	Sri Lanka	21 098 099	N/A	N/A	500 974	948 250	93	C	948 250
	Thailand	66 785 001	33 392 501	5 342 800	N/A	1 130 757	32 569	C	1 130 757
	Timor-Leste	1 114 106	1 114 106	857 862	N/A	182 854	6 148	P+C	181 917
Western Pacific	Cambodia	14 864 646	7 878 262	6 540 444	N/A	194 263	45 553	P+C	189 186
	China	1 377 064 907	575 911 328	196 109	N/A	6 918 770	2 718	P+C	6 918 657
	Lao People's Democratic Republic	6 645 827	3 921 038	2 392 498	N/A	369 976	46 819	P+C	369 359
	Malaysia	29 239 927	N/A	N/A	1 187 920	1 566 872	4 725	C	1 566 872
	Papua New Guinea	7 167 010	7 167 010	6 736 989	N/A	878 371	643 214	S	385 352
	Philippines	96 706 764	77 155 915	6 937 659	N/A	332 063	7 133	C	332 063
	Republic of Korea	49 002 683	N/A	N/A	3 758 499	555	555	C	–
	Solomon Islands	549 598	544 102	544 102	N/A	249 520	57 296	P+C	216 607
	Vanuatu	247 262	244 789	244 789	N/A	33 379	3 541	P+C	33 273
	Viet Nam	90 795 769	34 042 276	15 939 973	N/A	3 436 534	43 717	P+C	3 412 455

	Regional Summary	Population				Reported malaria cases			
		UN population	At risk (low + high)	At risk (high)	Number of people living in active foci	Suspected malaria cases	Presumed and confirmed malaria cases	Malaria case definition	Mic. slides/ RDTs performed
	African	888 530 874	750 159 788	609 725 673	23 086 332	120 789 792	77 604 457		78 641 443
	Region of the Americas	567 176 164	103 978 618	24 284 204	4 898 451	7 629 247	469 369		7 632 593
	Eastern Mediterranean	429 415 046	273 565 047	118 950 012	3 063 762	13 119 024	7 033 879		11 886 961
	European	129 688 955	N/A	N/A	2 195 740	1 869 184	422		1 869 184
	South-East Asia	1 833 020 203	1 356 418 365	344 905 112	19 714 597	130 013 789	3 760 367		128 291 449
	Western Pacific	1 672 284 393	706 864 720	39 532 564	4 946 419	13 980 303	855 271		13 423 824
	Total	**5 520 115 635**	**3 190 986 539**	**1 137 397 565**	**57 905 301**	**287 401 339**	**89 723 765**		**241 745 454**

C=confirmed – P=presumed – S=suspected – N/A=not applicable

RDT, rapid diagnostic test

[1] Method 1 for cases: Adjusted data reported by countries
Method 2 for cases: Modelled relationship between malaria transmission, case incidence and intervention coverage
Method 1 for deaths: Fixed case fatality rate applied to case estimates
Method 2 for deaths: Modelled relationship between malaria transmission, malaria mortality and intervention coverage
See *World Malaria Report 2011* for more details of methods used

[2] South Sudan became a separate State on 9 July 2011 and a Member State of WHO on 27 September 2011. South Sudan and Sudan have distinct epidemiological profiles comprising high-transmission and low-transmission areas respectively. For this reason data up to June 2011 from the high-transmission areas of Sudan (10 southern states which correspond to South Sudan) and low-transmission areas (15 northern states which correspond to contemporary Sudan) are reported separately.

[3] All cases were introduced

Reported malaria cases					Inpatient malaria cases and deaths		Method used to calculate[1]		Estimates, 2012					
									Cases			Deaths		
Mic. slides/ RDTs positive	Mic. slides/ RDTs *P. falciparum*	Mic. slides/ RDTs *P. vivax*	Imported cases / (Introduced cases)	Cases at community level	Inpatient malaria cases	Malaria attributed deaths	Cases	Deaths	Lower	Point	Upper	Lower	Point	Upper
54 840	1 231	53 609	–	177 827	4 220	36	(1)	(1)	280 000	380 000	500 000	10	30	40
25	25	0	–	0	0	0	(1)	(1)	6 100	21 000	51 000	10	60	200
1 629	144	1 418	842 /(12)	–	73	–	(1)	(1)	840	930	990	0	0	1
8	–	–	8	–	0	0	(1)	(1)	0	0	0	0	0	0
290 781	95 095	228 215	–	0	57 188	260	(1)	(1)	2 700 000	3 500 000	4 500 000	1 000	2 000	3 100
3 406	1 279	2 088	3324	–	5	0	(1)	(1)	90	100	100	0	0	0
18 842	–	–	–	–	5 852	–	(1)	(2)	120 000	650 000	1 800 000	460	2 900	8 500
225 371	–	–	–	812 511	–	1 321	–	–	1 700 000	3 200 000	5 400 000	1 700	6 000	12 000
526 931	–	–	–	–	107 029	618	(1)	(2)	2 600 000	5 000 000	8 800 000	800	5 600	13 000
109 908	150 563	398	–	–	2 106	72	(1)	(1)	280 000	430 000	620 000	600	1 300	2 200
4	1	3	1	–	1	0	(1)	(1)	3	4	4	0	0	0
5	3	2	4 /(1)	–	5	0	(1)	(1)	1	1	1	0	0	0
3	1	2	3	–	3	0	(1)	(1)	0	0	0	0	0	0
33	2	31	15	–	21	0	(1)	(1)	20	20	20	0	0	0
376	131	243	157 /(219)	–	–	–	(1)	(1)	0	0	0	0	0	0
1	1	0	1	–	1	0	(1)	(1)	0	0	0	0	0	0
9 901	9 428	396	–	19 617	1 457	11	(1)	(1)	470 000	610 000	780 000	710	1 400	2 300
82	33	47	0	–	35	1	(1)	(1)	90	150	380	0	0	0
21 850	–	–	–	–	0	0	(1)	(1)	23 000	26 000	28 000	0	0	0
1 067 824	524 370	534 129	–	–	–	519	(1)	(1)	14 000 000	19 000 000	24 000 000	14 000	28 000	46 000
417 819	199 977	187 583	–	0	–	252	(1)	(1)	4 500 000	5 600 000	7 000 000	4 800	9 400	15 000
480 586	314 676	135 388	–	38 666	26 881	403	(1)	(1)	1 200 000	1 400 000	1 800 000	1 600	2 900	4 500
2 092	612	1 480	–	–	93	0	(1)	(1)	12 000	17 000	25 000	7	20	30
93	41	45	70	–	75	0	(1)	(1)	30	80	200	0	0	0
32 569	11 553	17 506	–	–	3 494	37	(1)	(1)	77 000	140 000	310 000	60	170	400
5 211	1 962	2 288	–	310	86	3	(1)	(1)	33 000	93 000	140 000	40	160	310
40 476	14 896	19 575	–	106 081	7 087	45	(1)	(1)	130 000	160 000	200 000	140	270	430
2 603	1 419	1 080	–	–	–	14	(1)	(1)	3 400	6 800	13 000	4	10	20
46 202	37 692	7 634	–	–	935	44	(1)	(1)	89 000	110 000	140 000	150	300	470
4 725	894	1 461	924 /(35)	–	3 946	12	(1)	(1)	5 100	9 800	19 000	4	10	20
150 195	58 747	7 108	–	–	9 238	301	(1)	(1)	770 000	1 000 000	1 300 000	1 400	2 800	4 400
7 133	4 774	2 189	–	953	1 220	16	(1)	(1)	16 000	23 000	30 000	20	50	80
555	54	501	47	–	353	0	(1)	(1)	680	1 310	2 570	0	0	0
24 383	14 748	9 339	–	–	1 050	18	(1)	(1)	34 000	39 000	45 000	5	30	60
3 435	1 257	1 680	–	1 377	–	–	(1)	(1)	7 200	9 300	12 000	5	9	10
19 638	11 448	7 220	–	29 104	10 563	8	(1)	(1)	24 000	27 000	30 000	30	50	80

Reported malaria cases					Inpatient malaria cases and deaths		Estimates, 2012					
							Cases			Deaths		
Mic. slides/ RDTs positive	Mic. slides/ RDTs *P. falciparum*	Mic. slides/ RDTs *P. vivax*	Imported cases / (Introduced cases)	Cases at community level	Inpatient malaria cases	Malaria attributed deaths	Lower	Point	Upper	Lower	Point	Upper
36 689 227	13 835 422	755 856	910	5 128 924	5 324 803	102 788	93 100 000	165 190 000	244 610 000	410 000	562 400	722 200
469 289	118 799	347 177	1 996	37 200	5 360	108	660 000	790 000	950 000	500	800	1 200
1 231 741	248 337	285 728	4 174	990 338	176 473	2 307	9 890 000	13 240 000	17 950 000	11 000	17 800	31 100
422	139	281	181	0	31	0	24	26	28	0	0	0
2 038 027	1 062 652	878 862	70	58 593	32 121	1 226	21 730 000	26 790 000	32 510 000	25 200	42 400	60 300
299 345	145 929	57 787	971	137 515	34 392	458	1 150 000	1 410 000	1 690 000	2 100	3 500	5 200
40 728 051	**15 411 278**	**2 325 691**	**8 302**	**6 352 570**	**5 573 180**	**106 887**	**135 170 000**	**207 420 000**	**286 960 000**	**472 500**	**627 000**	**789 300**

Annex 6B – Estimated cases and deaths by WHO Region, 2000–2012

Cases	2000	2001	2002	2003	2004	2005	2006
Africa	173 600 000	178 000 000	182 100 000	186 600 000	189 700 000	192 400 000	189 800 000
Americas	2 240 000	1 754 000	1 606 000	1 552 000	1 535 000	1 685 000	1 430 000
Eastern Mediterranean	15 960 000	15 570 000	15 830 000	15 610 000	14 830 000	13 340 000	13 760 000
Europe	40 000	28 000	23 800	18 800	11 300	6 000	3 100
South–East Asia	31 380 000	30 970 000	28 740 000	29 750 000	30 750 000	34 300 000	28 680 000
Western Pacific	2930000	2537000	2266000	2496000	2774000	2283000	2405000
World	**226 100 000**	**228 800 000**	**230 500 000**	**236 000 000**	**239 600 000**	**244 000 000**	**236 100 000**
Lower bound	151 000 000	152 700 000	152 400 000	156 300 000	157 900 000	160 500 000	154 100 000
Upper bound	**304 100 000**	**306 700 000**	**312 100 000**	**318 900 000**	**325 000 000**	**329 500 000**	**321 900 000**

Deaths	2000	2001	2002	2003	2004	2005	2006
Africa	802 000	804 000	804 000	800 000	791 000	779 000	737 000
Americas	2 100	1 900	1 700	1 700	1 600	1 700	1 500
Eastern Mediterranean	22 000	22 000	22 000	22 000	20 000	20 000	19 000
Europe	3	3	2	1	1	0	0
South–East Asia	49 000	45 000	43 000	43 000	45 000	49 000	43 000
Western Pacific	6900	5800	5100	5700	6100	4700	4900
World	**881 000**	**878 000**	**876 000**	**872 000**	**864 000**	**854 000**	**806 000**
Lower bound	670 000	666 000	664 000	662 000	656 000	644 000	613 000
Upper bound	**1 113 000**	**1 113 000**	**1 110 000**	**1 102 000**	**1 094 000**	**1 076 000**	**1 015 000**

2007	2008	2009	2010	2011	2012	Lower	Upper
185 200 000	181 000 000	175 700 000	170 100 000	165 500 000	165 200 000	93 100 000	244 600 000
1 230 000	941 200	999 500	1 065 000	845 700	790 000	660 000	950 000
12 980 000	12 800 000	11 580 000	12 480 000	12 670 000	13 240 000	9 890 000	17 950 000
1 400	700	340	210	90	30	20	30
26 150 000	28 550 000	28 700 000	28 240 000	25 420 000	26 790 000	21 730 000	32 510 000
1877000	1722000	2111000	1668000	1406000	1410000	1 150 000	1 690 000
227 400 000	**225 100 000**	**219 100 000**	**213 500 000**	**205 800 000**	**207 400 000**	**135 200 000**	**287 000 000**
149 200 000	146 200 000	142 500 000	139 700 000	132 900 000			
312 600 000	**307 500 000**	**299 800 000**	293 400 000	284 600 000			

2007	2008	2009	2010	2011	2012	Lower	Upper
714 000	677 000	647 000	608 000	575 000	562 000	410 000	720 000
1 300	1 000	1 200	1 200	950	800	500	1 200
19 000	18 000	17 000	18 000	18 000	18 000	11 000	31 000
–	–	–	–	–	–	–	–
40 000	46 000	48 000	46 000	41 000	42 000	25 000	60 000
4100	3900	5000	3900	3400	3500	2 100	5 200
778 000	**747 000**	**718 000**	**676 000**	**640 000**	**627 000**	**473 000**	**789 000**
595 000	569 000	547 000	516 000	489 000			
985 000	**937 000**	**901 000**	851 000	804 000			

Annex 6C – Reported malaria cases by method of confirmation, 1990–2012

WHO Region	Country/area		1990	1991	1992	1993	1994	1995	1996	1997	1998
African	Algeria	Presumed and confirmed	152	229	106	84	206	107	221	197	–
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Angola	Presumed and confirmed	243 673	1 143 701	782 988	722 981	667 376	156 603	–	893 232	1 169 028
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Benin	Presumed and confirmed	92 870	118 796	290 868	403 327	546 827	579 300	623 396	670 857	650 025
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Botswana	Presumed and confirmed	10 750	14 364	4 995	55 331	29 591	17 599	80 004	101 887	59 696
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Burkina Faso	Presumed and confirmed	496 513	448 917	420 186	502 275	472 355	501 020	582 658	672 752	721 480
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Burundi	Presumed and confirmed	92 870	568 938	773 539	828 429	831 481	932 794	974 226	670 857	687 301
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Cabo Verde	Presumed and confirmed	69	80	38	44	21	127	77	20	41
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Cameroon	Presumed and confirmed	869 048	787 796	664 413	478 693	189 066	784 321	931 311	787 796	664 413
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Central African Republic	Presumed and confirmed	174 436	125 038	89 930	82 072	82 057	100 962	95 259	99 718	105 664
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Chad	Presumed and confirmed	212 554	246 410	229 444	234 869	278 225	293 564	278 048	343 186	395 205
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Comoros	Presumed and confirmed	–	–	–	12 012	13 860	15 707	15 509	–	3 844
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Congo	Presumed and confirmed	32 428	32 391	21 121	15 504	35 957	28 008	14 000	9 491	17 122
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Côte d'Ivoire	Presumed and confirmed	511 916	466 895	553 875	421 043	–	755 812	1 109 011	983 089	–
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Democratic Republic of the Congo	Presumed and confirmed	–	–	–	–	–	–	198 064	–	141 353
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Equatorial Guinea	Presumed and confirmed	25 552	22 598	25 100	17 867	14 827	12 530	–	–	–
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Eritrea	Presumed and confirmed	–	–	–	–	–	81 183	129 908	–	255 150
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Ethiopia	Presumed and confirmed	–	–	206 262	305 616	358 469	412 609	478 411	509 804	604 960
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
701	541	435	307	427	163	299	117	288	196	94	408	191	887
–	27 733	26 411	18 803	17 059	16 686	18 392	13 869	14 745	11 964	15 635	12 224	11 974	15 790
–	541	435	307	427	163	299	117	288	196	94	408	191	887
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	506	427	299	421	160	297	116	261	192	90	396	187	828
1 471 993	2 080 348	1 249 767	1 862 662	3 246 258	2 489 170	2 329 316	2 283 097	2 295 136	2 151 072	2 221 076	2 783 619	2 534 549	1 496 834
–	–	–	–	–	–	–	–	1 458 123	2 118 053	2 172 036	1 947 349	1 765 933	2 245 223
–	–	–	–	–	–	889 572	1 029 198	1 295 535	1 106 534	1 120 410	1 324 264	1 147 473	1 056 563
–	–	–	–	–	–	–	106 801	506 756	541 291	906 916	639 476	833 753	1 069 483
–	–	–	–	–	–	–	53 200	237 950	271 458	453 012	358 606	484 809	440 271
–	–	–	–	–	–	–	–	–	–	–	–	–	–
709 348	–	717 290	782 818	819 256	853 034	803 462	861 847	1 171 522	1 147 005	1 256 708	1 432 095	1 283 183	1 151 038
–	–	–	–	–	–	–	–	–	–	0	–	88 134	243 008
–	–	–	–	–	–	–	–	–	–	534 590	–	68 745	0
–	–	–	–	–	–	–	–	–	–	–	–	475 986	825 005
–	–	–	–	–	–	–	–	–	–	355 007	–	354 223	705 839
–	–	–	–	–	–	–	–	–	–	–	–	–	–
72 640	71 555	48 281	28 907	23 657	22 404	11 242	23 514	16 983	17 886	14 878	12 196	1 141	308
–	–	–	–	–	–	–	–	14 200	23 253	17 553	–	–	–
–	8 056	4 716	1 588	1 830	3 453	530	2 548	381	914	951	1 046	432	193
–	–	–	–	–	–	–	–	113	941	1 053	–	167	81
–	–	–	–	–	–	–	–	9	13	73	–	3	4
–	–	–	–	–	–	–	–	–	–	–	–	–	–
867 866	–	322 581	1 156 074	1 411 928	1 512 026	1 563 768	1 983 085	2 404 759	3 688 338	4 399 837	5 409 156	4 602 524	6 089 101
–	–	30 006	32 796	31 256	52 874	73 262	122 047	127 120	138 414	137 632	177 879	400 005	223 372
–	–	–	–	–	18 256	21 335	44 265	44 246	36 514	59 420	88 540	83 857	90 089
–	–	0	0	0	–	–	–	–	–	182 658	940 985	450 281	4 516 273
–	–	0	0	0	–	–	–	–	–	123 107	715 999	344 256	3 767 957
–	–	–	–	–	–	–	–	–	–	–	–	–	–
1 936 584	3 076 538	3 149 338	2 423 268	1 996 275	1 505 270	1 757 589	1 771 257	1 363 360	1 334 939	1 764 343	2 919 866	1 829 644	2 151 076
–	484 249	508 558	530 019	600 369	608 017	903 942	1 034 519	1 411 407	1 161 153	1 537 768	2 825 558	2 859 720	2 659 372
–	308 095	312 015	327 138	353 459	363 395	327 464	649 756	860 606	690 748	893 314	1 599 908	1 485 332	1 484 676
–	–	–	–	–	–	–	251 925	406 738	330 915	472 341	273 324	181 489	1 148 965
–	–	–	–	–	–	–	141 975	241 038	185 993	292 308	163 539	86 542	666 400
–	–	–	–	–	–	–	–	–	–	–	–	–	–
29	144	107	76	68	45	68	80	18	35	65	47	36	36
–	6 843	7 141	8 022	6 001	9 833	7 902	6 979	7 402	7 033	–	–	–	8 715
–	144	107	76	68	45	68	80	18	35	65	47	–	36
–	–	–	–	–	–	–	1 750	1 500	2 000	21 913	–	26 508	–
–	–	–	–	–	–	–	–	–	–	–	–	36	–
–	15	7	18	20	13	14	17	16	19	–	29	–	35
–	–	–	–	–	–	277 413	634 507	604 153	1 650 749	1 883 199	1 845 691	598 492	313 315
–	–	–	–	–	–	–	–	–	–	–	–	1 110 308	1 182 610
–	–	–	–	–	–	–	–	313 083	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	0	–	120 466	93 392
–	–	–	–	–	–	–	–	–	–	0	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
127 964	89 614	140 742	–	78 094	129 367	131 856	114 403	119 477	152 260	175 210	66 484	221 980	451 012
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	55 746
–	–	–	–	–	–	–	–	–	–	–	–	–	46 759
–	–	–	–	–	–	–	–	–	–	–	–	–	–
392 815	431 836	446 289	516 248	496 546	480 957	496 075	233 614	502 236	462 573	474 257	345 015	528 454	590 786
–	45 283	43 180	44 689	54 381	1 525	37 439	62 895	64 884	64 171	74 791	89 749	–	69 789
–	40 078	38 287	43 933	45 195	1 360	31 668	45 155	48 288	47 757	–	75 342	86 348	–
–	–	–	–	–	–	–	–	–	–	–	309 927	114 122	–
–	–	–	–	–	–	–	–	–	–	–	125 106	94 778	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
9 793	–	–	–	–	43 918	29 554	54 830	53 511	46 426	49 679	47 364	24 856	49 840
–	–	–	–	–	–	–	–	–	–	13 387	87 595	63 217	125 030
–	–	–	–	–	12 874	6 086	20 559	–	–	5 982	35 199	22 278	45 507
–	–	–	–	–	–	–	–	–	–	–	5 249	20 226	27 714
–	–	–	–	–	–	–	–	–	–	–	1 339	2 578	4 333
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	157 757	103 213	117 291	92 855	446 656	277 263	117 640
–	–	–	–	–	–	–	–	163 924	203 869	203 160	–	114 678	6 006
–	–	–	–	–	–	–	–	103 213	117 291	92 855	–	71 048	3 717
–	–	–	–	–	–	–	–	–	–	–	–	0	0
–	–	–	–	–	–	–	–	–	–	–	–	0	0
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	1 193 288	1 109 751	1 136 810	1 275 138	1 280 914	1 253 408	1 277 670	1 327 520	1 820 000	1 721 461	2 568 152	2 168 215
–	–	–	–	–	–	–	–	–	19 661	34 755	–	49 828	195 546
–	–	–	–	–	–	–	–	–	3 527	7 388	62 726	29 976	107 563
–	–	–	–	–	–	–	–	–	–	–	–	–	1 572 785
–	–	–	–	–	–	–	–	–	–	–	–	–	1 033 064
–	–	–	–	–	–	–	–	–	–	–	–	–	–
1 508 042	961 762	2 197 534	2 638 199	4 384 256	4 130 878	6 332 048	5 006 230	3 277 830	3 938 597	6 749 112	7 937 162	6 865 504	6 263 607
–	3 758	3 244	3 704	4 820	5 320	5 531	4 779	1 181 323	2 613 038	2 956 592	3 678 849	4 226 533	4 329 318
–	897	1 531	1 735	2 438	2 684	2 971	2 050	740 615	1 618 091	1 873 816	2 374 930	2 700 818	2 656 864
–	–	–	–	–	–	–	–	2 275	428	12 436	54 728	2 912 088	3 327 071
–	–	–	–	–	–	–	–	243	127	4 889	42 850	1 861 163	2 134 734
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	15 828	62 312	78 983	72 551	33 830	15 169
–	–	–	–	–	–	–	–	10 752	11 815	15 960	42 585	23 004	33 245
–	–	–	–	–	–	–	–	5 842	7 883	11 603	39 636	20 601	13 196
–	–	–	–	–	–	–	–	655	2 572	3 773	16 772	2 899	6 826
–	–	–	–	–	–	–	–	445	1 620	2 581	14 177	1 865	1 973
–	–	–	–	–	–	–	–	–	–	–	–	–	–
147 062	–	125 746	74 861	65 517	27 783	24 192	10 148	19 568	10 572	21 298	53 750	39 567	42 178
–	–	22 637	52 228	52 428	41 361	48 937	46 096	68 905	54 075	68 407	79 024	67 190	84 861
–	–	9 716	6 078	10 346	4 119	9 073	6 541	9 528	4 364	6 633	13 894	15 308	11 557
–	–	–	–	–	–	–	–	7 520	6 566	0	0	25 570	33 758
–	–	–	–	–	–	–	–	6 037	4 400	5 126	22 088	19 540	10 258
–	–	–	–	–	–	–	–	–	–	–	–	–	–
647 919	–	2 555 314	2 929 685	3 582 097	5 170 614	3 901 957	3 038 565	2 557 152	2 532 645	3 043 203	4 068 764	3 549 559	3 876 745
–	–	851 942	1 115 167	1 010 925	1 312 422	1 364 194	785 209	739 627	986 323	2 065 237	2 509 544	3 418 719	3 778 480
–	–	392 377	427 795	463 797	578 904	538 942	447 780	451 816	458 561	927 992	1 158 197	1 480 306	1 692 578
–	–	–	–	–	–	–	–	–	–	262 877	–	–	–
–	–	–	–	–	–	–	–	–	–	108 324	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–

Annex 6C – Reported malaria cases by method of confirmation, 1990–2012 (continued)

WHO Region	Country/area		1990	1991	1992	1993	1994	1995	1996	1997	1998
African	Gabon	Presumed and confirmed	57 450	80 247	100 629	70 928	82 245	54 849	74 310	57 450	80 247
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Gambia	Presumed and confirmed	222 538	215 414	188 035	–	299 824	135 909	266 189	325 555	–
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Ghana	Presumed and confirmed	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
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Guinea	Presumed and confirmed	21 762	17 718	–	–	607 560	600 317	772 731	802 210	817 949
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Guinea-Bissau	Presumed and confirmed	81 835	64 123	56 073	158 748	–	197 386	6 457	10 632	2 113
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Kenya	Presumed and confirmed	–	–	–	–	6 103 447	4 343 190	3 777 022	–	80 718
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Liberia	Presumed and confirmed	–	–	–	–	–	–	239 998	826 151	777 754
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Madagascar	Presumed and confirmed	–	–	–	–	–	196 358	–	–	–
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Malawi	Presumed and confirmed	3 870 904	–	–	4 686 201	4 736 974	–	6 183 290	2 761 269	2 985 659
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Mali	Presumed and confirmed	248 904	282 256	280 562	295 737	263 100	95 357	29 818	384 907	12 234
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Mauritania	Presumed and confirmed	26 903	42 112	45 687	43 892	156 080	214 478	181 204	189 571	168 131
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Mayotte, France	Presumed and confirmed	–	–	–	–	–	–	–	–	–
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Mozambique	Presumed and confirmed	–	–	–	–	–	–	12 794	–	194 024
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Namibia	Presumed and confirmed	–	–	–	380 530	401 519	275 442	345 177	390 601	353 110
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Niger	Presumed and confirmed	1 162 824	808 968	865 976	726 666	806 204	778 175	1 162 824	978 855	872 925
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Nigeria	Presumed and confirmed	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
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Rwanda	Presumed and confirmed	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
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
–	127 024	132 918	157 440	166 321	170 182	176 610	33 458	93 529	77 278	112 840	136 440	178 822	137 695
–	–	–	–	–	100 107	129 513	136 916	142 406	151 137	1 623	54 714	–	66 018
–	50 810	53 167	62 976	58 212	70 075	70 644	33 458	45 186	40 701	660	12 816	–	18 694
–	–	–	–	–	–	–	–	–	–	–	7 887	–	4 129
–	–	–	–	–	–	–	–	–	–	–	1 120	–	1 059
–	–	–	–	–	–	–	–	–	–	–	–	–	–
127 899	–	481 590	620 767	540 165	395 043	329 426	427 598	439 798	508 846	479 409	194 009	261 967	271 038
–	–	–	–	–	–	–	–	–	–	–	290 842	172 241	156 580
–	–	–	–	–	–	–	–	–	39 164	50 378	52 245	71 588	29 325
–	–	–	–	–	–	–	–	–	–	–	123 564	–	705 862
–	–	–	–	–	–	–	–	–	–	–	64 108	190 379	271 038
–	–	–	–	–	–	–	–	–	–	–	–	–	–
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	3 050 513	1 899 544	2 642 221	3 240 791	8 774 516
–	–	–	–	–	–	–	–	0	1 100 238	2 431 048	2 031 674	1 172 838	4 219 097
–	–	–	–	–	475 441	655 093	472 255	476 484	956 359	962 599	1 029 384	624 756	2 971 699
–	–	–	–	–	–	–	–	–	143 879	468 449	247 278	781 892	1 438 284
–	–	–	–	–	–	0	0	–	138 124	141 771	42 253	416 504	783 467
–	–	–	–	–	–	–	–	–	–	–	–	–	–
807 895	816 539	851 877	850 147	731 911	876 837	850 309	834 835	888 643	657 003	812 471	1 092 554	1 101 975	1 220 574
–	–	–	–	–	–	–	–	–	–	–	–	43 549	–
–	4 800	6 238	16 561	107 925	103 069	50 452	41 228	28 646	33 405	20 932	20 936	5 450	191 421
–	–	–	–	–	–	–	16 554	21 150	–	20 866	–	139 066	–
–	–	–	–	–	–	–	12 999	15 872	–	14 909	–	90 124	125 779
–	–	–	–	–	–	–	–	–	–	–	–	–	–
197 454	246 316	202 379	194 976	162 344	187 910	166 431	128 978	120 105	128 758	143 011	85 280	71 982	50 381
–	–	–	–	–	–	33 721	34 862	34 384	31 083	25 379	48 799	57 698	61 048
–	–	–	–	–	–	14 659	15 120	14 284	11 299	11 757	30 239	21 320	23 547
–	–	–	–	–	–	–	–	–	–	25 000	56 455	139 531	97 047
–	–	–	–	–	–	–	–	–	–	–	20 152	50 662	26 834
–	–	–	–	–	–	–	–	–	–	–	–	–	–
122 792	4 216 531	3 262 931	3 295 805	5 280 498	7 513 874	9 181 224	8 926 058	9 610 691	839 904	8 123 689	4 585 712	9 114 566	5 788 381
–	–	–	43 643	96 893	59 995	–	–	–	–	–	2 384 402	3 009 051	4 836 617
–	–	–	20 049	39 383	28 328	–	–	–	839 904	–	898 531	1 002 805	1 426 719
–	–	–	–	–	–	–	–	–	–	–	–	–	164 424
–	–	–	–	–	–	–	–	–	–	–	–	–	26 752
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	44 875	886 543	553 774	606 952	871 560	2 263 973	2 074 391	1 407 455
–	–	–	–	–	–	8 718	165 095	123 939	238 752	327 392	335 973	728 443	772 362
–	–	–	–	–	–	5 025	115 677	80 373	157 920	212 657	212 927	577 641	507 967
–	–	–	–	–	–	57 325	880 952	508 987	635 855	676 569	998 043	1 593 676	1 276 521
–	–	–	–	–	–	39 850	645 738	411 899	449 032	626 924	709 246	1 338 121	899 488
–	–	–	–	–	–	–	–	–	–	–	–	–	–
1 141 474	1 367 854	1 361 475	1 576 439	2 167 873	1 426 872	1 198 195	1 063 934	578 175	116 538	215 110	202 450	224 498	359 420
–	31 575	33 354	27 752	37 333	39 174	37 943	29 318	30 921	30 566	23 963	24 393	34 813	38 453
–	6 946	8 538	5 272	6 909	7 638	6 753	5 689	4 823	4 096	2 720	2 173	3 447	3 667
–	–	–	–	–	–	–	–	175 595	299 000	610 035	604 114	739 572	906 080
–	–	–	–	–	–	–	–	43 674	89 138	212 390	200 277	221 051	355 753
–	–	–	–	–	–	–	–	–	–	–	–	–	–
4 193 145	3 646 212	3 823 796	2 784 001	3 358 960	2 871 098	3 688 389	4 498 949	4 786 045	5 185 082	6 183 816	6 851 108	4 942 496	3 659 565
–	–	–	–	–	–	–	–	–	–	–	–	119 996	406 907
–	–	–	–	–	–	–	–	–	–	–	–	50 526	283 138
–	–	–	–	–	–	–	–	–	–	–	–	580 708	2 763 986
–	–	–	–	–	–	–	–	–	–	–	–	253 973	1 281 846
–	–	–	–	–	–	–	–	–	–	–	–	–	–
530 197	546 634	612 896	723 077	809 428	1 969 214	962 706	1 022 592	1 291 853	1 045 424	1 633 423	1 018 846	1 293 547	2 171 739
–	–	–	–	–	–	–	–	–	–	–	–	–	0
–	–	–	–	–	–	–	–	–	–	–	–	–	97 995
–	–	–	–	–	–	–	–	–	–	–	1 380 178	974 558	–
–	–	–	–	–	–	–	–	–	–	–	227 482	307 035	788 487
–	–	–	–	–	–	–	–	–	–	–	–	–	–
253 513	–	243 942	224 614	318 120	224 840	223 472	158 073	222 476	199 791	167 705	238 565	145 186	165 834
–	–	–	–	–	–	–	31 013	–	835	3 717	5 449	3 752	1 865
–	–	–	–	–	–	–	1 061	–	268	603	909	1 130	255
–	–	–	–	–	–	–	–	–	720	4 338	2 299	7 991	3 293
–	–	–	–	–	–	–	–	–	34	337	1 085	1 796	1 633
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	792	743	500	560	562	411	399	433	97	72
–	–	–	–	–	–	–	–	–	–	–	2 023	1 214	1 463
–	–	–	–	792	743	500	392	421	346	352	396	92	72
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	88	136	155	268	236	52	47
2 336 640	–	–	–	–	–	–	–	6 155 082	4 831 491	4 310 086	1 522 577	1 756 874	1 813 984
–	–	–	–	–	–	–	–	–	–	–	1 950 933	2 504 720	2 546 213
–	–	–	–	–	–	–	–	141 663	120 259	93 874	644 568	1 093 742	886 143
–	–	–	–	–	–	–	–	–	–	–	2 287 536	2 966 853	2 234 994
–	–	–	–	–	–	–	–	–	–	–	878 009	663 132	927 841
–	–	–	–	–	–	–	–	–	–	–	–	–	–
429 571	–	538 512	445 803	468 259	610 799	339 204	265 595	172 024	132 130	87 402	25 889	14 406	3 163
–	–	–	–	–	–	–	–	–	24 361	16 059	14 522	13 262	7 875
–	–	41 636	23 984	20 295	36 043	23 339	27 690	4 242	1 092	505	556	335	194
–	–	–	–	–	–	–	–	–	0	0	0	48 599	0
–	–	–	–	–	–	–	–	–	0	0	0	1 525	0
–	–	–	–	–	–	–	–	–	–	–	–	–	–
815 895	–	1 340 142	888 345	681 783	754 934	745 428	790 817	249 027	496 858	309 675	620 058	2 677 186	3 525 112
–	–	–	–	–	81 814	107 092	87 103	1 308 896	2 229 812	2 358 156	165 514	130 658	120 528
–	–	–	–	56 460	76 030	46 170	–	55 628	62 243	79 066	49 285	68 529	84 234
–	–	–	–	–	–	21 230	12 567	1 308 896	530 910	312 802	7 426 774	1 130 514	1 084 748
–	–	–	–	–	–	9 873	3 956	193 399	434 615	230 609	570 773	712 347	758 109
–	–	–	–	–	–	–	–	–	–	–	–	–	–
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	2 834 174	4 295 686	3 873 463	3 392 234	2 087 068
–	–	–	–	–	–	–	–	–	–	–	–	672 185	1 953 399
–	–	150	380	–	–	–	–	–	143 079	335 201	523 513	–	–
–	–	–	–	–	–	–	–	–	–	–	45 924	242 526	2 898 052
–	–	–	–	–	–	–	–	–	–	144 644	27 674	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
906 552	–	1 003 793	1 073 546	1 217 405	1 303 494	1 654 246	1 429 072	946 569	772 197	1 247 583	638 669	208 498	483 470
–	–	748 806	951 797	1 071 519	1 201 811	1 438 603	1 523 892	1 754 196	1 640 106	2 637 468	2 708 973	1 602 271	2 904 793
–	–	423 493	506 028	553 150	589 315	683 769	573 686	382 686	316 242	698 745	638 669	208 858	422 224
–	–	–	–	–	–	–	–	–	–	–	–	–	190 593
–	–	–	–	–	–	–	–	–	–	–	–	–	61 246
–	–	–	–	–	–	–	–	–	–	–	–	–	–

Annex 6C – Reported malaria cases by method of confirmation, 1990–2012 (continued)

WHO Region	Country/area		1990	1991	1992	1993	1994	1995	1996	1997	1998
African	Sao Tome and Principe	Presumed and confirmed	–	–	–	–	–	51 938	47 074	47 757	46 026
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Senegal	Presumed and confirmed	–	–	–	–	450 071	628 773	–	861 276	948 823
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Sierra Leone	Presumed and confirmed	–	–	–	–	–	–	7 192	209 312	249 744
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	South Africa	Presumed and confirmed	6 822	4 693	2 872	13 285	10 289	8 750	27 035	23 121	26 445
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Swaziland	Presumed and confirmed	–	–	–	–	–	–	38 875	23 754	4 410
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Togo	Presumed and confirmed	810 509	780 825	634 166	561 328	328 488	–	352 334	366 672	368 472
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Uganda	Presumed and confirmed	–	–	2 446 659	1 470 662	2 191 277	1 431 068	–	2 317 840	2 845 811
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	United Republic of Tanzania	Presumed and confirmed	10 715 736	8 715 736	7 681 524	8 777 340	7 976 590	2 438 040	4 969 273	1 131 655	–
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	United Republic of Tanzania (Mainland)	Presumed and confirmed	–	–	–	–	–	–	–	–	–
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	United Republic of Tanzania (Zanzibar)	Presumed and confirmed	–	–	–	–	–	–	–	–	–
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Zambia	Presumed and confirmed	1 933 696	2 340 994	2 953 692	3 514 000	3 514 000	2 742 118	3 215 866	–	3 399 630
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Zimbabwe	Presumed and confirmed	662 613	581 168	420 137	877 734	324 188	761 791	1 696 192	1 849 383	1 719 960
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
Region of the Americas	Argentina	Presumed and confirmed	1 660	803	643	758	948	1 065	2 048	592	339
		Microscopy examined	22 624	16 844	13 619	11 389	14 070	12 986	12 833	9 684	9 341
		Confirmed with microscopy	1 660	803	643	758	948	1 065	2 048	592	339
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Bahamas	Presumed and confirmed	4	3	2	2	0	3	0	8	21
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	4	3	2	2	0	3	0	8	21
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	4	3	2	2	0	3	0	8	14
	Belize	Presumed and confirmed	3 033	3 317	5 341	8 586	10 411	9 413	6 605	4 014	2 614
		Microscopy examined	17 204	25 281	24 135	47 742	50 740	37 266	35 113	26 598	27 000
		Confirmed with microscopy	3 033	3 317	5 341	8 586	10 411	9 413	6 605	4 014	2 614
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Bolivia (Plurinational State of)	Presumed and confirmed	19 680	19 031	24 486	27 475	34 749	46 911	64 012	51 478	73 913
		Microscopy examined	121 743	125 509	125 414	125 721	128 580	152 748	161 077	141 804	176 023
		Confirmed with microscopy	19 680	19 031	24 486	27 475	34 749	46 911	64 012	51 478	73 913
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Brazil	Presumed and confirmed	560 396	614 431	609 860	483 367	564 406	565 727	455 194	405 051	469 982
		Microscopy examined	3 294 234	3 283 016	2 955 196	2 551 704	2 671 953	2 582 017	2 159 551	1 869 382	2 089 175
		Confirmed with microscopy	560 396	614 431	609 860	483 367	564 406	565 727	455 194	405 051	469 982
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
37 026	32 149	44 034	50 953	47 830	53 991	22 370	7 293	2 421	1 647	6 182	3 346	8 442	12 550
–	66 076	83 045	93 882	81 372	97 836	68 819	58 672	49 298	38 583	59 228	48 366	83 355	103 773
–	31 975	42 086	50 586	42 656	46 486	18 139	5 146	2 421	1 647	3 798	2 233	6 373	10 706
–	–	–	–	–	–	–	–	–	140 478	60 649	9 989	33 924	23 124
–	–	–	–	–	–	–	–	–	4 611	2 384	507	2 069	1 844
–	–	–	–	–	–	–	–	–	–	–	–	–	–
1 145 112	1 168 336	881 917	912 581	1 329 015	1 171 799	1 379 318	1 594 616	1 002 918	443 828	222 232	371 912	299 788	366 912
–	56 169	55 494	54 257	85 246	67 750	105 093	138 254	195 487	48 324	43 026	27 793	18 325	19 946
–	44 959	12 920	14 425	26 865	22 234	33 160	48 070	78 278	24 830	19 614	17 750	14 142	11 905
–	–	–	–	–	–	–	–	90 161	487 188	485 548	651 737	556 787	532 694
–	–	–	–	–	–	–	–	40 054	217 096	146 319	325 920	262 100	270 053
–	–	–	–	–	–	–	–	–	–	–	–	–	–
409 670	460 881	445 047	500 227	516 634	352 859	224 584	148 625	653 987	851 478	646 808	934 028	638 859	1 537 322
–	–	4 985	10 605	12 298	4 985	10 605	12 298	–	471 600	770 463	718 473	46 280	194 787
–	–	2 206	3 702	3 945	2 206	3 702	3 945	–	154 459	273 149	218 473	25 511	104 533
–	–	–	–	–	–	3 452	4 675	–	235 800	544 336	1 609 455	886 994	1 975 972
–	–	–	–	–	–	1 106	987	–	154 459	373 659	715 555	613 348	1 432 789
–	–	–	–	–	–	–	–	–	–	–	–	–	–
51 444	64 624	26 506	15 649	13 459	13 399	7 755	14 456	6 327	7 796	6 117	8 060	9 866	6 846
–	–	–	–	–	–	–	–	–	–	–	15 900	178 387	121 291
–	–	26 506	15 649	13 459	13 399	7 755	12 098	6 327	7 796	6 072	3 787	5 986	1 632
–	–	–	–	–	–	–	–	–	–	–	276 669	204 047	30 053
–	–	–	–	–	–	–	–	–	–	–	4 273	3 880	3 997
–	–	–	–	–	–	–	–	–	–	3 313	4 185	–	–
30 420	29 374	12 854	10 129	7 203	5 140	6 066	7 807	6 338	5 881	6 624	1 722	797	626
–	–	24 123	13 997	12 564	6 754	4 587	3 985	0	0	0	0	0	0
–	–	1 395	670	342	574	279	155	84	58	106	87	130	78
–	0	–	–	–	–	–	–	–	–	1	767	2 223	1 070
–	0	–	–	–	–	–	–	–	–	1	181	419	217
–	–	–	–	–	–	–	–	–	–	–	–	–	–
412 619	–	498 826	583 872	490 256	516 942	437 662	566 450	516 640	602 908	618 842	617 101	519 450	697 374
–	–	–	–	–	–	–	–	231 860	321 171	420 053	478 354	502 977	579 507
–	–	–	–	–	–	–	–	117 720	152 724	192 966	224 087	237 305	260 535
–	–	–	–	–	–	–	–	188 225	318 895	314 250	575 245	390 611	660 627
–	–	–	–	–	–	–	–	103 390	192 138	198 372	393 014	282 145	436 839
–	–	–	–	–	–	–	–	–	–	–	–	–	–
3 070 800	–	678 791	655 972	18 088 590	17 713 004	12 397 268	16 700 366	11 525 127	7 621 061	25 413 642	20 920 893	10 508 198	10 338 093
–	–	–	194 736	8 647 075	11 108 844	16 031 596	8 303 450	9 300 453	7 674 717	–	7 211 369	11 170 526	3 466 571
–	–	58 689	67 953	3 937 523	4 992 828	5 520 470	3 855 007	3 691 541	–	–	2 553 684	3 625 883	1 413 149
–	–	–	–	–	–	–	–	–	–	–	–	2 943 754	2 449 526
–	–	–	–	–	–	–	–	–	–	–	–	671 150	1 249 109
–	–	–	–	–	–	–	–	–	–	–	–	–	–
423 967	17 734	342 969	340 478	9 059 437	8 872 075	6 211 753	8 358 110	5 769 646	3 816 868	12 755 332	10 524 480	5 481 958	2 975 117
–	53 533	53 804	123 352	4 350 487	5 579 910	8 037 619	4 167 063	4 661 982	3 887 346	60 691	3 637 659	5 656 907	6 931 025
–	17 734	38 537	42 468	1 976 614	2 502 382	2 764 049	1 928 296	1 845 917	77	211	1 277 024	1 813 179	1 772 062
–	–	–	–	–	–	–	–	–	173 311	121 248	136 123	1 628 092	1 091 615
–	–	–	–	–	–	–	–	–	4 508	3 031	1 974	337 582	214 893
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	324 584	323 495	9 043 732	8 860 139	6 204 125	8 356 525	5 769 353	3 812 283	12 752 090	10 522 142	5 477 469	2 972 186
–	–	–	71 384	4 296 588	5 528 934	7 993 977	4 136 387	4 638 471	3 830 767	–	3 573 710	5 513 619	6 784 639
–	–	20 152	25 485	1 960 909	2 490 446	2 756 421	1 926 711	1 845 624	–	–	1 276 660	1 812 704	1 771 388
–	–	–	–	–	–	–	–	–	–	–	–	1 315 662	701 477
–	–	–	–	–	–	–	–	–	–	–	–	333 568	212 636
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	17 734	18 385	16 983	15 705	11 936	7 628	1 585	293	4 585	3 242	2 338	4 489	2 931
–	53 533	53 804	51 968	53 899	50 976	43 642	30 676	23 511	56 579	60 691	63 949	143 288	146 386
–	17 734	18 385	16 983	15 705	11 936	7 628	1 585	293	77	211	364	475	674
–	–	–	–	–	–	–	–	–	173 311	121 248	136 123	312 430	390 138
–	–	–	–	–	–	–	–	–	4 508	3 031	1 974	4 014	2 257
–	–	–	–	–	–	–	–	–	–	–	–	–	–
3 385 616	3 337 796	3 838 402	3 760 335	4 346 172	4 078 234	4 121 356	4 731 338	4 248 295	3 080 301	2 976 395	4 229 839	4 607 908	4 695 400
–	–	–	–	–	–	–	–	0	0	0	–	–	–
–	–	–	–	–	–	–	–	0	0	0	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
1 804 479	–	–	–	–	1 815 470	1 494 518	1 313 458	1 154 519	1 003 846	736 897	648 965	319 935	276 963
–	–	–	–	–	215 576	253 280	219 344	234 730	59 132	122 133	0	10 004	0
–	–	–	–	–	33 980	37 908	39 404	116 518	16 394	57 014	0	0	0
–	–	–	–	–	–	–	–	–	59 132	122 133	513 032	470 007	727 174
–	–	–	–	–	–	–	–	–	16 394	57 014	249 379	319 935	276 963
–	–	–	–	–	–	–	–	–	–	–	–	–	–
222	440	215	125	122	115	252	212	387	130	86	72	18	4
8 524	7 949	6 685	5 043	3 977	3 018	3 018	6 353	6 353	5 157	–	2 547	7 872	7 027
222	440	215	125	122	115	252	212	387	130	86	72	18	4
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	46	18	4
30	2	4	1	3	2	1	49	6	14	0	1	6	0
–	22	–	–	34	17	9	546	–	35	–	27 272	31 013	–
30	2	4	1	3	2	1	49	6	14	–	1	6	–
–	–	–	–	–	–	–	–	–	–	–	0	0	–
–	–	–	–	–	–	–	–	–	–	–	0	0	–
21	2	4	1	3	2	1	30	5	2	–	1	6	–
1 855	1 486	1 162	1 134	1 084	1 066	1 549	844	845	540	256	150	79	37
19 395	18 559	18 173	15 480	15 480	17 358	25 119	25 755	22 134	25 550	26 051	27 366	22 996	20 789
1 855	1 486	1 162	1 134	1 084	1 066	1 549	844	845	540	256	150	79	37
–	–	–	–	–	–	–	–	0	0	0	0	0	0
–	–	–	–	–	–	–	–	–	–	0	0	0	0
–	–	–	–	–	–	–	–	–	–	–	–	–	–
50 037	31 469	15 765	14 276	20 343	14 910	20 142	18 995	14 610	9 748	9 743	13 769	7 143	7 415
159 618	143 990	122 933	137 509	158 299	163 307	202 021	208 616	180 316	159 826	132 633	133 463	143 272	121 944
50 037	31 469	15 765	14 276	20 343	14 910	20 142	18 995	14 610	9 748	9 234	12 252	6 108	6 293
–	–	–	–	–	5 000	6 000	6 000	1 500	5 000	981	7 394	7 390	10 960
–	–	–	–	–	–	1 300	730	–	–	509	1 517	1 035	1 122
–	–	–	–	–	–	–	–	–	6	–	21	17	–
609 594	613 241	388 303	348 259	408 886	465 004	606 067	549 469	458 652	315 746	309 316	334 668	267 146	242 758
2 435 451	2 562 576	2 274 610	2 118 491	2 009 414	2 194 780	2 660 539	2 959 489	2 986 381	2 726 433	2 620 787	2 711 432	2 476 335	2 325 775
609 594	613 241	388 303	348 259	408 886	465 004	606 067	549 469	458 652	315 746	309 316	334 667	266 713	237 978
–	–	–	–	–	–	–	–	0	0	90 275	1	1 486	23 566
–	–	–	–	–	–	–	–	–	–	–	1	433	4 780
–	–	–	–	–	–	–	–	–	–	–	–	–	–

Annex 6C – Reported malaria cases by method of confirmation, 1990–2012 (continued)

WHO Region	Country/area		1990	1991	1992	1993	1994	1995	1996	1997	1998
Region of the Americas	Colombia	Presumed and confirmed	99 489	184 156	184 023	129 377	127 218	187 082	135 923	180 898	190 553
		Microscopy examined	496 087	740 938	736 498	656 632	572 924	667 473	461 137	583 309	–
		Confirmed with microscopy	99 489	184 156	184 023	129 377	127 218	187 082	135 923	180 898	190 553
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Costa Rica	Presumed and confirmed	1 151	3 273	6 951	5 033	4 445	4 515	5 480	4 712	5 148
		Microscopy examined	113 167	130 530	149 198	140 435	143 721	143 408	148 161	155 925	103 976
		Confirmed with microscopy	1 151	3 273	6 951	5 033	4 445	4 515	5 480	4 712	5 148
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Dominican Republic	Presumed and confirmed	356	377	698	987	1 670	1 808	1 414	816	2 006
		Microscopy examined	297 599	343 491	299 549	290 073	316 182	380 143	436 473	446 874	453 850
		Confirmed with microscopy	356	377	698	987	1 670	1 808	1 414	816	2 006
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Ecuador	Presumed and confirmed	71 670	59 400	41 089	46 859	30 006	18 128	11 914	16 365	43 696
		Microscopy examined	363 080	346 465	377 321	419 590	301 546	253 714	162 128	174 692	300 752
		Confirmed with microscopy	71 670	59 400	41 089	46 859	30 006	18 128	11 914	16 365	43 696
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	El Salvador	Presumed and confirmed	9 269	5 951	4 539	3 887	2 803	3 364	5 888	2 719	1 182
		Microscopy examined	230 246	190 540	202 446	172 624	139 587	169 267	164 491	166 895	161 900
		Confirmed with microscopy	9 269	5 951	4 539	3 887	2 803	3 364	5 888	2 719	1 182
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	French Guiana, France	Presumed and confirmed	5 909	3 573	4 072	3 974	4 241	4 711	4 724	3 195	3 462
		Microscopy examined	49 192	55 242	56 925	49 993	48 242	52 521	46 780	42 631	–
		Confirmed with microscopy	5 909	3 573	4 072	3 974	4 241	4 711	4 724	3 195	3 462
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Guatemala	Presumed and confirmed	41 711	57 829	57 560	41 868	22 057	24 178	20 268	32 099	46 765
		Microscopy examined	305 791	361 743	396 171	276 343	133 611	135 095	97 586	140 113	–
		Confirmed with microscopy	41 711	57 829	57 560	41 868	22 057	24 178	20 268	32 099	46 765
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Guyana	Presumed and confirmed	22 681	42 204	39 702	33 172	39 566	59 311	34 075	32 103	41 200
		Microscopy examined	135 260	141 046	159 108	172 469	168 127	291 370	262 526	229 710	296 596
		Confirmed with microscopy	22 681	42 204	39 702	33 172	39 566	59 311	34 075	32 103	41 200
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Haiti	Presumed and confirmed	4 806	25 511	13 457	853	23 140	–	18 877	5 870	34 449
		Microscopy examined	13 743	81 763	37 957	10 045	54 973	–	69 853	35 132	–
		Confirmed with microscopy	4 806	25 511	13 457	853	23 140	–	18 877	5 870	34 449
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Honduras	Presumed and confirmed	53 099	73 352	70 838	51 977	61 736	74 346	91 799	67 870	44 337
		Microscopy examined	418 513	468 811	471 950	372 180	361 776	373 364	305 167	310 815	249 105
		Confirmed with microscopy	53 099	73 352	70 838	51 977	61 736	74 346	91 799	67 870	44 337
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Jamaica	Presumed and confirmed	0	3	6	6	3	5	14	4	3
		Microscopy examined	281	–	–	–	–	–	206	110	207
		Confirmed with microscopy	0	3	6	6	3	5	14	4	3
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	0	3	6	6	3	5	14	4	3
	Mexico	Presumed and confirmed	44 513	26 565	16 170	15 793	12 864	7 423	6 293	5 046	25 023
		Microscopy examined	1 503 208	1 596 427	1 668 729	1 816 340	1 923 775	1 965 682	2 053 773	1 950 935	1 806 903
		Confirmed with microscopy	44 513	26 565	16 170	15 793	12 864	7 423	6 293	5 046	25 023
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Nicaragua	Presumed and confirmed	35 785	27 653	26 866	44 037	41 490	69 444	75 606	51 858	34 108
		Microscopy examined	466 558	364 786	381 715	440 891	374 348	493 399	461 989	410 132	440 312
		Confirmed with microscopy	35 785	27 653	26 866	44 037	41 490	69 444	75 606	51 858	34 108
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Panama	Presumed and confirmed	381	1 115	727	481	735	730	476	505	1 039
		Microscopy examined	315 359	336 569	308 359	278 557	237 992	222 498	188 914	193 853	187 055
		Confirmed with microscopy	381	1 115	727	481	735	730	476	505	1 039
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	147	130	10	–	–	–
	Paraguay	Presumed and confirmed	2 912	2 983	1 289	436	583	898	637	567	2 091
		Microscopy examined	98 417	127 807	149 523	164 146	96 885	86 664	68 151	83 104	42 944
		Confirmed with microscopy	2 912	2 983	1 289	436	583	898	637	567	2 091
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Peru	Presumed and confirmed	28 882	33 705	54 922	98 557	122 039	190 521	211 561	180 338	247 229
		Microscopy examined	90 040	109 654	123 147	158 325	295 824	833 614	1 162 230	1 299 929	1 942 529
		Confirmed with microscopy	28 882	33 705	54 922	98 557	122 039	190 521	211 561	180 338	247 229
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Suriname	Presumed and confirmed	1 608	1 490	1 404	6 107	4 704	6 606	16 649	11 323	12 412
		Microscopy examined	18 594	18 399	13 765	26 079	29 148	38 613	68 674	94 508	73 481
		Confirmed with microscopy	1 608	1 490	1 404	6 107	4 704	6 606	16 649	11 323	12 412
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
66 845	144 432	231 233	204 916	180 956	142 241	121 629	120 096	125 262	79 230	79 347	117 650	64 436	60 179
268 355	478 820	747 079	686 635	640 453	562 681	493 562	451 240	564 755	470 381	428 004	521 342	396 861	346 599
66 845	144 432	231 233	204 916	180 956	142 241	121 629	120 096	125 262	79 230	79 252	117 637	60 121	50 938
–	–	–	–	–	–	–	–	25 000	22 754	8 362	–	21 171	70 168
–	–	–	–	–	–	–	–	3 200	1 329	95	13	4 188	9 241
–	–	–	–	–	–	–	–	–	58	–	–	–	–
3 998	1 879	1 363	1 021	718	1 289	3 541	2 903	1 223	966	262	114	17	8
96 454	61 261	43 053	17 738	9 622	9 204	12 767	24 498	22 641	17 304	4 829	15 599	10 690	7 485
3 998	1 879	1 363	1 021	718	1 289	3 541	2 903	1 223	966	262	114	17	8
–	–	–	–	–	–	–	–	0	0	0	0	–	–
–	–	–	–	–	–	–	–	0	0	0	0	–	–
–	–	–	–	–	–	–	–	–	–	–	4	6	1
3 589	1 233	1 038	1 296	1 529	2 355	3 837	3 525	2 711	1 840	1 643	2 482	1 616	952
453 720	427 297	411 431	391 216	349 717	322 948	397 108	446 839	435 649	381 010	353 336	469 052	421 405	415 808
3 589	1 233	1 038	1 296	1 529	2 355	3 837	3 525	2 711	1 840	1 643	2 482	1 616	952
–	0	0	0	0	0	0	0	0	0	0	26 585	56 150	90 775
–	0	0	0	0	0	0	0	0	0	0	932	–	–
–	322	210	507	532	524	1 376	1 031	518	172	149	461	577	349
87 620	104 528	108 903	86 757	52 065	28 730	17 050	9 863	8 464	4 891	4 120	1 888	1 233	558
444 606	544 646	538 757	403 225	433 244	357 633	358 361	318 132	352 426	384 800	446 740	481 030	460 785	459 157
87 620	104 528	108 903	86 757	52 065	28 730	17 050	9 863	8 464	4 891	4 120	1 888	1 233	558
–	–	–	–	–	–	–	–	–	2 758	4 992	7 800	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	17	14	14
1 230	753	362	117	85	112	67	49	40	33	20	24	15	19
144 768	279 072	111 830	115 378	102 053	94 819	102 479	113 754	95 857	97 872	83 031	115 256	100 883	124 885
1 230	753	362	117	85	112	67	49	40	33	20	24	15	19
–	–	0	0	0	0	0	0	–	–	0	0	1	–
–	–	0	0	0	0	0	0	–	–	0	0	1	–
–	–	–	–	–	–	4	–	18	12	10	7	6	6
5 307	3 708	3 823	3 661	3 839	3 038	3 414	4 074	4 828	3 265	3 462	1 608	1 209	900
47 974	48 162	44 718	44 718	32 402	32 402	32 402	32 402	32 402	11 994	20 065	14 373	14 429	13 638
5 307	3 708	3 823	3 661	3 839	3 038	3 414	4 074	2 797	1 341	1 433	688	505	401
–	–	–	–	–	–	–	–	–	0	0	–	–	–
–	–	–	–	–	–	–	–	2 031	1 979	2 029	944	704	499
–	–	–	–	–	–	–	–	–	–	–	–	–	–
45 723	53 311	35 824	35 540	31 127	28 955	39 571	31 093	15 382	7 198	7 080	7 198	6 817	5 346
192 710	246 642	198 114	197 113	156 227	148 729	178 726	168 958	129 410	173 678	154 652	235 075	195 080	186 645
45 723	53 311	35 824	35 540	31 127	28 955	39 571	31 093	15 382	7 198	7 080	7 384	6 817	5 346
–	–	–	–	–	–	–	–	3 000	2 000	2 000	2 000	0	0
–	–	–	–	–	–	–	–	–	–	–	0	0	0
–	–	–	–	–	–	–	–	–	5	–	–	0	1
27 283	24 018	27 122	21 895	27 627	28 866	38 984	21 064	11 656	11 815	13 673	22 935	29 471	31 601
255 228	209 197	211 221	175 966	185 877	151 938	210 429	202 688	178 005	137 247	169 309	212 863	201 693	196 622
27 283	24 018	27 122	21 895	27 627	28 866	38 984	21 064	11 656	11 815	13 673	22 935	29 471	31 546
–	–	–	–	–	–	–	–	0	0	0	0	35	–
–	–	–	–	–	–	–	–	0	0	0	0	35	55
–	–	–	–	–	–	–	–	–	41	45	–	119	48
1 196	16 897	9 837	–	–	10 802	21 778	32 739	29 825	36 774	49 535	84 153	32 969	25 423
–	21 190	51 067	–	–	30 440	3 541 506	87 951	142 518	168 950	270 438	270 427	180 227	161 236
1 196	16 897	9 837	–	–	10 802	21 778	32 739	29 825	36 774	49 535	84 153	32 969	25 423
–	–	–	–	–	–	–	–	–	–	–	0	0	0
–	–	–	–	–	–	–	–	–	–	–	0	0	0
–	–	–	–	–	–	–	–	1	5	–	–	–	–
51 911	35 125	24 149	17 223	14 063	17 134	15 943	11 947	10 512	8 368	9 313	9 685	7 615	6 434
250 411	175 577	174 430	178 616	137 522	144 516	152 557	125 266	130 255	119 484	108 522	148 243	151 785	137 165
51 911	35 125	24 149	17 223	14 063	17 134	15 943	11 947	10 512	8 368	9 313	9 685	7 615	6 434
–	–	–	–	–	–	2 500	2 500	–	0	4 000	4 000	4 000	4 000
–	–	–	–	–	–	–	–	–	–	0	–	45	10
–	–	–	–	–	–	–	–	–	–	–	1	–	2
5	7	6	7	9	141	88	194	199	22	22	12	9	5
219	874	596	725	394	3 879	2 470	6 821	–	30 732	34 149	10 763	5 042	3 687
5	7	6	7	9	141	88	194	199	22	22	12	9	5
–	–	–	–	–	–	–	–	–	–	–	0	0	0
–	–	–	–	–	–	–	–	–	–	–	0	0	0
5	7	6	7	9	141	88	8	8	4	7	10	8	5
13 450	7 390	4 996	4 624	3 819	3 406	2 967	2 514	2 361	2 357	2 703	1 226	1 124	833
1 906 050	2 003 569	1 857 233	1 852 553	1 565 155	1 454 575	1 559 076	1 345 915	1 430 717	1 246 780	1 240 087	1 192 081	1 035 424	1 025 659
13 450	7 390	4 996	4 624	3 819	3 406	2 967	2 514	2 361	2 357	2 703	1 226	1 124	833
–	–	–	–	–	–	–	–	0	0	0	0	–	–
–	–	–	–	–	–	–	–	0	0	0	0	–	–
–	–	–	–	–	–	–	–	–	–	–	7	6	9
38 294	23 878	10 482	7 695	6 717	6 897	6 642	3 114	1 356	762	610	692	925	1 235
555 560	509 443	482 919	491 689	448 913	492 319	516 313	464 581	521 464	533 173	544 717	535 914	521 904	536 278
38 294	23 878	10 482	7 695	6 717	6 897	6 642	3 114	1 356	762	610	692	925	1 235
–	–	–	–	–	–	–	11 563	16 173	10 000	9 000	18 500	14 021	16 444
–	–	–	–	–	–	–	–	0	0	0	0	–	0
–	–	–	–	–	–	–	–	–	–	10	7	0	0
936	1 036	928	2 244	4 500	5 095	3 667	1 663	1 281	744	778	418	354	844
161 219	149 702	156 589	165 796	166 807	171 179	208 582	212 254	204 193	200 574	158 481	141 038	116 588	107 711
936	1 036	928	2 244	4 500	5 095	3 667	1 663	1 281	744	778	418	354	844
–	–	–	–	–	–	–	–	0	0	0	0	0	0
–	–	–	–	–	–	–	–	0	0	0	0	0	0
6	23	22	–	26	26	20	12	16	12	8	5	9	8
9 946	6 853	2 710	2 778	1 392	694	376	823	1 341	341	91	27	10	15
101 074	97 026	71 708	99 338	126 582	97 246	85 942	111 361	92 339	94 316	64 660	62 178	48 611	31 499
9 946	6 853	2 710	2 778	1 392	694	376	823	1 341	341	91	27	10	15
–	–	–	–	–	–	–	–	0	1 997	0	0	–	–
–	–	–	–	–	–	–	–	0	7	0	0	–	–
–	–	–	–	–	–	–	–	–	8	12	9	10	15
161 292	68 321	78 544	99 237	88 408	93 581	87 699	64 925	50 797	44 522	42 645	31 545	24 989	31 436
2 027 624	1 483 816	1 417 423	1 582 385	1 485 012	1 438 925	1 438 925	1 438 925	1 438 925	796 337	–	744 627	702 894	758 723
161 292	68 321	78 544	99 237	88 408	93 581	87 699	64 925	50 797	44 522	42 645	31 545	25 005	31 436
–	–	–	–	–	–	–	–	–	64 953	–	23	58	562
–	–	–	–	–	–	–	–	–	–	–	1	34	134
–	–	–	–	–	–	–	–	–	–	–	–	–	–
13 939	11 361	16 003	12 837	10 982	8 378	9 131	3 289	1 104	2 086	2 499	1 771	795	569
65 087	63 377	67 369	68 070	43 241	56 975	59 855	45 722	31 768	28 137	33 279	16 533	15 135	17 464
13 939	11 361	16 003	12 837	10 982	8 378	9 131	3 289	1 104	2 086	1 842	1 574	730	295
–	–	–	–	–	–	–	–	2 224	1 774	1 438	541	135	3 346
–	–	–	–	–	–	–	–	637	623	538	138	20	50
–	–	–	–	–	–	–	–	–	635	1 176	1 032	538	–

Annex 6C – Reported malaria cases by method of confirmation, 1990–2012 (continued)

WHO Region	Country/area		1990	1991	1992	1993	1994	1995	1996	1997	1998
Region of the Americas	Venezuela (Bolivarian Republic of)	Presumed and confirmed	46 679	42 826	21 416	12 539	16 311	22 501	21 852	22 400	21 815
		Microscopy examined	361 194	375 473	336 571	290 483	210 890	302 487	285 326	271 989	333 786
		Confirmed with microscopy	46 679	42 826	21 416	12 539	16 311	22 501	21 852	22 400	21 815
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
Eastern Mediterranean	Afghanistan	Presumed and confirmed	317 479	297 605	–	123 425	88 302	186 912	303 955	202 767	288 070
		Microscopy examined	735 624	768 685	–	431 353	626 338	602 320	364 948	527 181	–
		Confirmed with microscopy	317 479	297 605	–	123 425	31 606	186 912	78 279	189 898	272 115
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Djibouti	Presumed and confirmed	3 237	7 338	7 468	4 166	6 140	5 982	6 105	4 314	5 920
		Microscopy examined	11 463	26 758	28 636	–	25 366	–	–	–	–
		Confirmed with microscopy	3 237	7 335	7 468	–	6 140	–	–	4 314	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Egypt[2]	Presumed and confirmed	75	24	16	17	527	322	25	11	13
		Microscopy examined	1 145 251	1 213 769	1 183 608	562 096	1 052 433	–	1 090 924	1 052 658	–
		Confirmed with microscopy	75	24	16	17	495	–	23	11	13
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	0	0	0	0	32	9	2	7	13
	Iran (Islamic Republic of)	Presumed and confirmed	77 470	96 340	76 971	64 581	51 089	67 532	56 362	38 684	32 951
		Microscopy examined	2 226 412	2 699 845	3 227 770	3 959 288	4 074 869	–	3 556 000	3 244 334	–
		Confirmed with microscopy	77 470	96 340	76 971	64 581	51 089	67 532	56 362	38 677	32 951
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	6 701	8 431	12 024	8 162	7 052	–	–	18 852	11 558
	Iraq	Presumed and confirmed	3 924	1 764	5 752	49 863	98 243	98 705	49 840	13 959	9 684
		Microscopy examined	–	941 988	1 166 378	–	1 553 231	–	1 650 864	1 480 948	–
		Confirmed with microscopy	3 924	1 764	5 752	–	98 243	–	31 737	9 594	9 684
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	20	42	–	21	6	4	29	–
	Morocco[1]	Presumed and confirmed	837	494	405	198	206	197	102	125	121
		Microscopy examined	1 347 400	982 321	898 625	761 837	724 364	1 047 890	461 605	461 802	421 946
		Confirmed with microscopy	837	494	405	198	206	197	102	125	121
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	51	89	54	63	50	31	49	49	53
	Oman	Presumed and confirmed	32 720	19 274	14 827	16 873	7 215	1 801	1 265	1 026	1 093
		Microscopy examined	270 748	250 447	211 887	251 630	295 194	464 091	531 123	485 184	438 166
		Confirmed with microscopy	32 720	19 274	14 827	16 873	7 215	1 801	1 265	1 026	1 093
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	2 800	637	662	897	979
	Pakistan	Presumed and confirmed	79 689	66 586	99 015	92 634	108 586	111 836	98 035	77 480	73 516
		Microscopy examined	2 608 398	271 586	2 668 997	2 615 771	2 796 528	–	2 711 179	2 914 056	3 187 814
		Confirmed with microscopy	79 689	66 586	99 015	92 634	108 586	111 836	98 035	77 480	73 516
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Saudi Arabia	Presumed and confirmed	15 666	9 962	19 623	18 380	10 032	18 751	21 007	20 631	40 796
		Microscopy examined	682 649	570 551	601 847	–	697 960	727 703	–	–	795 135
		Confirmed with microscopy	15 666	9 962	19 623	18 380	10 032	18 751	21 007	20 631	40 796
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	634	830	1 204	–	3 405	3 089	5 786	2 939	4 657
	Somalia	Presumed and confirmed	–	–	–	3 049	–	–	–	–	–
		Microscopy examined	–	–	–	6 467	–	–	–	–	–
		Confirmed with microscopy	–	–	–	3 049	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	South Sudan	Presumed and confirmed	–	–	–	–	–	–	–	–	–
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Sudan	Presumed and confirmed	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
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	330 136	321 969	1 167 847	923 374	664 491	656 978	30 217	446 949	821 199
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Syrian Arab Republic[2]	Presumed and confirmed	107	54	456	966	583	626	345	130	60
		Microscopy examined	–	–	–	–	97 436	–	84 496	68 154	–
		Confirmed with microscopy	107	54	456	966	583	626	345	130	60
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	39	43	37	–	49	44	65	47	46
	Yemen	Presumed and confirmed	11 384	12 717	29 320	31 262	37 201	500 000	416 246	1 394 495	–
		Microscopy examined	80 986	103 700	126 580	172 403	160 687	–	–	7 821 530	–
		Confirmed with microscopy	11 384	12 717	29 320	31 262	37 201	500 000	416 246	682 153	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
European	Armenia[1]	Presumed and confirmed	0	0	0	0	196	502	347	841	1 156
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	0	0	0	0	196	502	347	841	1 156
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	0	0	0	0	0	0	0	0	0
		Imported cases	0	0	0	–	195	502	198	274	614
	Azerbaijan	Presumed and confirmed	24	113	27	23	667	2 840	13 135	9 911	5 175
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	24	113	27	23	667	2 840	13 135	9 911	5 175
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	0	0	0	0	0	0	0	0	0
		Imported cases	–	–	–	–	–	–	–	–	0

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
19 086	29 736	20 006	29 491	31 719	46 655	45 049	37 062	41 749	32 037	35 828	45 155	45 824	52 803
218 959	261 866	198 000	278 205	344 236	420 165	420 165	479 708	392 197	414 137	370 258	400 495	382 303	410 663
19 086	29 736	20 006	29 491	31 719	46 655	45 049	37 062	41 749	32 037	35 828	45 155	45 824	52 803
–	–	–	–	–	–	–	–	4 141	–	–	0	0	0
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	506	554	728	814	1 080	1 539
395 581	203 911	364 243	626 839	585 602	273 377	326 694	414 407	456 490	467 123	390 729	392 463	482 748	391 365
463 032	257 429	–	–	–	248 946	338 253	460 908	504 856	549 494	521 817	524 523	531 053	511 408
162 531	94 475	–	415 356	360 940	242 022	116 444	86 129	92 202	81 574	64 880	69 397	77 549	54 840
–	–	–	–	–	–	–	–	–	–	–	–	–	–
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–	–	–	–	–	–	–	–	–	–	–	–	–	–
6 140	4 667	4 312	5 021	5 036	2 142	2 469	6 457	4 694	3 528	2 686	1 010	232	25
–	–	–	–	–	–	1 913	–	3 461	2 896	–	–	124	1 410
–	–	–	–	5 036	122	413	1 796	210	119	2 686	1 010	–	22
–	–	–	–	–	–	–	–	–	–	–	–	–	0
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61	17	11	10	45	43	23	29	30	80	94	85	116	206
–	1 155 904	1 357 223	1 041 767	–	–	–	–	23 402	34 880	41 344	664 294	–	818 600
61	17	11	10	45	43	23	29	30	80	94	85	116	206
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
61	17	11	10	45	43	23	29	30	80	94	85	116	206
23 110	19 716	19 303	15 558	23 562	13 821	18 966	15 909	15 712	11 460	6 122	3 031	3 239	1 629
2 014 963	1 732 778	1 867 500	1 416 693	1 358 262	1 326 108	1 674 895	1 131 261	1 074 196	966 150	744 586	614 817	530 470	479 655
23 110	19 716	19 303	15 558	23 562	13 821	18 966	15 909	15 712	11 460	6 122	3 031	3 239	1 629
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7 253	7 422	10 379	6 436	6 502	6 219	4 570	2 782	2 434	3 111	1 645	1 184	1 529	842
4 138	1 860	1 265	952	347	155	47	24	3	6	1	7	11	8
–	–	997 812	1 072 587	681 070	913 400	944 163	970 000	844 859	1 105 054	1 493 143	1 849 930	2 097 732	1 963 638
4 138	1 860	1 265	952	347	155	47	24	3	6	1	7	11	8
–	–	–	–	–	–	10 824	–	–	–	–	–	–	–
–	–	–	–	–	–	0	–	–	–	–	–	0	–
–	–	–	–	3	5	3	1	1	4	1	7	11	8
60	59	59	107	73	56	100	83	75	142	145	218	312	364
376 920	277 671	335 723	345 173	405 800	405 601	–	–	367 705	292 826	290 566	232 598	171 400	285 039
60	56	59	107	73	56	100	83	75	142	145	218	312	364
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
43	56	59	88	69	55	100	83	75	142	145	215	312	364
901	694	635	590	740	615	544	443	705	965	898	1 193	1 531	2 051
496 067	494 884	521 552	495 826	409 532	326 127	258 981	242 635	244 346	245 113	234 803	226 009	267 353	–
901	694	635	590	740	615	544	443	705	965	898	1 193	1 531	1 531
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
872	688	633	584	734	615	544	443	701	957	898	1 169	1 518	2 029
91 774	3 337 054	3 577 845	4 238 778	4 210 611	1 958 350	4 022 823	4 314 637	4 553 732	4 658 701	4 242 032	4 281 356	4 065 802	4 285 449
3 440 986	–	3 572 425	3 399 524	4 577 037	4 243 108	4 776 274	4 490 577	4 905 561	3 775 793	3 655 272	4 281 346	4 168 648	4 497 330
91 774	82 526	125 292	107 666	125 152	126 719	127 826	124 910	128 570	104 454	132 688	220 870	287 592	250 526
–	–	–	–	–	–	–	–	–	–	243 521	279 724	518 709	410 949
–	–	–	–	–	–	–	–	–	–	34 891	19 721	46 997	40 255
–	–	–	–	2 592	1 101	290	1 149	190	120	–	–	–	–
13 166	6 608	3 074	2 612	1 724	1 232	1 059	1 278	2 864	1 491	2 333	1 941	2 788	3 406
–	–	821 860	825 443	819 869	780 392	715 878	804 087	1 015 781	1 114 841	1 078 745	944 723	1 062 827	1 186 179
13 166	6 608	3 074	2 612	1 724	1 232	1 059	1 278	2 864	1 491	2 333	1 941	2 788	3 406
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
3 067	1 872	1 471	1 402	1 024	924	852	1 008	2 397	1 430	2 275	1 912	2 719	3 324
9 055	10 364	10 364	96 922	23 349	36 732	28 404	49 092	50 444	82 980	72 362	24 553	41 167	59 709
–	–	–	21 350	12 578	30 127	47 882	–	–	73 985	59 181	20 593	26 351	34
–	–	–	15 732	7 571	11 436	12 516	16 430	16 675	36 905	25 202	5 629	1 627	18 842
–	–	–	–	–	–	–	–	–	–	–	200 105	35 236	34
–	–	–	–	–	–	–	–	–	–	–	18 924	1 724	13
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	237 712	462 056	646 673	515 958	337 582	116 473	101 008	136 492	325 634	900 283	795 784	1 125 039
–	–	–	–	–	–	–	–	–	116 555	–	–	–	–
–	–	–	–	–	–	–	–	–	52 011	–	900 283	112 024	225 371
–	–	–	–	–	–	–	–	–	–	–	–	–	–
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–	–	–	–	–	–	–	–	–	–	–	–	–	–
4 215 308	4 332 827	3 985 702	3 054 400	3 084 320	2 083 711	2 515 693	2 117 514	3 040 181	3 073 996	2 361 188	1 465 496	1 246 833	1 001 571
–	–	–	–	–	–	–	–	2 243 981	2 050 354	2 791 156	–	–	–
594 927	368 557	203 491	280 550	933 267	537 899	628 417	721 233	686 908	569 296	711 462	625 365	506 806	526 931
–	–	–	–	–	–	–	–	–	–	–	1 653 300	–	2 000 700
–	–	–	–	–	–	–	–	–	–	–	95 192	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
43	42	79	27	24	13	28	34	37	51	39	23	48	42
–	–	–	–	–	–	–	–	68 000	–	25 751	19 151	25 109	19 136
43	42	79	27	24	13	28	34	37	51	39	23	48	42
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	0	–
38	36	16	12	22	12	28	34	37	51	39	23	48	42
2 781 640	1 394 495	–	187 159	265 032	158 561	200 560	217 270	223 299	158 608	138 579	198 963	142 147	165 678
–	–	–	556 143	398 472	501 747	472 970	799 747	585 015	781 318	797 621	645 463	645 093	685 406
2 781 640	1 394 495	–	75 508	50 811	48 756	44 150	55 000	67 607	43 545	53 445	78 269	60 207	68 849
–	–	–	–	–	–	–	–	303	5 015	18 566	97 289	108 110	150 218
–	–	–	–	–	–	–	–	70	661	2 001	28 428	30 203	41 059
–	–	–	–	–	–	–	–	–	–	–	–	–	–
616	141	79	52	29	47	7	230	1	1	0	1	0	0
–	356	174	165	126	220	209	230	658	30 761	31 467	31 026	–	–
616	141	79	52	29	47	7	0	1	1	0	1	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
0	0	0	0	0	0	0	0	0	0	0	–	–	–
287	85	48	36	21	41	4	0	1	1	0	1	0	–
2 315	1 526	1 058	506	482	386	242	143	110	73	80	52	8	4
–	527 688	536 260	507 252	536 822	545 145	515 144	498 697	465 033	408 780	451 436	456 652	449 168	497 040
2 315	1 526	1 058	506	482	386	242	143	110	73	80	52	8	4
–	–	–	–	–	–	–	–	–	–	–	–	–	–
0	–	–	–	–	–	–	–	–	–	0	–	–	–
4	0	3	1	2	0	0	2	2	1	2	2	4	1

Annex 6C – Reported malaria cases by method of confirmation, 1990–2012 (continued)

WHO Region	Country/area		1990	1991	1992	1993	1994	1995	1996	1997	1998
European	Georgia	Presumed and confirmed	1	2	1	0	1	1	7	1	16
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	1	2	1	0	1	1	7	1	16
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	0	0	0	0	0	0	0	0	0
		Imported cases	1	2	1	0	1	1	4	1	2
	Kyrgyzstan	Presumed and confirmed	1	1	2	0	6	3	26	13	11
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	1	1	2	0	6	3	26	13	11
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	0	0	0	0	0	0	0	0	0
		Imported cases	1	1	2	0	6	3	25	13	6
	Russian Federation	Presumed and confirmed	216	169	160	209	335	425	611	831	1 081
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	216	169	160	209	335	425	611	831	1 081
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	0	0	0	0	0	0	0	0	0
		Imported cases	209	169	160	195	359	421	601	798	1 018
	Tajikistan	Presumed and confirmed	0	0	0	0	0	0	0	0	0
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Turkey	Presumed and confirmed	0	0	0	0	0	0	0	0	0
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	5	5	11	4	24	342	250	80	62
	Turkmenistan[1]	Presumed and confirmed	1	17	11	3	9	10	14	14	137
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	1	17	11	3	9	10	14	14	137
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	1	4	6	2	8	10	11	10	22
	Uzbekistan	Presumed and confirmed	28	12	25	36	21	27	51	52	74
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	28	12	25	36	21	27	51	52	74
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	25	11	25	36	21	27	51	52	74
South-East Asia	Bangladesh	Presumed and confirmed	–	–	–	–	–	–	–	–	–
		Microscopy examined	2 444 415	2 081 137	1 919 349	1 635 589	1 661 701	1 461 556	1 112 563	955 542	437 928
		Confirmed with microscopy	53 875	63 575	115 660	125 402	166 564	152 729	100 783	68 594	60 023
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Bhutan	Presumed and confirmed	–	–	–	–	–	–	–	–	–
		Microscopy examined	33 973	67 699	73 986	78 260	97 415	83 889	76 019	68 153	62 033
		Confirmed with microscopy	9 497	22 126	28 900	28 116	38 901	23 195	15 696	9 029	7 693
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Democratic People's Republic of Korea	Presumed and confirmed	0	0	0	0	0	0	0	0	2 100
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	2 100
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	India	Presumed and confirmed	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
		Microscopy examined	74 420 000	75 158 681	79 011 151	77 941 025	82 179 407	85 133 349	91 536 450	89 445 561	89 380 937
		Confirmed with microscopy	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
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Indonesia	Presumed and confirmed	1 484 496	1 631 710	1 431 284	1 337 373	1 698 040	1 510 425	1 747 287	1 325 633	1 708 020
		Microscopy examined	7 365 250	7 586 249	7 501 500	6 152 901	4 801 009	2 795 718	3 377 083	2 815 193	2 102 828
		Confirmed with microscopy	175 049	140 352	110 004	146 339	146 376	143 363	179 878	131 084	179 970
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Myanmar	Presumed and confirmed	989 042	939 257	789 672	702 239	701 043	656 547	664 507	568 262	548 066
		Microscopy examined	–	1 147 570	1 038 248	898 237	734 087	600 252	486 616	427 288	450 000
		Confirmed with microscopy	133 049	126 967	125 710	117 068	111 672	100 448	96 203	112 500	104 753
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Nepal	Presumed and confirmed	–	–	–	–	–	–	–	160 253	175 879
		Microscopy examined	847 484	781 543	724 068	596 689	430 801	338 189	204 355	126 774	178 265
		Confirmed with microscopy	22 856	29 135	23 234	16 380	9 884	9 718	9 020	8 557	8 498
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Sri Lanka	Presumed and confirmed	287 384	400 263	399 349	363 197	273 502	142 294	184 319	218 550	211 691
		Microscopy examined	1 220 699	1 398 002	1 558 660	1 503 902	1 370 369	1 098 105	1 288 990	1 331 641	1 338 146
		Confirmed with microscopy	287 384	400 263	399 349	363 197	273 502	142 294	184 319	218 550	211 691
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Thailand	Presumed and confirmed	273 880	198 383	168 370	115 220	102 119	82 743	87 622	97 540	131 055
		Microscopy examined	7 273 320	6 793 221	5 575 282	4 850 123	4 756 284	4 569 108	4 318 788	4 068 474	4 217 716
		Confirmed with microscopy	273 880	198 383	168 370	115 220	102 119	82 743	87 622	97 540	131 055
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Timor-Leste	Presumed and confirmed	–	–	–	–	–	–	–	–	10 332
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
51	173	438	472	315	256	155	60	25	8	7	0	6	5
–	–	3 574	6 145	5 457	3 365	5 169	4 400	3 400	4 398	4 120	2 368	2 032	1 046
51	245	438	474	316	257	155	60	25	8	7	0	6	5
–	–	–	–	–	–	–	–	–	–	–	–	–	–
0	0	0	0	0	0	0	0	0	0	0	–	–	–
16	1	1	1	8	3	1	2	1	2	6	0	5	4
5	12	28	2 743	468	93	226	318	96	18	4	6	5	3
–	70 500	72 020	69 807	144 070	79 895	114 316	74 729	62 444	40 833	33 983	30 190	27 850	18 268
5	12	28	2 743	468	93	226	318	96	18	4	6	5	3
–	–	–	–	–	–	–	–	–	–	–	–	–	–
0	0	0	0	0	0	0	0	0	0	0	–	–	–
5	5	13	31	3	2	0	4	0	0	0	3	5	3
792	795	898	642	533	382	205	143	122	96	107	102	85	0
–	–	–	–	–	–	–	–	35 784	28 340	27 382	33 024	28 311	–
792	795	898	642	533	382	205	143	122	96	107	102	85	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
0	0	0	0	0	0	0	0	0	0	0	–	–	–
715	752	764	503	461	382	165	132	112	88	107	101	83	–
0	19 064	11 387	6 160	5 428	3 588	2 309	1 344	635	318	165	112	78	33
–	233 785	248 565	244 632	296 123	272 743	216 197	175 894	159 232	158 068	165 266	173 523	173 367	209 239
–	19 064	11 387	6 160	5 428	3 588	2 309	1 344	635	318	165	112	78	33
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	0	0	0	1	1	7	4	1	1	13	15
0	11 432	10 812	10 224	9 222	5 302	2 084	796	358	215	84	78	128	376
–	1 597 290	1 550 521	1 320 010	1 187 814	1 158 673	1 042 509	934 839	775 502	616 570	606 875	507 841	421 295	337 830
–	11 432	10 812	10 224	9 222	5 302	2 084	796	358	215	84	78	128	376
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	0	0	0	0	0	0	0	0	0	0	–	–	–
55	51	54	40	40	50	48	45	45	49	46	69	128	157
49	24	8	18	7	3	1	1	0	1	0	0	0	0
–	50 105	50 075	59 834	72 643	71 377	56 982	58 673	65 666	75 524	94 237	81 784	–	–
49	24	8	18	7	3	1	1	0	1	0	0	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
39	6	3	3	1	0	0	1	0	1	0	0	0	–
85	126	77	74	74	66	102	76	89	27	4	5	1	1
–	735 164	691 500	735 164	812 543	893 187	917 843	924 534	858 968	883 807	916 839	921 364	886 243	805 761
85	126	77	74	74	66	102	76	89	27	4	5	1	1
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	0	–	–	–
78	80	68	63	41	35	38	16	59	20	4	2	1	1
–	437 838	320 010	313 859	489 377	386 555	290 418	164 159	59 866	168 885	79 853	91 227	51 773	29 518
378 921	360 300	250 258	275 987	245 258	185 215	220 025	209 991	266 938	336 505	397 148	308 326	270 253	253 887
63 723	55 599	54 216	62 269	54 654	58 894	48 121	32 857	58 659	50 004	25 203	20 519	20 232	4 016
–	–	–	–	–	–	–	–	3 199	106 001	156 639	152 936	119 849	35 675
–	–	–	–	–	–	–	–	1 207	34 686	38 670	35 354	31 541	5 885
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	82 380	71 956	81 207	65 052	57 562	61 977	67 947	52 239	450	1 421	487	207	82
77 461	76 445	65 974	74 696	61 246	54 892	60 152	66 079	51 446	47 268	62 341	54 709	44 481	42 512
12 237	5 935	5 982	6 511	3 806	2 670	1 825	1 868	793	329	972	436	194	82
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	0
15 362	204 428	300 000	241 192	60 559	33 803	11 507	9 353	4 795	16 989	14 845	13 520	16 760	21 850
–	–	143 674	129 889	32 083	27 090	11 315	12 983	7 985	24 299	34 818	25 147	26 513	39 238
15 362	90 582	143 674	16 578	16 538	27 090	11 315	12 983	4 795	16 989	14 845	13 520	16 760	21 850
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	450	378	213	127	1 127	–
2 284 713	2 031 790	2 085 484	1 841 227	1 869 403	1 915 363	1 816 569	1 785 109	1 508 927	1 532 497	1 563 574	1 599 986	1 310 656	1 067 824
88 333 965	86 790 375	90 389 019	91 617 725	99 136 143	97 111 526	104 120 792	106 606 703	86 355 000	86 734 579	103 396 076	108 679 429	108 969 660	109 033 790
2 284 713	2 031 790	2 085 484	1 841 227	1 869 403	1 915 363	1 816 569	1 785 109	1 508 927	1 532 497	1 563 574	1 599 986	1 310 656	1 067 824
–	–	–	–	–	–	–	–	8 500 000	9 000 000	9 100 000	10 600 000	10 500 384	13 125 480
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
1 243 213	1 432 178	2 776 477	2 416 039	2 554 223	3 016 262	1 445 831	1 320 581	1 140 423	746 120	544 470	1 963 807	2 384 260	2 051 425
1 867 488	1 752 763	1 604 573	1 440 320	1 224 232	1 109 801	1 178 457	1 233 334	1 750 000	1 243 744	1 420 795	1 335 445	962 090	1 429 139
138 002	245 612	267 592	273 793	223 074	268 852	437 323	347 597	333 792	266 277	199 577	465 764	422 447	417 819
–	–	–	–	–	–	19 164	12 990	–	462 249	1 040 633	255 734	250 709	471 586
–	–	–	–	–	–	–	–	–	–	72 914	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
592 878	581 560	661 463	721 739	716 806	602 888	516 041	538 110	520 887	634 280	591 492	693 124	567 452	480 586
379 795	381 610	463 194	467 871	481 201	432 581	437 387	485 251	512 862	499 296	381 424	275 374	312 689	265 135
121 376	120 083	170 502	173 096	177 530	152 070	165 737	203 071	216 510	223 174	164 965	103 285	91 752	75 220
–	–	–	–	–	–	–	–	499 725	543 941	599 216	729 878	795 618	1 158 831
–	–	–	–	–	–	–	–	157 448	223 899	271 103	317 523	373 542	405 366
–	–	–	–	–	–	–	–	–	–	–	–	–	–
132 044	48 686	146 351	133 431	196 605	140 687	178 056	166 474	135 809	153 331	123 903	96 383	71 752	70 272
135 814	100 063	126 962	183 519	196 223	158 044	188 930	166 476	135 809	153 331	150 230	102 977	95 011	152 780
8 959	7 981	6 396	12 750	9 506	4 895	5 050	4 969	5 621	3 888	3 335	3 115	1 910	1 659
–	–	–	–	–	–	–	–	–	–	–	17 887	25 353	22 472
–	–	–	–	–	–	–	–	–	–	–	779	1 504	433
–	–	1 198	1 280	1 132	805	641	618	880	660	610	1 102	1 126	–
264 549	210 039	66 522	41 411	10 510	3 720	1 640	591	198	670	558	684	175	93
1 569 352	1 781 372	1 353 386	1 390 850	1 192 259	1 198 181	974 672	1 076 121	1 047 104	1 047 104	909 632	1 001 107	985 060	948 250
264 549	210 039	66 522	41 411	10 510	3 720	1 640	591	198	670	558	736	175	93
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	21	27	52	51	70
125 379	78 561	63 528	44 555	37 355	26 690	29 782	30 294	33 178	28 569	29 462	32 480	24 897	32 569
4 461 075	4 403 739	4 100 778	3 819 773	3 256 939	3 012 710	2 524 788	2 280 070	2 041 733	1 910 982	1 816 383	1 695 980	1 354 215	1 130 757
125 379	78 561	63 528	44 555	37 355	26 690	29 782	30 294	33 178	26 150	23 327	22 969	14 478	32 569
–	–	–	–	–	–	–	–	–	20 786	68 437	81 997	96 670	0
–	–	–	–	–	–	–	–	–	2 419	6 135	9 511	10 419	0
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	15 212	83 049	86 684	33 411	202 662	130 679	164 413	121 905	143 594	108 434	119 072	36 064	6 148
–	–	–	60 311	83 785	79 459	97 781	96 485	114 283	92 870	96 828	109 806	82 175	64 318
–	15 212	–	26 651	33 411	39 164	43 093	37 896	46 869	45 973	41 824	40 250	19 739	5 211
–	–	–	–	–	–	–	–	32 027	30 134	41 132	85 643	127 272	117 599
–	–	–	–	–	–	–	–	5 944	5 287	5 703	7 887	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–

Annex 6C – Reported malaria cases by method of confirmation, 1990–2012 (continued)

WHO Region	Country/area		1990	1991	1992	1993	1994	1995	1996	1997	1998
Western Pacific	Cambodia	Presumed and confirmed	123 796	102 930	91 000	99 200	85 012	76 923	74 883	88 029	58 874
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	China	Presumed and confirmed	117 359	101 600	74 000	59 000	62 000	47 118	33 382	26 800	27 090
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Lao People's Democratic Republic	Presumed and confirmed	22 044	41 048	38 500	41 787	52 601	52 021	77 894	72 190	39 031
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Malaysia	Presumed and confirmed	50 500	39 189	36 853	39 890	58 958	59 208	51 921	26 649	13 491
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Papua New Guinea	Presumed and confirmed	104 900	86 500	86 500	66 797	65 000	99 000	71 013	38 105	20 900
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Philippines	Presumed and confirmed	86 200	86 400	95 778	64 944	61 959	56 852	40 545	42 005	50 709
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Republic of Korea	Presumed and confirmed	0	0	0	1	20	107	396	1 724	3 992
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Solomon Islands	Presumed and confirmed	116 500	141 400	153 359	126 123	131 687	118 521	84 795	68 125	72 808
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Vanuatu	Presumed and confirmed	28 805	19 466	13 330	10 469	3 771	8 318	5 654	6 099	6 181
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	28 805	19 466	13 330	10 469	3 771	8 318	5 654	6 099	6 181
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–
	Viet Nam	Presumed and confirmed	123 796	187 994	225 928	156 069	140 120	100 116	84 625	65 859	72 091
		Microscopy examined	–	–	–	–	–	–	–	–	–
		Confirmed with microscopy	–	–	–	–	–	–	–	–	–
		RDT Examined	–	–	–	–	–	–	–	–	–
		Confirmed with RDT	–	–	–	–	–	–	–	–	–
		Imported cases	–	–	–	–	–	–	–	–	–

Regional Summary (presumed and confimed malaria cases)	African	15 707 308	12 808 592	16 096 895	20 292 113	27 014 847	21 642 318	28 431 539	22 877 000	26 576 925
	Region of the Americas	1 055 674	1 229 551	1 186 061	1 016 131	1 126 125	1 298 690	1 191 309	1 079 831	1 303 387
	Eastern Mediterranean	8 051 292	7 459 945	9 580 797	10 273 192	8 970 329	7 339 807	5 548 379	5 819 082	5 514 224
	European	271	314	226	271	1 235	3 808	14 191	11 663	7 650
	South-East Asia	5 053 585	5 287 073	4 914 501	4 725 460	5 286 157	5 380 240	5 719 323	5 030 295	5 009 891
	Western Pacific	773 900	806 527	815 248	664 280	661 128	618 184	525 108	435 585	365 167
	Total	**30 642 030**	**27 592 002**	**32 593 728**	**36 971 447**	**43 059 821**	**36 283 047**	**41 429 849**	**35 253 456**	**38 777 244**

Cases reported before 2000 can be presumed and confirmed or only confirmed cases depending on the country

[1] Armenia, Morocco and Turkmenistan are certified malaria-free-countries, but are included in this listing for historical purposes

[2] There is no local transmission

* In May 2013 South Sudan was reassigned to the Who African Region (WHA resolution 66.21 http://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R21-en.pdf). Nonetheless, since most data in this report precede 2013, South Sudan is placed in Eastern Mediterranean Region

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
64 679	203 164	110 161	100 194	119 712	91 855	67 036	89 109	59 848	58 887	83 777	47 910	51 611	45 553
–	122 555	121 691	108 967	106 330	99 593	88 991	94 460	135 731	130 995	96 886	90 175	86 526	80 212
–	51 320	42 150	38 048	42 234	37 389	26 914	33 010	22 081	20 347	24 999	14 277	13 792	10 124
–	18 167	23 928	24 954	54 024	51 359	58 791	102 590	46 989	51 036	94 788	103 035	130 186	108 974
–	11 122	11 451	8 854	29 031	22 356	22 522	45 686	20 437	21 777	39 596	35 079	43 631	30 352
–	–	–	–	–	–	–	–	–	–	–	–	–	–
26 797	0	26 945	172 200	169 828	145 676	100 106	116 260	133 699	135 467	14 598	7 855	4 498	2 718
–	–	5 391 809	5 641 752	4 635 132	4 212 559	3 814 715	3 995 227	3 958 190	4 316 976	4 637 168	7 115 784	9 189 270	6 918 657
–	–	21 237	25 520	28 491	27 197	21 936	35 383	29 304	16 650	9 287	4 990	3 367	2 603
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	556	621	1 714	2 632	2 097	1 192	780	–	–	–	–
28 050	279 903	103 983	85 192	88 657	53 808	30 359	20 468	20 364	19 347	22 800	23 047	17 904	46 819
–	256 273	226 399	245 916	256 534	181 259	156 954	113 165	159 002	168 027	173 459	150 512	213 578	223 934
–	40 106	27 076	21 420	18 894	16 183	13 615	8 093	6 371	4 965	5 508	4 524	6 226	13 232
–	–	–	–	–	–	–	95 676	113 694	143 368	84 511	127 790	77 843	145 425
–	–	–	–	–	–	–	10 289	11 087	14 382	9 166	16 276	11 609	32 970
–	–	–	–	–	–	–	–	–	–	–	–	–	–
11 106	12 705	12 780	11 019	6 338	6 154	5 569	5 294	5 456	7 390	7 010	6 650	5 306	4 725
–	1 832 802	1 808 759	1 761 721	1 632 024	1 577 387	1 425 997	1 388 267	1 565 033	1 562 148	1 565 982	1 619 074	1 600 439	1 566 872
–	12 705	12 780	11 019	6 338	6 154	5 569	5 294	5 456	7 390	7 010	6 650	5 306	4 725
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	2 002	1 224	1 038	868	788	588	697	829	873	584	831	1 142	924
18 564	1 606 187	1 483 293	1 435 941	1 518 179	1 736 565	1 614 143	1 536 399	1 458 055	1 444 654	1 355 668	1 254 181	1 023 546	643 214
–	225 535	254 266	227 387	205 103	222 903	267 132	223 464	239 956	240 686	128 335	198 742	184 466	156 495
–	79 839	94 484	75 748	72 620	91 055	92 957	88 817	82 979	81 657	62 845	75 985	70 603	67 202
–	–	–	–	–	–	–	10 756	7 643	5 955	25 150	20 820	27 391	228 857
–	–	–	–	–	–	–	5 121	3 976	2 795	14 913	17 971	13 457	82 993
–	–	–	–	–	–	–	–	–	–	–	–	–	–
37 061	36 596	34 968	37 005	48 441	50 850	46 342	35 405	36 235	23 655	19 316	18 560	9 552	7 133
–	444 668	418 182	377 340	526 874	446 104	581 871	378 535	403 415	278 652	352 006	301 031	327 060	332 063
–	36 596	34 787	37 005	48 441	50 850	46 342	35 405	36 235	23 655	19 316	18 560	9 552	7 133
–	–	–	–	–	–	12 125	18 171	4 839	–	–	–	0	0
–	–	–	–	–	–	–	–	–	–	–	–	0	0
–	–	–	–	–	–	–	–	1	2	–	–	–	–
3 621	4 183	2 556	1 799	1 171	864	1 369	2 051	2 227	1 052	1 345	1 772	838	555
–	4 183	2 556	1 799	1 171	–	–	–	–	–	–	1 772	838	555
–	4 183	2 556	1 799	1 171	864	1 369	2 051	2 227	1 052	1 345	1 772	838	555
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	41	68	36	64	38	45	30	35	29	36	56	64	47
63 169	368 913	373 838	353 114	208 364	412 251	393 288	403 892	150 126	102 140	84 078	95 006	80 859	57 296
–	300 806	297 345	278 178	300 591	321 954	316 898	328 555	311 447	276 639	231 221	212 329	182 847	202 620
–	68 107	76 493	74 936	92 227	90 297	76 390	75 337	65 404	40 535	33 002	35 373	23 202	21 904
–	–	–	–	–	–	–	–	–	–	0	17 300	17 457	13 987
–	–	–	–	–	–	–	–	–	–	0	4 331	3 455	2 479
–	–	–	–	–	–	–	–	–	–	–	–	–	–
5 152	33 779	19 493	35 151	43 386	42 008	34 912	30 067	20 215	24 279	22 271	16 831	5 764	3 541
–	31 668	36 576	54 234	54 524	53 524	61 092	40 625	38 214	30 267	24 813	29 180	19 183	16 981
5 152	6 768	7 647	14 339	15 240	14 653	9 834	8 055	5 471	3 473	3 615	4 013	2 077	733
–	–	–	–	–	–	–	–	–	1 639	2 065	10 246	12 529	16 292
–	–	–	–	–	–	–	–	–	292	574	4 156	2 743	2 702
–	–	–	–	–	–	–	–	–	–	–	–	–	–
75 102	274 910	188 122	151 961	135 989	108 350	84 473	74 766	59 601	51 668	49 186	54 297	45 588	43 717
–	2 682 862	2 821 440	2 856 539	2 738 600	2 694 854	2 728 481	2 842 429	3 634 060	1 297 365	2 829 516	2 760 119	2 791 917	2 897 730
–	74 316	68 699	47 807	38 790	24 909	19 496	22 637	16 389	11 355	16 130	17 515	16 612	19 638
–	–	10 000	94 000	–	–	–	130 000	78 294	72 087	44 647	7 017	491 373	514 725
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–

34 963 534	32 169 337	43 015 913	45 271 847	64 009 071	69 289 106	68 255 700	70 927 130	72 020 886	60 123 280	82 688 953	83 578 030	79 369 928	77 604 457
1 213 388	1 181 104	982 778	895 134	889 993	909 466	1 049 444	920 506	784 591	563 429	573 032	677 243	493 820	469 369
7 540 977	9 312 314	8 204 604	8 691 031	8 847 138	5 044 766	7 454 992	7 253 650	8 449 274	8 595 623	7 542 842	7 270 622	6 782 758	7 036 542
3 913	33 293	24 785	20 891	16 558	10 123	5 331	3 111	1 436	757	451	356	311	422
4 658 138	5 122 672	6 574 840	5 921 344	6 033 301	6 386 192	4 482 500	4 247 031	3 578 227	3 425 385	3 058 012	4 610 770	4 463 996	3 760 367
333 301	2 820 340	2 356 139	2 383 576	2 340 065	2 648 381	2 377 597	2 313 711	1 945 826	1 868 539	1 660 049	1 526 109	1 245 466	855 271
48 713 251	**50 639 060**	**61 159 059**	**63 183 823**	**82 136 126**	**84 288 034**	**83 625 564**	**85 665 139**	**86 780 240**	**74 577 012**	**95 523 339**	**97 663 130**	**92 356 279**	**89 726 428**

Annex 6D – Reported malaria cases by species, 1990–2012

WHO Region	Country/area		1990	1991	1992	1993	1994	1995	1996	1997	1998
African	Algeria	Suspected	152	229	106	84	206	107	221	197	–
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Angola	Suspected	243 673	1 143 701	782 988	722 981	667 376	156 603	–	893 232	1 169 028
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Benin	Suspected	92 870	118 796	290 868	403 327	546 827	579 300	623 396	670 857	650 025
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Botswana	Suspected	10 750	14 364	4 995	55 331	29 591	17 599	80 004	101 887	59 696
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Burkina Faso	Suspected	496 513	448 917	420 186	502 275	472 355	501 020	582 658	672 752	721 480
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Burundi	Suspected	92 870	568 938	773 539	828 429	831 481	932 794	974 226	670 857	687 301
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Cabo Verde	Suspected	69	80	38	44	21	127	77	20	41
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Cameroon	Suspected	869 048	787 796	664 413	478 693	189 066	784 321	931 311	787 796	664 413
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Central African Republic	Suspected	174 436	125 038	89 930	82 072	82 057	100 962	95 259	99 718	105 664
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Chad	Suspected	212 554	246 410	229 444	234 869	278 225	293 564	278 048	343 186	395 205
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Comoros	Suspected	–	–	–	12 012	13 860	15 707	15 509	–	3 844
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Congo	Suspected	32 428	32 391	21 121	15 504	35 957	28 008	14 000	9 491	17 122
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Côte d'Ivoire	Suspected	511 916	466 895	553 875	421 043	–	755 812	1 109 011	983 089	–
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Democratic Republic of the Congo	Suspected	–	–	–	–	–	–	198 064	–	141 353
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Equatorial Guinea	Suspected	25 552	22 598	25 100	17 867	14 827	12 530	–	–	–
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Eritrea	Suspected	–	–	–	–	–	81 183	129 908	–	255 150
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Ethiopia	Suspected	–	–	206 262	305 616	358 469	412 609	478 411	509 804	604 960
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Gabon	Suspected	57 450	80 247	100 629	70 928	82 245	54 849	74 310	57 450	80 247
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Gambia	Suspected	222 538	215 414	188 035	–	299 824	135 909	266 189	325 555	–
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Ghana	Suspected	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
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Guinea	Suspected	21 762	17 718	–	–	607 560	600 317	772 731	802 210	817 949
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Guinea-Bissau	Suspected	81 835	64 123	56 073	158 748	–	197 386	6 457	10 632	2 113
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Kenya	Suspected	–	–	–	–	6 103 447	4 343 190	3 777 022	–	80 718
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Liberia	Suspected	–	–	–	–	–	–	239 998	826 151	777 754
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
701	27 733	26 411	18 803	17 059	16 686	18 392	13 869	14 745	11 964	15 635	12 224	11 974	15 790
–	261	247	188	313	71	242	91	261	185	88	401	179	860
–	277	181	116	111	92	57	24	24	10	6	4	12	24
–	–	–	–	–	–	–	–	–	0	0	3	0	3
1 471 993	2 080 348	1 249 767	1 862 662	3 246 258	2 489 170	2 329 316	2 283 097	2 726 530	3 432 424	3 726 606	3 687 574	3 501 953	3 314 706
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
709 348	–	717 290	782 818	819 256	853 034	803 462	861 847	1 171 522	1 147 005	1 256 708	1 432 095	1 424 335	1 513 212
–	–	–	–	–	–	–	–	–	–	534 590	–	68 745	–
–	–	–	–	–	–	–	–	–	–	0	–	0	0
–	–	–	–	–	–	–	–	–	–	0	–	0	0
72 640	71 555	48 281	28 907	23 657	22 404	11 242	23 514	30 906	41 153	32 460	12 196	1 141	308
–	–	–	–	–	–	–	–	381	914	951	1 046	432	193
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
867 866	–	352 587	1 188 870	1 443 184	1 546 644	1 615 695	2 060 867	2 487 633	3 790 238	4 537 600	5 723 481	5 024 697	6 970 700
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
1 936 584	3 252 692	3 345 881	2 626 149	2 243 185	1 749 892	2 334 067	2 265 970	2 079 861	1 950 266	2 588 830	4 255 301	3 298 979	3 808 337
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
29	6 843	7 141	8 022	6 001	9 833	7 902	8 729	8 902	9 033	21 913	–	26 508	8 715
–	144	107	76	68	45	68	80	18	35	65	47	36	36
–	0	0	0	0	0	0	0	0	0	0	0	0	0
–	–	–	–	–	–	–	–	0	0	0	0	0	0
–	–	–	–	–	–	277 413	634 507	604 153	1 650 749	1 883 199	1 845 691	1 829 266	1 589 317
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
127 964	89 614	140 742	–	78 094	129 367	131 856	114 403	119 477	152 260	175 210	66 484	221 980	459 999
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
392 815	437 041	451 182	517 004	505 732	481 122	501 846	251 354	518 832	478 987	549 048	544 243	528 454	660 575
–	20 977	19 520	21 959	21 532	665	14 770	21 354	24 282	24 015	–	–	–	–
–	19 101	18 767	21 974	23 663	695	16 898	23 801	24 006	23 742	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
9 793	–	–	–	–	43 918	29 554	54 830	53 511	46 426	57 084	103 670	83 443	152 744
–	–	–	–	–	–	–	–	–	–	5 771	33 791	21 387	43 681
–	–	–	–	–	–	–	–	–	–	79	528	334	637
–	–	–	–	–	–	–	–	–	–	132	880	557	1 189
–	–	–	–	–	–	–	157 757	163 924	203 869	203 160	446 656	277 263	117 640
–	–	–	–	–	–	–	–	103 213	117 291	92 855	–	–	–
–	–	–	–	–	–	–	–	0	0	0	–	–	–
–	–	–	–	–	–	–	–	0	0	0	–	–	–
–	–	1 193 288	1 109 751	1 136 810	1 275 138	1 280 914	1 253 408	1 277 670	1 343 654	1 847 367	1 721 461	2 588 004	2 795 919
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
1 508 042	964 623	2 199 247	2 640 168	4 386 638	4 133 514	6 334 608	5 008 959	3 720 570	4 933 845	7 839 435	9 252 959	9 442 144	9 128 398
–	889	1 517	1 727	2 418	2 659	2 844	2 043	1 642	1 196	–	–	–	–
–	–	–	–	6	7	110	3	7	27	–	0	0	–
–	–	–	–	–	–	–	–	–	–	–	0	0	0
–	–	–	–	–	–	–	–	20 948	67 196	84 532	78 095	37 267	40 071
–	–	–	–	–	–	–	–	5 842	7 883	11 603	39 636	20 601	13 196
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
147 062	–	138 667	121 011	107 599	65 025	64 056	49 703	80 428	62 449	77 946	96 792	97 479	138 982
–	–	8 994	5 335	8 998	3 480	7 506	5 750	3 006	1 519	3 358	9 785	10 263	6 164
–	–	722	743	1 348	639	1 567	791	6 508	2 832	3 244	3 989	4 932	5 249
–	–	–	–	–	–	–	–	0	0	0	57	19	35
647 919	–	3 014 879	3 617 057	4 129 225	5 904 132	4 727 209	3 375 994	2 844 963	3 060 407	4 335 001	5 420 111	5 487 972	5 962 647
–	–	233 218	262 623	291 403	396 621	374 335	293 326	269 514	274 657	594 751	732 776	814 547	946 595
–	–	157 625	164 772	171 388	178 676	158 658	149 020	171 710	173 300	287 114	390 252	665 813	745 983
–	–	–	–	–	–	–	–	–	–	0	0	–	–
–	127 024	132 918	157 440	166 321	200 214	235 479	136 916	190 749	187 714	113 803	185 105	178 822	188 089
–	50 810	53 167	62 976	58 212	70 075	70 644	33 458	45 186	40 701	187	2 157	–	–
–	–	–	–	–	–	–	–	–	–	23	720	–	–
–	–	–	–	–	–	–	–	–	–	0	2 015	–	–
127 899	–	481 590	620 767	540 165	395 043	329 426	427 598	439 798	508 846	479 409	414 406	261 967	862 442
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
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	3 200 147	3 694 671	3 849 536	4 154 261	10 676 731
–	–	–	–	–	–	–	–	457 424	918 105	924 095	926 447	593 518	2 971 699
–	–	–	–	–	–	–	–	0	0	0	0	0	0
–	–	–	–	–	–	–	–	19 060	38 254	38 504	102 937	31 238	0
807 895	816 539	851 877	850 147	731 911	876 837	850 309	834 835	888 643	657 003	812 471	1 092 554	1 189 016	1 220 574
–	4 800	6 238	16 561	4 378	103 069	50 452	41 228	28 646	33 405	20 932	20 936	5 450	191 421
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
197 454	246 316	202 379	194 976	162 344	187 910	185 493	148 720	140 205	148 542	156 633	140 143	197 229	158 095
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
122 792	4 216 531	3 262 931	3 319 399	5 338 008	7 545 541	9 181 224	8 926 058	9 610 691	–	8 123 689	6 071 583	11 120 812	9 335 951
–	–	–	–	39 383	28 328	–	–	–	839 904	–	898 531	1 002 805	1 426 719
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	66 043	1 171 175	694 428	874 607	1 035 940	2 675 816	2 480 748	2 048 883
–	–	–	–	–	–	44 875	761 095	80 373	157 920	212 657	212 927	577 641	507 967
–	–	–	–	–	–	–	–	0	0	0	0	–	–
–	–	–	–	–	–	–	–	0	0	0	0	–	–

Annex 6D – Reported malaria cases by species, 1990–2012 (continued)

WHO Region	Country/area		1990	1991	1992	1993	1994	1995	1996	1997	1998
African	Madagascar	Suspected	–	–	–	–	–	196 358	–	–	–
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Malawi	Suspected	3 870 904	–	–	4 686 201	4 736 974	–	6 183 290	2 761 269	2 985 659
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Mali	Suspected	248 904	282 256	280 562	295 737	263 100	95 357	29 818	384 907	12 234
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Mauritania	Suspected	26 903	42 112	45 687	43 892	156 080	214 478	181 204	189 571	168 131
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Mayotte, France	Suspected	–	–	–	–	–	–	–	–	–
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Mozambique	Suspected	–	–	–	–	–	–	12 794	–	194 024
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Namibia	Suspected	–	–	–	380 530	401 519	275 442	345 177	390 601	353 110
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Niger	Suspected	1 162 824	808 968	865 976	726 666	806 204	778 175	1 162 824	978 855	872 925
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Nigeria	Suspected	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
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Rwanda	Suspected	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
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Sao Tome and Principe	Suspected	–	–	–	–	–	51 938	47 074	47 757	46 026
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Senegal	Suspected	–	–	–	–	450 071	628 773	–	861 276	948 823
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Sierra Leone	Suspected	–	–	–	–	–	–	7 192	209 312	249 744
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	South Africa	Suspected	6 822	4 693	2 872	13 285	10 289	8 750	27 035	23 121	26 445
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Swaziland	Suspected	–	–	–	–	–	–	38 875	23 754	4 410
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Togo	Suspected	810 509	780 825	634 166	561 328	328 488	–	352 334	366 672	368 472
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Uganda	Suspected	–	–	2 446 659	1 470 662	2 191 277	1 431 068	–	2 317 840	2 845 811
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	United Republic of Tanzania[3]	Suspected	10 715 736	8 715 736	7 681 524	8 777 340	7 976 590	2 438 040	4 969 273	1 131 655	–
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Mainland	Suspected	–	–	–	–	–	–	–	–	–
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Zanzibar	Suspected	–	–	–	–	–	–	–	–	–
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Zambia	Suspected	1 933 696	2 340 994	2 953 692	3 514 000	3 514 000	2 742 118	3 215 866	–	3 399 630
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Zimbabwe	Suspected	662 613	581 168	420 137	877 734	324 188	761 791	1 696 192	1 849 383	1 719 960
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
Region of the Americas	Argentina	Suspected	22 624	16 844	13 619	11 389	14 070	12 986	12 833	9 684	9 341
		No *Pf*	1	3	0	1	1	0	0	0	0
		No *Pv*	1 659	800	643	757	947	1 065	2 048	592	339
		No Other	0	0	0	0	0	0	0	0	0
	Bahamas	Suspected	4	3	2	2	0	3	0	8	21
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1 141 474	1 392 483	1 386 291	1 598 919	2 198 297	1 458 408	1 229 385	1 087 563	736 194	352 870	633 998	628 507	774 385	944 533
–	–	–	–	–	–	–	–	–	–	–	–	–	–
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4 193 145	3 646 212	3 823 796	2 784 001	3 358 960	2 871 098	3 688 389	4 498 949	4 786 045	5 185 082	6 183 816	6 851 108	5 338 701	5 265 474
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530 197	546 634	612 896	723 077	809 428	1 969 214	962 706	1 022 592	1 291 853	1 045 424	1 633 423	2 171 542	1 961 070	2 171 739
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253 513	–	243 942	224 614	318 120	224 840	223 472	188 025	222 476	201 044	174 820	244 319	154 003	169 104
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–	–	–	–	–	–	–	–	–	–	399	2 023	1 214	1 463
–	–	–	–	–	–	–	373	413	328	306	355	86	66
–	–	–	–	–	–	–	3	0	4	8	10	5	2
–	–	–	–	–	–	–	2	1	7	20	31	0	4
2 336 640	–	–	–	–	–	–	–	6 155 082	4 831 491	4 310 086	4 238 469	5 471 573	4 781 207
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–	–	–	–	–	–	–	–	–	–	–	–	–	–
429 571	–	538 512	445 803	468 259	610 799	339 204	265 595	172 024	155 399	102 956	39 855	74 407	10 844
–	–	–	–	–	–	–	–	–	1 092	505	556	335	194
–	–	–	–	–	–	–	–	–	0	0	0	0	0
–	–	–	–	–	–	–	–	–	0	0	0	0	0
815 895	–	1 340 142	888 345	681 783	760 718	817 707	886 531	2 617 792	2 760 722	2 670 958	7 592 288	3 157 482	3 888 044
–	–	–	–	–	53 637	74 129	44 612	54 515	60 998	77 485	47 806	66 473	81 707
–	–	–	–	–	–	–	–	–	–	–	0	0	0
–	–	–	–	–	–	–	–	1 113	1 245	1 581	1 479	2 056	2 527
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	2 834 174	4 295 686	3 873 463	4 306 945	6 938 519
–	–	–	–	–	–	–	–	–	–	–	523 513	–	–
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906 552	–	1 329 106	1 519 315	1 735 774	1 915 990	2 409 080	2 379 278	2 318 079	2 096 061	3 186 306	2 708 973	3 204 542	3 095 386
–	–	–	–	–	–	–	–	–	316 242	698 745	638 669	208 858	422 224
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37 026	66 250	84 993	94 249	86 546	105 341	73 050	60 819	49 298	358 122	119 877	58 961	117 279	126 897
–	–	–	–	–	–	–	–	–	–	–	2 219	6 363	10 700
–	–	–	–	–	–	–	–	–	–	–	14	4	1
–	–	–	–	–	–	–	–	–	–	–	0	6	4
1 145 112	1 123 377	931 682	960 478	1 414 383	1 195 402	1 346 158	1 555 310	1 170 234	737 414	584 873	707 772	598 658	637 594
–	44 959	14 261	15 261	28 272	23 171	38 746	49 366	78 278	24 830	19 614	17 750	14 142	11 905
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409 670	460 881	447 826	507 130	524 987	355 638	233 833	160 666	653 987	932 819	1 314 799	2 327 928	933 274	2 170 759
–	–	2 206	3 702	3 945	2 206	3 702	3 945	–	–	273 149	218 473	25 511	104 533
–	–	0	0	0	0	0	0	–	–	–	–	–	–
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51 444	64 624	26 506	15 649	13 459	13 399	7 755	14 456	6 327	7 796	6 117	276 669	382 434	152 561
–	–	–	–	–	–	–	–	–	–	–	2 181	326	568
–	–	–	–	–	–	–	–	–	–	–	0	14	5
–	–	–	–	–	–	–	–	–	–	–	5	15	7
30 420	29 374	35 582	23 456	19 425	11 320	10 374	11 637	6 338	5 881	6 624	2 221	2 471	1 401
–	–	1 395	670	342	574	279	155	84	58	106	87	130	78
–	–	0	0	0	0	0	0	0	0	0	0	0	0
–	–	–	–	–	–	–	–	0	0	0	0	0	0
412 619	–	498 826	583 872	490 256	516 942	437 662	566 450	715 615	898 112	961 807	1 053 599	893 588	1 240 134
–	–	–	–	–	–	–	–	117 131	151 960	191 357	224 080	237 282	260 526
–	–	–	–	–	–	–	–	0	0	0	0	0	0
–	–	–	–	–	–	–	–	0	0	195	7	23	9
3 070 800	3 552 859	5 624 032	7 536 748	9 657 332	10 717 076	9 867 174	10 168 389	11 978 636	11 602 700	12 086 399	13 208 169	12 173 358	13 591 932
–	–	–	546 016	785 748	861 451	1 082 224	850 050	1 024 470	959 712	1 275 310	1 565 348	134 726	1 413 149
–	–	–	–	–	–	–	–	–	–	–	15 812	0	0
–	–	–	–	–	–	–	–	–	–	–	0	0	0
423 967	53 533	378 388	421 362	11 433 310	11 949 603	11 485 323	10 596 877	8 585 711	7 872 940	12 934 029	13 019 264	10 616 196	9 010 802
–	17 734	18 385	16 983	15 705	11 936	7 628	1 585	293	77	211	364	475	674
–	–	–	–	–	–	–	–	–	–	0	0	0	0
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	324 584	369 394	11 379 411	11 898 627	11 441 681	10 566 201	8 562 200	7 643 050	12 752 090	12 819 192	10 160 478	8 474 278
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–	53 533	53 804	51 968	53 899	50 976	43 642	30 676	23 511	229 890	181 939	200 072	455 718	536 524
–	17 734	18 385	16 983	15 705	11 936	7 628	1 585	293	77	211	364	475	674
–	–	–	–	–	–	–	–	–	0	0	0	0	0
–	–	–	–	–	–	–	–	–	0	0	0	0	0
3 385 616	3 337 796	3 838 402	3 760 335	4 346 172	4 078 234	4 121 356	4 731 338	4 248 295	3 080 301	2 976 395	4 229 839	4 607 908	4 695 400
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–	–	–	–	–	–	–	–	–	–	–	–	–	–
1 804 479	–	–	–	–	1 997 066	1 709 890	1 493 398	1 272 731	1 089 322	867 135	912 618	480 011	727 174
–	–	–	–	–	–	–	–	–	–	–	249 379	0	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	0	–
8 524	7 949	6 685	5 043	3 977	3 018	3 018	6 353	6 353	5 157	86	2 547	7 872	7 027
0	1	0	0	0	0	1	1	2	0	0	–	–	0
222	439	215	125	122	115	251	211	385	130	86	72	18	4
0	0	0	0	0	0	0	0	0	0	–	–	–	0
30	22	4	1	34	17	9	546	6	35	0	27 272	31 013	0
–	–	–	–	–	2	1	–	–	13	–	–	–	–
–	–	–	–	–	0	0	–	–	0	–	–	–	–
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Annex 6D – Reported malaria cases by species, 1990–2012 (continued)

WHO Region	Country/area		1990	1991	1992	1993	1994	1995	1996	1997	1998
Region of the Americas	Belize	Suspected	17 204	25 281	24 135	47 742	50 740	37 266	35 113	26 598	27 000
		No *Pf*	40	131	165	251	420	475	455	126	222
		No *Pv*	2 987	3 181	5 175	8 332	9 991	8 938	6 150	3 887	2 392
		No Other	6	5	1	0	0	0	0	0	0
	Bolivia (Plurinational State of)	Suspected	121 743	125 509	125 414	125 721	128 580	152 748	161 077	141 804	176 023
		No *Pf*	652	1 103	2 757	5 375	4 833	3 374	4 252	5 381	11 414
		No *Pv*	19 028	17 928	21 729	22 100	29 916	43 537	59 760	46 097	62 499
		No Other	0	0	0	0	0	0	0	0	0
	Brazil	Suspected	3 294 234	3 283 016	2 955 196	2 551 704	2 671 953	2 582 017	2 159 551	1 869 382	2 089 175
		No *Pf*	252 191	265 597	267 054	176 379	197 009	203 402	135 132	95 084	105 945
		No *Pv*	308 184	348 722	342 650	289 656	367 251	361 560	318 331	296 686	345 820
		No Other	21	112	156	180	146	765	1 731	1 206	1 461
	Colombia	Suspected	496 087	740 938	736 498	656 632	572 924	667 473	461 137	583 309	190 553
		No *Pf*	35 490	70 868	69 274	42 508	34 070	62 687	37 315	66 261	100 890
		No *Pv*	63 855	113 173	114 690	86 816	93 108	124 354	98 573	114 544	89 663
		No Other	144	115	59	53	40	41	35	105	0
	Costa Rica	Suspected	113 167	130 530	149 198	140 435	143 721	143 408	148 161	155 925	103 976
		No *Pf*	5	22	16	8	3	16	65	45	15
		No *Pv*	1 146	3 251	6 935	5 025	4 442	4 499	5 415	4 667	5 133
		No Other	0	0	0	0	0	0	0	0	0
	Dominican Republic	Suspected	297 599	343 491	299 549	290 073	316 182	380 143	436 473	446 874	453 850
		No *Pf*	334	367	694	983	1 664	1 807	1 112	812	1 999
		No *Pv*	22	10	4	4	5	1	2	4	7
		No Other	0	0	0	0	1	0	0	0	0
	Ecuador	Suspected	363 080	346 465	377 321	419 590	301 546	253 714	162 128	174 692	300 752
		No *Pf*	21 871	13 868	15 970	21 646	10 241	4 738	1 886	3 091	21 448
		No *Pv*	49 799	45 532	25 119	25 213	19 765	13 390	10 028	13 274	22 248
		No Other	0	0	0	0	0	0	0	0	0
	El Salvador	Suspected	230 246	190 540	202 446	172 624	139 587	169 267	164 491	166 895	161 900
		No *Pf*	18	18	6	4	5	6	4	5	11
		No *Pv*	9 251	5 915	4 533	3 883	2 798	3 356	5 884	2 714	1 171
		No Other	0	0	0	0	0	0	0	0	0
	French Guiana, France	Suspected	49 192	55 242	56 925	49 993	48 242	52 521	46 780	42 631	3 462
		No *Pf*	2 607	1 745	2 796	3 154	3 809	4 137	3 980	2 349	2 658
		No *Pv*	3 292	1 663	1 151	720	415	545	687	715	552
		No Other	10	71	125	100	17	29	57	131	210
	Guatemala	Suspected	305 791	361 743	396 171	276 343	133 611	135 095	97 586	140 113	–
		No *Pf*	1 008	1 616	1 480	2 094	423	671	130	879	1 049
		No *Pv*	40 703	56 070	56 080	39 774	21 634	23 490	20 140	31 220	35 355
		No Other	0	0	0	0	0	17	0	0	0
	Guyana	Suspected	135 260	141 046	159 108	172 469	168 127	291 370	262 526	229 710	296 596
		No *Pf*	12 904	23 397	23 871	18 091	22 503	29 976	18 239	20 238	22 799
		No *Pv*	9 777	18 807	15 831	15 081	17 153	29 335	15 836	11 865	18 401
		No Other	0	0	0	0	0	0	0	0	0
	Haiti	Suspected	13 743	81 763	37 957	10 045	54 973	–	69 853	35 132	34 449
		No *Pf*	4 806	25 511	13 457	853	–	–	18 877	5 870	34 449
		No *Pv*	0	–	0	0	–	–	0	–	0
		No Other	0	–	0	0	–	–	0	–	0
	Honduras	Suspected	418 513	468 811	471 950	372 180	361 776	373 364	305 167	310 815	249 105
		No *Pf*	659	1 731	1 216	448	568	1 124	874	858	1 067
		No *Pv*	52 436	71 621	69 622	44 065	52 110	58 322	73 613	65 005	41 912
		No Other	0	0	0	0	0	0	0	0	0
	Jamaica	Suspected	281	3	6	6	3	5	206	110	207
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Mexico	Suspected	1 503 208	1 596 427	1 668 729	1 816 340	1 923 775	1 965 682	2 053 773	1 950 935	1 806 903
		No *Pf*	62	278	129	202	63	73	87	67	159
		No *Pv*	44 451	26 287	16 041	15 591	12 801	7 243	6 206	4 979	24 864
		No Other	0	0	0	0	0	0	0	0	0
	Nicaragua	Suspected	466 558	364 786	381 715	440 891	374 348	493 399	461 989	410 132	440 312
		No *Pf*	1 568	1 702	2 192	2 492	1 524	3 844	2 733	1 815	3 193
		No *Pv*	34 217	25 951	24 674	41 445	40 551	67 536	73 536	50 043	30 716
		No Other	0	0	0	0	0	0	0	0	0
	Panama	Suspected	315 359	336 569	308 359	278 557	237 992	222 498	188 914	193 853	187 055
		No *Pf*	105	118	113	20	18	18	25	179	125
		No *Pv*	276	997	614	461	717	712	451	326	914
		No Other	0	0	0	0	0	0	0	0	0
	Paraguay	Suspected	98 417	127 807	149 523	164 146	96 885	86 664	68 151	83 104	42 944
		No *Pf*	55	18	10	1	12	35	5	1	3
		No *Pv*	2 857	2 965	1 279	435	571	862	632	565	2 087
		No Other	0	0	0	0	0	1	0	1	1
	Peru	Suspected	90 040	109 654	123 147	158 325	295 824	833 614	1 162 230	1 299 929	1 942 529
		No *Pf*	131	187	793	9 634	21 203	37 591	50 009	53 016	84 289
		No *Pv*	28 693	33 502	54 129	85 504	100 801	152 868	161 375	127 287	162 695
		No Other	58	16	0	84	35	62	124	35	79
	Suriname	Suspected	18 594	18 399	13 765	26 079	29 148	38 613	68 674	94 508	73 481
		No *Pf*	1 584	1 402	1 326	5 930	4 384	6 249	14 942	9 251	10 193
		No *Pv*	21	33	25	84	240	256	744	1 125	1 699
		No Other	3	55	53	113	80	101	258	245	520
	Venezuela (Bolivarian Republic of)	Suspected	361 194	375 473	336 571	290 483	210 890	302 487	285 326	271 989	333 786
		No *Pf*	9 135	8 182	5 004	3 501	3 677	4 251	4 098	4 064	5 248
		No *Pv*	25 944	34 641	16 365	8 988	12 617	18 168	17 714	18 272	15 733
		No Other	3	3	47	50	17	82	40	64	65
Eastern Mediterranean	Afghanistan	Suspected	735 624	768 685	–	431 353	683 034	602 320	590 624	540 050	–
		No *Pf*	1 832	4 312	–	2 383	4 459	4 158	2 501	5 878	13 665
		No *Pv*	315 647	293 293	–	121 040	27 142	182 687	75 749	183 989	–
		No Other	0	0	–	0	0	0	0	0	–

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
19 395	18 559	18 173	15 480	15 480	17 358	25 119	25 755	22 134	25 550	26 051	27 366	22 996	20 789
52	20	6	0	0	6	32	10	0	0	1	0	1	1
1 801	1 466	1 156	1 134	1 084	1 060	1 517	834	845	540	255	149	78	36
0	–	0	0	0	2	0	0	0	0	0	0	0	0
159 618	143 990	122 933	137 509	158 299	163 307	202 021	220 616	181 816	169 826	134 595	140 857	150 662	132 904
7 557	2 536	808	727	793	695	1 080	1 785	1 622	836	574	808	231	348
42 480	28 932	14 957	13 549	17 319	14 215	19 062	17 210	12 988	8 912	8 660	11 444	5 877	5 993
0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 435 451	2 562 576	2 274 610	2 118 491	2 009 414	2 194 780	2 660 539	2 959 489	2 986 381	2 726 433	2 711 062	2 711 432	2 477 821	2 349 341
121 228	131 616	81 333	80 188	88 174	110 422	155 169	145 858	93 591	49 358	50 933	51 048	35 273	35 379
473 437	478 212	306 396	267 245	320 378	354 366	450 687	403 383	364 912	266 300	258 271	283 435	231 368	203 018
888	932	574	826	298	216	211	228	149	88	112	183	143	105
268 355	478 820	747 079	686 635	640 453	562 681	493 562	451 240	589 755	493 135	436 366	521 342	418 032	416 767
25 389	51 730	100 242	88 972	75 730	55 158	43 472	46 147	54 509	22 392	21 441	34 334	15 404	15 721
41 137	92 702	130 991	115 944	105 226	87 083	78 157	73 949	70 753	56 838	57 111	83 255	44 701	37 099
319	0	0	0	0	0	0	0	0	0	0	48	16	9
96 454	61 261	43 053	17 738	9 622	9 204	12 767	24 498	22 641	17 304	4 829	15 599	10 690	7 485
15	12	1	2	14	5	3	32	11	0	1	2	4	0
3 983	1 867	1 362	1 008	704	1 284	3 538	2 667	1 212	966	261	112	13	5
0	0	0	0	0	0	0	0	0	0	0	0	0	2
453 720	427 297	411 431	391 216	349 717	322 948	397 108	446 839	435 649	381 010	353 336	495 637	477 555	506 583
3 584	1 226	1 034	1 292	1 528	2 353	3 829	3 519	2 708	1 839	1 643	2 480	1 614	950
5	7	4	4	1	2	8	6	3	1	0	2	2	2
0	0	0	0	0	0	0	0	0	0	0	0	0	0
444 606	544 646	538 757	403 225	433 244	357 633	358 361	318 132	352 426	387 558	451 732	488 830	460 785	459 157
50 158	48 974	37 491	20 015	10 724	5 891	2 212	1 596	1 158	396	551	258	296	80
37 462	55 624	71 412	66 742	41 341	22 839	14 836	8 267	7 306	4 495	3 569	1 630	937	478
0	0	0	0	0	0	0	0	0	0	0	0	0	0
144 768	279 072	111 830	115 378	102 053	94 819	102 479	113 754	95 857	97 872	83 031	115 256	100 883	124 885
9	9	2	0	2	1	2	1	2	1	1	2	3	3
1 221	744	360	117	83	111	65	48	38	32	19	22	12	16
0	0	0	0	0	0	0	0	0	0	0	0	0	0
47 974	48 162	44 718	44 718	32 402	32 402	32 402	32 402	32 402	11 994	20 065	14 373	14 429	13 638
4 567	3 051	3 166	2 547	3 080	2 437	1 777	1 847	845	406	424	604	376	264
564	657	657	954	759	600	1 637	2 227	1 804	925	1 003	476	339	257
214	214	0	160	0	0	71	27	23	10	6	5	5	2
192 710	246 642	198 114	197 113	156 227	148 729	178 726	168 958	132 410	175 678	156 652	237 075	195 080	186 645
1 708	1 474	1 044	1 841	1 310	852	1 062	804	196	50	56	35	67	68
45 284	50 171	34 772	33 695	29 817	28 103	38 641	30 289	15 182	7 148	7 024	7 163	6 707	5 278
0	36	0	0	0	0	48	0	0	0	0	0	0	0
255 228	209 197	211 221	175 966	185 877	151 938	210 429	202 688	178 005	137 247	169 309	212 863	201 693	196 622
16 144	12 324	12 831	10 599	12 970	12 226	16 438	9 818	4 677	5 741	7 542	14 401	20 309	20 293
11 139	11 694	14 291	11 296	14 654	16 141	21 255	10 560	6 712	5 927	6 029	8 402	9 066	11 206
0	0	0	0	3	446	1 291	686	267	147	102	132	96	74
1 196	21 190	51 067	–	–	30 440	3 541 506	87 951	142 518	168 950	270 438	270 427	180 227	161 236
1 196	16 897	9 837	–	–	10 802	21 778	32 739	29 824	36 768	49 535	84 153	32 969	25 423
0	0	0	–	–	0	0	0	1	6	0	0	0	0
0	0	0	–	–	0	0	0	0	0	0	0	0	0
250 411	175 577	174 430	178 616	137 522	144 516	155 976	127 436	130 255	119 484	108 522	152 243	155 785	141 165
1 264	1 446	938	606	540	834	998	767	813	610	1 382	985	605	581
45 520	33 679	23 211	16 617	13 523	16 300	14 942	11 180	9 700	7 758	7 931	8 700	7 010	5 853
0	0	0	0	0	0	0	0	0	0	0	0	0	0
219	874	596	725	394	3 879	2 470	6 821	199	30 732	34 149	10 763	5 042	3 687
–	–	3	–	–	–	–	–	–	21	17	–	–	–
–	–	2	–	–	–	–	–	–	1	4	–	–	–
–	–	1	–	–	–	–	–	–	–	1	–	–	–
1 906 050	2 003 569	1 857 233	1 852 553	1 565 155	1 454 575	1 559 076	1 345 915	1 430 717	1 246 780	1 240 087	1 192 081	1 035 424	1 025 659
96	131	69	19	44	49	22	16	4	0	1	0	0	0
13 354	7 259	4 927	4 605	3 775	3 357	2 945	2 498	2 357	2 357	2 702	1 226	1 124	833
0	0	0	0	0	0	0	0	0	0	0	0	0	0
555 560	509 443	482 919	491 689	448 913	492 319	516 313	476 144	537 637	543 173	553 717	554 414	535 925	552 722
1 812	1 369	1 194	995	1 213	1 200	1 114	336	106	61	93	154	150	236
36 635	22 645	9 304	6 700	5 525	5 699	5 498	2 784	1 250	701	517	538	775	999
0	0	0	0	0	0	0	0	0	0	0	0	0	0
161 219	149 702	156 589	165 796	166 807	171 179	208 582	212 254	204 193	200 574	158 481	141 038	116 588	107 711
40	45	39	337	627	882	766	62	48	4	3	20	1	1
896	991	889	1 907	3 873	4 213	2 901	1 601	1 233	740	775	398	353	843
0	0	0	0	0	0	0	0	0	0	0	0	0	0
101 074	97 026	71 708	99 338	126 582	97 246	85 942	111 361	92 339	96 313	64 660	62 178	48 611	31 499
2	0	4	1	4	1	0	2	2	7	10	5	7	11
9 944	6 853	2 706	2 777	1 388	693	376	821	1 337	333	81	22	3	4
0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 027 624	1 483 816	1 417 423	1 582 385	1 485 012	1 438 925	1 438 925	1 438 925	1 438 925	861 290	36 886	744 650	702 952	759 285
67 215	20 618	17 687	21 174	19 154	20 905	15 058	8 437	7 766	4 768	4 044	2 374	3 018	3 399
94 077	47 690	61 680	78 000	66 588	72 676	72 611	56 488	43 031	33 895	32 976	29 168	21 984	28 030
0	13	11	10	13	0	–	–	–	–	0	3	3	7
65 087	63 377	67 369	68 070	43 241	56 975	59 855	45 722	33 992	29 911	34 717	17 074	15 270	17 464
11 685	10 648	13 217	9 752	8 782	6 738	6 931	2 331	547	838	929	721	331	126
1 371	1 673	1 229	1 648	1 047	915	1 611	733	509	639	895	817	382	167
883	811	1 549	1 388	0	726	589	225	14	17	18	36	17	2
218 959	261 866	198 000	278 205	344 236	420 165	420 165	479 708	396 338	414 137	370 258	–	382 303	410 663
3 531	5 491	2 774	2 572	5 562	4 620	6 026	6 928	8 077	5 540	8 776	12 385	11 167	13 302
15 548	24 829	17 224	26 907	26 111	41 972	38 985	30 111	33 621	26 437	27 002	32 710	34 651	39 478
7	1	8	12	46	63	38	23	51	60	50	60	6	23
696 082	366 865	–	–	–	280 301	548 503	789 186	869 144	935 043	847 666	847 589	936 252	847 933
9 131	5 115	–	84 528	44 243	12 789	5 917	6 216	6 283	4 355	4 026	6 142	5 581	1 231
153 253	89 240	–	330 083	316 697	229 233	110 527	79 913	85 919	77 219	60 854	63 255	71 968	53 609
0	–	–	0	0	0	0	0	0	0	0	0	0	0

Annex 6D – Reported malaria cases by species, 1990–2012 (continued)

WHO Region	Country/area		1990	1991	1992	1993	1994	1995	1996	1997	1998
Eastern Mediterranean	Djibouti	Suspected	11 463	26 761	28 636	–	25 366	–	–	–	–
		No *Pf*	3 072	7 165	7 296	–	6 048	–	–	–	–
		No *Pv*	165	170	172	–	92	–	–	–	–
		No Other	0	0	0	–	0	–	–	–	–
	Egypt[2]	Suspected	–	–	–	–	–	–	–	–	–
		No *Pf*	69	19	10	13	475	–	21	9	–
		No *Pv*	6	5	6	4	20	–	–	2	–
		No Other	0	0	0	0	0	–	–	0	–
	Iran (Islamic Republic of)	Suspected	–	–	–	–	–	–	–	–	–
		No *Pf*	36 313	45 035	26 542	25 900	19 451	–	12 121	8 698	4 523
		No *Pv*	40 600	50 253	49 310	37 917	–	–	–	–	28 416
		No Other	4	8	8	18	–	–	–	–	12
	Iraq	Suspected	–	–	–	–	–	–	–	–	–
		No *Pf*	–	6	7	–	21	–	–	12	–
		No *Pv*	–	1 758	5 745	–	98 222	–	–	9 582	–
		No Other	–	0	0	–	0	–	–	0	–
	Oman	Suspected	–	–	–	–	–	–	–	–	–
		No *Pf*	30 907	17 817	13 958	16 149	6 543	1 282	754	552	523
		No *Pv*	1 777	1 426	845	694	669	513	500	469	551
		No Other	1	4	0	0	0	6	11	5	19
	Pakistan	Suspected	2 608 398	271 586	2 668 997	2 615 771	2 796 528	–	2 711 179	2 914 056	3 187 814
		No *Pf*	43 106	26 860	53 310	40 821	49 759	–	46 645	25 255	24 910
		No *Pv*	36 514	39 658	45 591	51 707	–	–	–	–	–
		No Other	0	0	0	0	–	–	–	–	–
	Saudi Arabia	Suspected	–	–	–	–	–	–	–	–	–
		No *Pf*	14 943	8 575	17 340	–	7 814	16 537	–	–	38 661
		No *Pv*	420	1 302	2 182	–	–	–	–	–	–
		No Other	303	80	101	–	–	–	–	–	–
	Somalia	Suspected	–	–	–	6 467	–	–	–	–	–
		No *Pf*	–	–	–	2 880	–	–	–	–	–
		No *Pv*	–	–	–	52	–	–	–	–	–
		No Other	–	–	–	103	–	–	–	–	–
	South Sudan	Suspected	–	–	–	–	–	–	–	–	–
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Sudan	Suspected	–	–	–	–	–	–	–	–	–
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Syrian Arab Republic[2]	Suspected	–	–	–	–	97 436	–	84 496	68 154	–
		No *Pf*	–	24	15	–	–	–	27	19	–
		No *Pv*	–	26	438	–	145	–	–	–	–
		No Other	–	3	2	–	–	–	–	–	–
	Yemen	Suspected	80 986	103 700	126 580	172 403	160 687	–	–	8 533 872	–
		No *Pf*	11 170	12 345	–	–	34 735	–	–	553 937	–
		No *Pv*	178	318	–	–	–	–	–	–	–
		No Other	36	52	–	–	–	–	–	–	–
European	Armenia[1]	Suspected	0	0	0	0	196	502	347	841	1 156
		No *Pf*	0	0	0	0	0	0	0	0	0
		No *Pv*	0	0	0	0	196	502	347	841	1 156
		No Other	0	0	0	0	0	0	0	0	0
	Azerbaijan	Suspected	24	113	27	23	667	2 840	13 135	9 911	5 175
		No *Pf*	0	0	0	0	0	0	0	0	0
		No *Pv*	24	113	27	23	667	2 840	13 135	9 911	5 175
		No Other	0	0	0	0	0	0	0	0	0
	Georgia	Suspected	1	2	1	0	1	1	7	1	16
		No *Pf*	0	0	0	0	0	0	0	0	0
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Kyrgyzstan	Suspected	1	1	2	0	6	3	26	13	11
		No *Pf*	0	0	0	0	0	0	0	1	0
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Russian Federation	Suspected	216	169	160	209	335	425	611	831	1 081
		No *Pf*	136	109	–	85	86	69	80	97	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Tajikistan	Suspected	175	294	404	619	2 411	6 103	16 561	29 794	19 351
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Turkey	Suspected	8 680	12 218	18 676	47 210	84 345	82 096	60 884	35 456	36 842
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Turkmenistan[1]	Suspected	1	17	11	3	9	10	14	14	137
		No *Pf*	0	0	0	0	0	0	0	0	0
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Uzbekistan	Suspected	28	12	25	36	21	27	51	52	74
		No *Pf*	0	3	9	6	2	0	2	0	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
South-East Asia	Bangladesh	Suspected	53 875	63 578	115 660	125 402	166 564	152 729	100 864	68 594	437 928
		No *Pf*	34 061	30 282	51 775	54 973	81 015	75 860	54 278	42 342	42 222
		No *Pv*	19 814	33 293	63 885	70 429	85 549	76 869	46 505	26 252	17 801
		No Other	–	–	–	–	–	–	–	–	–

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
–	–	–	–	–	–	3 969	–	7 945	6 305	–	–	356	1 410
–	–	–	–	–	–	413	1 796	210	119	–	1 010	–	25
–	–	–	–	–	–	0	0	0	0	–	0	–	0
–	–	–	–	–	–	0	0	0	0	–	0	–	0
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	17	9	8	44	39	23	27	28	76	81	82	107	179
–	0	–	2	1	4	0	2	2	4	13	3	9	26
–	0	–	0	0	0	0	0	0	0	0	0	0	0
–	–	–	–	–	–	–	–	–	–	–	–	–	–
3 247	2 546	2 158	2 382	4 475	1 380	2 219	1 199	1 266	938	485	339	463	144
–	–	17 145	13 176	19 087	12 441	16 747	14 710	14 322	10 337	5 485	2 610	2 668	1 418
–	–	0	0	0	0	0	0	0	0	0	0	0	0
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	1	1	0	0	0	1	0	2	3	0
–	–	–	–	346	154	47	24	3	5	1	4	7	8
–	–	–	–	0	0	0	0	0	0	0	0	0	0
–	–	–	–	–	–	–	–	–	–	–	–	–	–
456	316	283	266	299	158	153	100	93	94	160	140	101	–
416	366	336	315	428	449	385	341	602	870	718	1 039	1 422	–
29	12	16	9	13	8	6	2	2	1	2	3	0	–
3 440 986	–	7 024 978	7 530 636	8 662 496	6 074 739	8 671 271	8 680 304	9 330 723	8 330 040	7 973 246	8 601 835	8 418 570	8 902 947
30 347	–	41 771	32 591	39 944	32 761	42 056	37 837	39 856	24 550	37 079	73 857	73 925	70 006
–	–	83 504	75 046	85 176	93 385	85 748	86 999	88 699	79 868	95 604	143 136	205 879	215 950
–	–	0	0	–	538	0	–	15	36	0	0	0	0
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	2 360	1 999	1 234	–	–	984	2 349	833	1 649	883	1 045	1 279
–	–	678	567	462	–	–	280	515	658	672	1 023	1 719	2 088
–	–	28	42	28	–	–	12	0	0	12	24	19	35
–	–	–	102 540	28 356	55 423	63 770	–	–	120 060	106 341	220 698	99 403	–
–	–	–	15 732	7 571	11 436	12 516	16 430	16 058	36 167	24 698	5 629	–	–
–	–	–	0	0	0	0	0	617	738	504	0	–	–
–	–	–	0	0	0	0	0	0	0	0	0	–	–
–	–	–	–	–	–	–	–	–	201 036	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	112 024	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	4 597 254	4 555 054	4 440 882	2 398 239	–	2 475 340
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	68 000	–	25 751	19 151	25 109	19 136
–	–	–	–	–	–	17	27	35	46	38	19	37	40
–	–	–	–	–	–	–	–	–	–	1	0	9	1
–	–	–	–	–	–	–	–	–	–	0	3	0	1
–	–	–	667 794	612 693	611 552	629 380	962 017	740 940	900 735	899 320	835 018	804 940	891 394
–	–	–	73 667	47 782	47 306	42 627	53 887	64 991	42 702	52 836	77 271	59 689	109 504
–	–	–	1 659	1 474	1 297	1 442	1 019	2 339	745	589	966	478	398
–	–	–	122	–	7	27	10	0	4	3	2	33	4
616	356	174	165	126	220	209	230	658	30 761	31 467	31 026	0	0
4	1	0	0	4	2	0	0	1	1	0	1	–	–
616	140	79	52	25	45	7	0	0	0	0	0	–	–
0	0	0	0	0	0	0	0	0	0	0	0	–	–
2 315	527 688	536 260	507 252	536 822	545 145	515 144	498 697	465 033	408 780	451 436	456 652	449 168	497 040
3	0	1	0	0	0	0	0	1	1	0	2	2	1
2 315	1 526	1 056	506	482	386	242	143	109	72	80	50	6	3
0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	173	3 574	6 145	5 457	3 365	5 169	4 400	3 400	4 398	4 120	2 368	2 032	1 046
0	0	0	1	2	1	0	1	0	1	5	0	3	3
–	245	438	473	314	255	155	59	24	7	1	0	3	2
–	0	0	0	0	0	0	0	1	0	1	0	0	0
5	70 500	72 020	69 807	144 070	79 895	114 316	74 729	62 444	40 833	33 983	30 190	27 850	18 268
0	0	0	1	0	0	0	1	0	0	0	0	1	1
–	12	28	2 742	468	93	226	318	96	18	4	6	4	2
–	0	0	0	0	0	0	0	0	0	0	0	0	0
792	795	898	642	533	382	205	143	35 784	28 340	27 382	33 024	28 311	0
63	60	–	48	51	43	31	41	42	47	62	60	39	–
–	–	–	–	–	–	–	–	76	46	40	34	40	–
–	–	–	–	–	–	–	–	4	3	5	5	6	–
13 493	233 785	248 565	244 632	296 123	272 743	216 197	175 894	159 232	158 068	165 266	173 523	173 367	209 239
–	831	826	509	252	151	81	28	7	2	1	1	5	2
–	18 233	10 561	5 651	5 176	3 437	2 228	1 316	628	316	164	111	73	31
–	0	0	0	0	0	0	0	0	0	0	0	0	0
20 963	1 597 290	1 550 521	1 320 010	1 187 814	1 158 673	1 042 509	934 839	775 502	616 570	606 875	507 841	421 295	337 830
–	7	11	12	12	13	32	29	29	23	16	49	97	131
–	11 424	10 799	10 209	9 209	5 289	2 052	767	329	191	65	28	30	243
–	1	2	3	1	0	0	0	0	1	3	0	1	1
49	50 105	50 075	59 834	72 643	71 377	56 982	58 673	65 666	75 524	94 237	81 784	0	0
0	–	–	0	0	0	0	0	0	0	0	0	–	–
–	24	8	18	7	3	1	1	0	1	0	0	–	–
–	0	0	0	0	0	0	0	0	0	0	0	–	–
85	735 164	691 500	735 164	812 543	893 187	917 843	924 534	858 968	883 807	916 839	921 364	886 243	805 761
3	1	0	1	0	0	0	3	2	0	1	0	1	1
–	125	77	72	74	66	102	73	87	27	3	5	0	0
–	0	0	1	0	0	0	0	0	0	0	0	0	0
386 153	742 539	516 052	527 577	679 981	512 876	462 322	341 293	270 137	526 701	569 767	496 616	390 102	309 179
44 363	39 475	39 274	46 418	41 356	46 402	37 679	24 828	44 910	34 920	18 242	16 658	17 543	3 614
19 360	16 124	14 942	15 851	13 298	12 492	10 442	8 029	13 063	14 409	6 853	3 824	2 579	361
–	–	–	–	–	–	–	–	–	–	–	0	0	0

Annex 6D – Reported malaria cases by species, 1990–2012 (continued)

WHO Region	Country/area		1990	1991	1992	1993	1994	1995	1996	1997	1998
South-East Asia	Bhutan	Suspected	9 497	22 126	28 900	28 116	39 852	23 188	15 696	9 029	7 693
		No *Pf*	4 231	13 138	14 092	12 943	16 474	7 540	6 026	3 614	3 985
		No *Pv*	5 266	8 988	14 808	15 173	22 427	15 655	9 670	5 415	3 708
		No Other	–	–	–	–	–	–	–	–	–
	Democratic People's Republic of Korea	Suspected	0	0	0	0	0	0	0	0	2 100
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	India	Suspected	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
		No *Pf*	752 118	918 488	876 246	852 763	990 508	1 173 599	1 179 561	1 007 366	1 030 159
		No *Pv*	1 266 665	1 198 972	1 249 580	1 354 668	1 520 945	1 814 632	1 856 027	1 652 691	1 192 589
		No Other	–	–	–	–	–	–	–	–	–
	Indonesia	Suspected	1 484 496	1 631 710	1 431 284	1 337 373	1 698 040	1 510 425	1 747 287	1 325 633	1 708 020
		No *Pf*	8 544	7 544	6 888	11 433	9 646	2 967	6 178	7 490	10 866
		No *Pv*	166 505	132 808	103 116	134 906	136 730	140 396	173 700	123 594	169 104
		No Other	–	–	–	–	–	–	–	–	–
	Myanmar	Suspected	989 042	1 959 860	1 702 210	1 483 408	1 323 458	1 156 351	1 054 920	883 050	893 313
		No *Pf*	112 928	107 079	106 695	100 570	95 791	83 397	78 910	72 753	85 658
		No *Pv*	20 112	19 877	19 006	16 154	15 832	17 051	17 293	15 853	19 052
		No Other	–	–	–	–	–	–	–	–	–
	Nepal	Suspected	847 491	781 543	725 068	596 689	430 801	338 189	204 355	160 253	175 879
		No *Pf*	1 853	5 066	2 954	1 609	1 200	844	951	252	776
		No *Pv*	21 003	24 069	20 280	14 771	8 684	8 868	8 069	6 307	8 119
		No Other	–	–	–	–	–	–	–	–	–
	Sri Lanka	Suspected	287 384	400 263	399 349	363 197	273 502	142 294	184 319	218 550	211 691
		No *Pf*	57 736	76 541	82 655	77 970	47 638	119 056	44 957	54 694	42 396
		No *Pv*	223 245	323 722	316 694	285 227	225 864	23 238	139 362	163 856	169 295
		No Other	–	–	–	–	–	–	–	–	–
	Thailand	Suspected	273 880	198 383	168 370	115 220	102 119	82 743	87 622	97 540	131 055
		No *Pf*	173 265	122 730	97 389	68 270	57 073	45 268	46 550	48 318	69 063
		No *Pv*	99 369	87 136	70 981	46 950	45 046	37 475	41 072	49 222	61 992
		No Other	–	–	–	–	–	–	–	–	–
	Timor-Leste	Suspected	–	–	–	–	–	–	–	–	10 332
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
Western Pacific	Cambodia	Suspected	123 796	102 930	91 000	99 200	85 012	76 923	74 883	88 029	58 874
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	China	Suspected	117 359	101 600	74 000	59 000	62 000	47 118	33 382	26 800	27 090
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Lao People's Democratic Republic	Suspected	22 044	41 048	38 500	41 787	52 601	52 021	77 894	72 190	39 031
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Malaysia	Suspected	50 500	39 189	36 853	39 890	58 958	59 208	51 921	26 649	13 491
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Papua New Guinea	Suspected	104 900	86 500	86 500	66 797	65 000	99 000	71 013	38 105	20 900
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Philippines	Suspected	86 200	86 400	95 778	64 944	61 959	56 852	40 545	42 005	50 709
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Republic of Korea	Suspected	0	0	0	1	20	107	396	1 724	3 992
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Solomon Islands	Suspected	116 500	141 400	153 359	126 123	131 687	118 521	84 795	68 125	72 808
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Vanuatu	Suspected	28 805	19 466	13 330	10 469	3 771	8 318	5 654	6 099	6 181
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–
	Viet Nam	Suspected	123 796	187 994	225 928	156 069	140 120	100 116	84 625	65 859	72 091
		No *Pf*	–	–	–	–	–	–	–	–	–
		No *Pv*	–	–	–	–	–	–	–	–	–
		No Other	–	–	–	–	–	–	–	–	–

Suspected cases are calculated by adding "examined cases" to "presumed cases"
Presumed cases are calculated by subtracting "confirmed cases" from "presumed and confirmed cases"

[1] Armenia, Morocco and Turkmenistan are certified malaria-free-countries, but are included in this listing for historical purposes

[2] There is no local transmission

[3] Where national totals for the United Republic of Tanzania are unavailable, refer to the sum of Mainland and Zanzibar

[*] In May 2013 South Sudan was reassigned to the Who African Region (WHA resolution 66.21 http://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R21-en.pdf). Nonetheless, since most data in this report precede 2013, South Sudan is placed in Eastern Mediterranean Region

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
12 237	152 890	131 948	149 392	122 492	109 784	120 304	132 158	102 892	47 389	62 790	54 760	44 494	42 512
6 531	2 738	2 915	3 207	1 518	966	853	772	288	136	559	140	87	33
5 706	3 197	2 805	3 015	2 126	1 580	871	963	414	148	413	261	92	47
–	–	–	–	–	–	–	–	0	0	0	0	0	0
15 362	204 428	300 000	354 503	76 104	33 803	11 507	25 966	7 985	24 299	34 818	25 147	26 513	39 238
–	–	0	0	0	0	0	0	0	0	0	0	0	0
–	–	115 615	98 852	16 538	15 827	6 728	6 913	4 795	16 989	14 845	13 520	16 760	21 850
–	–	–	–	–	–	–	–	0	0	0	0	0	0
2 284 713	86 790 375	90 389 019	91 617 725	99 136 143	97 111 526	104 120 792	106 606 703	94 855 000	95 734 579	112 496 076	119 279 429	119 470 044	122 159 270
1 141 359	1 047 218	1 005 236	897 446	857 101	890 152	805 077	840 360	741 076	775 523	839 877	830 779	662 748	524 370
1 143 354	984 572	1 080 248	943 781	1 012 302	1 025 211	1 011 492	944 769	767 851	750 687	723 697	765 622	645 652	534 129
–	–	–	–	–	–	–	–	–	–	–	–	–	–
1 243 213	2 939 329	4 113 458	3 582 566	3 555 381	3 857 211	2 206 129	2 219 308	2 556 631	2 185 836	2 733 407	3 089 222	3 174 612	3 534 331
21 003	89 289	85 596	98 430	81 591	98 729	127 594	160 147	–	127 813	95 557	220 077	200 662	199 977
116 999	156 323	190 608	190 048	161 180	145 868	147 543	177 006	159 179	125 150	93 801	221 176	187 989	187 583
–	–	–	–	–	–	–	–	–	0	240	2 547	2 261	981
851 297	843 087	954 155	1 016 514	1 020 477	883 399	787 691	820 290	1 159 516	1 230 444	1 136 064	1 277 568	1 210 465	1 423 966
98 261	95 499	130 029	133 187	138 178	114 523	124 644	149 399	148 010	167 562	121 636	70 941	59 604	46 695
20 419	21 802	35 783	35 030	35 151	34 045	37 014	50 667	53 351	52 256	40 167	29 944	28 966	25 920
124	252	941	864	867	501	638	453	433	288	319	346	162	103
132 044	140 768	266 917	304 200	383 322	293 836	361 936	327 981	265 997	302 774	270 798	213 353	188 702	243 432
1 089	560	428	2 165	1 195	743	1 181	1 358	1 295	792	575	550	219	504
8 610	7 056	6 216	10 621	8 200	3 892	5 691	3 932	3 870	3 096	2 760	2 349	1 631	1 155
–	–	–	–	–	–	–	–	–	–	–	0	0	0
264 549	1 781 372	1 353 386	1 390 850	1 192 259	1 198 181	974 672	1 076 121	1 047 104	1 047 104	909 632	1 001 107	985 060	948 250
63 878	59 650	10 600	4 848	1 273	549	134	27	7	46	21	18	12	41
200 671	150 389	55 922	36 563	9 237	3 171	1 506	564	191	623	529	702	158	45
–	–	–	–	–	–	–	–	–	–	–	1	–	2
125 379	4 403 739	4 100 778	3 819 773	3 256 939	3 012 710	2 524 788	2 280 070	2 041 733	1 931 768	1 884 820	1 777 977	1 450 885	1 130 757
64 433	43 717	29 061	20 389	19 024	13 371	14 670	14 124	16 557	12 108	9 486	9 401	5 710	11 553
60 946	37 975	34 467	24 166	18 331	13 319	14 921	15 991	16 495	13 886	13 616	13 401	8 608	17 506
–	47	40	40	32	29	59	35	16	10	23	20	13	3 172
–	15 212	83 049	120 344	83 785	242 957	185 367	223 002	215 402	215 338	198 867	266 384	225 772	182 854
–	–	–	26 651	33 411	39 164	43 093	37 896	34 174	34 406	29 252	28 350	14 261	1 962
–	–	–	11 148	15 392	16 158	15 523	13 477	12 544	11 295	12 160	11 432	3 758	2 288
–	–	–	–	–	–	–	–	0	0	0	0	0	0
64 679	281 444	202 179	187 213	208 801	183 062	165 382	207 463	200 050	198 794	210 856	386 420	433 424	194 263
–	46 150	37 105	33 010	36 338	31 129	17 482	24 779	16 518	15 095	17 442	8 213	7 054	4 639
–	4 505	4 408	4 386	5 179	5 709	9 004	7 551	4 987	4 625	6 362	4 794	5 155	4 451
–	–	–	–	–	–	–	–	–	–	0	0	0	–
26 797	0	5 397 517	5 788 432	4 776 469	4 331 038	3 892 885	4 076 104	4 062 585	4 435 793	4 642 479	7 118 649	9 190 401	6 918 770
–	–	3 732	5 753	3 497	3 879	3 588	2 808	1 613	1 222	948	1 269	1 370	1 419
–	–	17 295	19 581	24 852	23 138	18 187	32 345	27 550	15 323	8 214	3 675	1 907	1 080
–	–	–	–	–	–	–	–	141	105	125	20	50	60
28 050	496 070	303 306	309 688	326 297	218 884	173 698	210 927	275 602	311 395	266 096	280 549	291 490	369 976
–	38 271	25 851	20 696	18 307	15 648	13 106	18 058	6 171	4 697	5 328	4 393	5 770	11 410
–	1 689	1 204	712	574	491	473	316	193	247	176	122	442	1 715
–	–	–	–	–	–	–	–	7	21	0	1	14	1
11 106	1 832 802	1 808 759	1 761 721	1 632 024	1 577 387	1 425 997	1 388 267	1 565 033	1 562 148	1 565 982	1 619 074	1 600 439	1 566 872
–	6 000	5 643	5 486	2 756	2 496	2 222	1 790	1 778	2 268	1 885	1 681	973	894
–	5 953	6 315	4 921	3 127	3 167	2 729	2 774	2 862	3 820	3 379	3 812	2 422	1 461
–	–	–	–	–	–	–	–	615	1 011	1 502	984	1 758	2 306
18 564	1 751 883	1 643 075	1 587 580	1 650 662	1 868 413	1 788 318	1 676 681	1 618 699	1 606 843	1 431 395	1 379 787	1 151 343	878 371
–	63 591	74 117	58 403	54 653	63 053	62 926	56 917	60 168	60 000	48 681	56 735	59 153	58 747
–	14 721	18 113	14 187	14 055	18 730	22 833	22 744	16 239	16 806	11 472	13 171	9 654	7 108
–	–	–	–	–	–	–	–	2 787	1 444	1 024	1 990	632	609
37 061	444 668	418 363	377 340	526 874	446 104	593 996	396 706	408 254	278 652	352 006	301 031	327 060	332 063
–	25 912	18 006	22 831	32 948	29 018	20 033	24 515	8 789	11 807	13 933	11 824	6 877	4 774
–	–	–	–	–	–	6 482	8 839	3 622	4 806	4 951	2 885	2 380	2 189
–	–	–	–	–	–	–	–	17	197	262	175	127	57
3 621	4 183	2 556	1 799	1 171	864	1 369	2 051	2 227	1 052	1 345	1 772	838	555
–	–	–	–	–	–	–	–	–	11	26	51	56	54
–	–	–	–	–	–	–	–	2 227	1 052	1 319	1 721	782	501
–	–	–	–	–	–	–	–	–	–	–	0	0	0
63 169	601 612	594 690	556 356	416 728	643 908	633 796	657 110	396 169	338 244	282 297	284 931	254 506	249 520
–	46 703	50 806	50 090	64 910	64 449	54 001	54 441	48 612	29 492	19 580	22 892	14 454	14 053
–	21 322	25 649	24 822	27 399	25 927	22 515	20 971	16 653	11 173	8 544	12 281	8 665	7 787
–	–	–	–	–	–	–	–	139	84	–	–	0	–
5 152	58 679	48 422	75 046	82 670	80 879	86 170	62 637	52 958	52 420	44 960	48 088	32 656	33 379
–	3 226	3 402	7 016	8 406	6 999	3 817	3 522	2 424	1 579	1 802	1 545	770	206
–	2 972	4 236	7 210	6 582	6 350	4 453	4 405	2 987	1 850	1 632	2 265	1 224	499
–	–	–	–	–	–	–	–	0	0	4	10	2	0
75 102	2 883 456	2 950 863	3 054 693	2 835 799	2 778 295	2 793 458	3 024 558	3 755 566	1 409 765	2 907 219	2 803 918	3 312 266	3 436 534
–	57 605	52 173	36 583	29 435	19 023	14 231	17 911	11 470	8 901	12 719	12 763	10 101	11 448
–	15 935	15 898	10 846	9 004	5 681	5 102	4 497	4 737	2 348	3 206	4 466	5 602	7 220
–	–	–	–	–	–	–	–	0	0	0	0	0	0

Annex 6E – Reported malaria deaths, 1990–2012

WHO Region	Country/area	1990	1991	1992	1993	1994	1995	1996	1997	1998
African	Algeria	–	–	–	–	–	–	–	–	2
	Angola	–	–	–	–	–	–	–	–	–
	Benin	–	–	–	–	–	–	–	–	682
	Botswana	–	–	–	–	–	–	–	141	23
	Burkina Faso	–	–	–	–	–	–	–	–	2 624
	Burundi	–	–	–	–	–	–	–	–	–
	Cabo Verde	–	–	–	–	–	–	–	–	–
	Cameroon	–	–	–	–	–	–	–	–	–
	Central African Republic	–	–	–	–	–	–	–	–	374
	Chad	–	–	–	–	–	–	–	–	–
	Comoros	–	–	–	–	–	–	–	–	–
	Congo	–	–	–	–	–	–	–	–	–
	Côte d'Ivoire	–	–	–	–	–	–	–	–	1 337
	Democratic Republic of the Congo	–	–	–	–	–	–	–	–	–
	Equatorial Guinea	–	–	–	–	–	–	–	–	–
	Eritrea	–	–	–	–	–	–	–	–	404
	Ethiopia	–	–	–	–	–	–	–	–	–
	Gabon	–	–	–	–	–	–	–	–	–
	Gambia	–	–	–	–	–	–	–	–	–
	Ghana	–	–	–	–	–	–	–	–	2 798
	Guinea	–	–	–	–	–	–	–	–	13
	Guinea-Bissau	–	–	–	–	–	–	–	–	–
	Kenya	–	–	–	–	–	–	–	–	665
	Liberia	–	–	–	–	–	–	–	–	–
	Madagascar	–	–	–	–	–	–	–	–	–
	Malawi	57 649	–	–	–	–	–	–	35 982	–
	Mali	–	–	–	–	–	–	–	–	–
	Mauritania	–	–	–	–	–	–	–	–	279
	Mayotte	–	–	–	–	–	–	–	–	–
	Mozambique	–	–	–	–	–	–	–	–	896
	Namibia	–	–	–	–	–	250	469	547	404
	Niger	–	–	–	–	–	–	–	1 018	1 823
	Nigeria	2 284	1 947	1 068	710	1 686	3 268	4 773	4 603	6 197
	Rwanda	–	–	–	–	–	–	–	–	2 736
	Sao Tome and Principe	–	–	–	–	–	–	–	–	154
	Senegal	–	–	–	–	–	–	–	1 205	1 029
	Sierra Leone	–	–	–	–	–	–	–	–	–
	South Africa	35	19	14	45	12	44	163	104	198
	Swaziland	–	–	–	–	–	–	–	–	109
	Togo	–	–	–	–	–	–	–	–	475
	Uganda	–	–	–	–	–	–	–	–	–
	United Republic of Tanzania[3]	–	–	–	–	–	–	–	–	–
	Mainland	–	–	–	–	–	–	–	–	–
	Zanzibar	–	–	–	–	–	–	–	–	–
	Zambia	4 863	4 998	3 315	4 689	5 775	–	–	–	–
	Zimbabwe	–	–	–	–	–	–	–	1 192	1 248
Region of the Americas	Argentina	0	–	–	–	–	–	–	2	2
	Bahamas	0	0	0	0	0	0	0	0	0
	Belize	0	0	0	–	0	–	–	1	0
	Bolivia (Plurinational State of)	7	2	–	–	29	–	14	21	27
	Brazil	927	743	557	485	436	355	224	151	170
	Colombia	176	181	138	100	75	62	16	16	33
	Costa Rica	0	0	0	0	0	0	2	–	0
	Dominican Republic	2	0	7	5	11	14	5	5	14
	Ecuador	0	0	0	–	67	–	–	18	16
	El Salvador	0	0	–	–	–	–	–	4	0
	French Guiana, France	8	2	2	–	–	–	–	–	2
	Guatemala	180	127	–	–	–	–	–	0	9
	Guyana	–	4	14	–	150	–	–	32	34
	Haiti	–	101	–	5	–	–	61	37	25
	Honduras	–	–	–	–	–	–	–	–	0
	Jamaica	0	0	0	0	0	0	0	0	0
	Mexico	39	–	–	0	–	–	1	–	0
	Nicaragua	28	47	38	38	10	16	8	17	21
	Panama	1	1	1	0	0	0	0	0	0
	Paraguay	1	0	0	–	–	–	–	–	0
	Peru	–	–	–	–	39	39	46	59	52
	Suriname	1	4	–	10	20	25	24	9	14
	Venezuela (Bolivarian Republic of)	53	57	48	2	–	47	44	56	62
Eastern Mediterranean	Afghanistan	–	–	–	–	22	–	–	–	–
	Djibouti	–	–	–	–	–	–	8	–	–
	Egypt[2]	–	–	–	–	0	–	–	–	–
	Iran (Islamic Republic of)	–	–	–	–	–	–	–	22	–
	Iraq	–	–	–	–	–	–	–	–	–
	Oman	–	–	–	–	1	2	2	–	–
	Pakistan	–	–	–	–	–	–	–	–	–
	Saudi Arabia	–	–	–	–	–	–	–	6	28
	Somalia	–	–	–	–	–	–	–	–	–
	South Sudan*	–	–	–	–	–	–	–	–	–
	Sudan	1 434	1 898	1 935	2 404	2 464	2 759	1 944	1 825	1 958
	Syrian Arab Republic[2]	–	–	–	–	–	–	–	–	–

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
6	2	1	–	–	–	–	–	–	0	0	1	0	0
25 572	9 510	9 473	14 434	38 598	12 459	13 768	10 220	9 812	9 465	10 530	8 114	6 909	5 736
544	–	468	707	560	944	322	1 226	1 290	918	1 375	964	1 753	2 261
49	–	29	23	18	19	11	40	6	12	6	8	8	3
2 808	–	4 233	4 032	4 860	4 205	5 224	8 083	6 472	7 834	7 982	9 024	7 001	7 963
–	691	417	483	425	689	776	434	167	595	1 183	2 677	2 233	2 263
–	–	0	2	4	4	2	8	2	2	2	1	4	0
–	–	–	–	–	–	836	930	1 811	7 673	4 943	4 536	3 808	3 209
484	439	535	–	417	859	668	865	578	456	667	526	858	1 442
–	712	957	98	1 021	13	558	837	617	1 018	221	886	1 220	1 359
50	–	–	–	–	28	92	56	20	47	–	53	19	17
–	–	–	–	–	–	–	–	113	143	116	–	892	623
974	–	–	–	–	–	–	–	797	1 249	18 156	1 023	1 389	1 534
–	3 856	416	2 152	989	13 613	15 322	12 970	14 372	17 940	21 168	23 476	23 748	21 601
–	–	–	–	–	–	–	–	–	4	23	30	52	77
169	–	133	86	79	24	49	47	42	19	23	27	12	30
–	–	1 681	1 607	2 138	3 327	1 086	1 357	991	1 169	1 121	1 581	936	1 621
–	2 016	1 693	1 141	692	466	353	238	216	156	197	182	74	134
–	–	275	259	192	153	426	150	424	403	240	151	440	289
2 826	6 108	1 717	2 376	2 103	1 575	2 037	3 125	4 622	3 889	3 378	3 859	3 259	2 855
13	626	517	440	586	528	490	–	472	441	586	735	743	979
–	–	635	780	1 137	565	565	507	370	487	369	296	472	370
1 545	48 767	48 286	47 697	51 842	25 403	44 328	40 079	–	–	–	26 017	713	785
–	–	–	–	–	–	41	877	310	345	1 706	1 422	–	1 725
640	591	742	575	817	715	699	441	428	355	348	427	398	552
4 747	–	3 355	5 775	4 767	3 457	5 070	6 464	7 486	8 048	8 915	8 206	6 674	5 516
583	748	562	826	1 309	1 012	1 285	1 914	1 782	1 227	2 331	3 006	2 128	1 894
525	–	–	–	–	–	–	67	142	–	91	211	77	106
–	–	–	–	–	–	–	–	–	–	–	0	0	0
1 189	–	–	–	–	–	–	–	5 816	4 424	3 747	3 354	3 086	2 818
531	–	1 728	1 504	1 106	1 185	1 325	571	181	152	68	63	36	4
2 165	1 244	2 366	2 769	2 248	1 333	2 060	1 150	1 358	2 461	2 159	3 929	2 802	2 825
4 123	–	4 317	4 092	5 343	6 032	6 494	6 586	10 289	8 677	7 522	4 238	3 353	7 734
1 881	–	4 275	3 167	2 679	2 362	2 581	2 486	1 772	566	809	670	380	459
–	254	248	321	193	169	85	26	3	16	23	14	19	7
1 235	1 275	1 515	1 226	1 602	1 524	1 587	1 678	1 935	741	574	553	472	649
–	–	328	461	157	126	50	90	324	871	1 734	8 188	3 573	3 611
406	424	81	96	142	88	63	87	37	43	45	83	54	72
149	–	62	46	30	28	17	27	17	10	13	8	8	7
766	–	1 394	1 661	1 130	1 183	1 024	819	1 236	2 663	1 556	1 507	1 314	1 197
–	–	2 066	1 256	30 194	39 406	36 397	41 787	25 122	24 902	33 472	31 686	23 605	15 632
–	379	1 228	815	15 251	19 859	18 322	20 962	12 593	12 497	16 776	15 867	11 806	7 820
–	–	838	441	14 943	19 547	18 075	20 825	12 529	12 405	16 696	15 819	11 799	7 812
–	379	390	374	308	312	247	137	64	92	80	48	7	8
8 580	–	9 369	9 021	9 178	8 289	7 737	6 484	6 183	3 781	3 862	4 834	4 540	3 705
1 139	–	–	1 844	1 044	1 809	1 916	802	401	232	108	255	451	351
0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	–	–
0	0	0	0	–	1	0	1	0	0	0	0	0	0
15	11	0	4	1	3	0	0	0	0	0	0	0	0
203	243	142	93	103	100	122	105	93	67	85	76	69	64
12	41	58	40	24	25	28	53	19	22	12	23	18	20
0	0	0	0	0	0	0	0	0	0	1	0	0	0
13	6	17	11	12	16	16	10	17	11	14	15	10	8
16	0	0	0	0	0	0	0	0	1	0	0	0	0
–	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	3	2	5	1	2	5	5	2	1	–	2	2
0	0	0	0	0	2	4	2	3	0	0	0	0	0
–	–	30	27	41	38	32	20	20	11	11	18	3	3
56	16	62	76	102	23	29	32	28	17	6	0	3	0
0	0	0	0	0	0	1	0	2	2	1	3	2	1
0	0	0	0	0	0	0	0	0	0	0	0	–	–
0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	4	2	8	7	1	6	1	0	0	0	1	1	2
0	1	1	2	4	2	1	1	1	1	0	1	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0
49	20	25	12	9	6	4	6	2	2	2	0	0	2
18	24	23	15	18	7	1	1	1	0	0	1	1	0
24	24	28	23	40	35	17	11	16	9	11	18	3	6
–	–	–	–	–	–	0	–	25	46	32	22	40	36
–	–	–	–	–	–	–	29	1	–	0	0	0	0
–	–	–	–	–	–	–	0	0	2	2	2	4	–
3	4	2	2	5	1	1	1	3	3	–	0	0	–
–	–	–	–	–	–	0	0	0	0	0	0	0	0
–	–	–	–	–	–	0	0	0	2	2	0	0	–
–	–	–	–	–	–	52	9	24	–	–	–	4	260
–	–	0	0	0	0	0	0	2	0	0	0	2	0
–	–	–	8	54	79	15	58	45	49	45	6	5	–
–	–	–	–	–	–	–	–	–	263	254	1 053	406	1 321
2 622	2 162	2 252	2 125	2 479	1 814	1 789	1 193	1 254	1 125	1 142	1 023	612	618
–	–	–	–	–	–	2	2	1	1	1	0	0	1

Annex 6E – Reported malaria deaths, 1990–2012 (continued)

WHO Region	Country/area	1990	1991	1992	1993	1994	1995	1996	1997	1998
European	Yemen	–	–	–	–	–	–	–	–	–
	Armenia	–	–	–	–	–	–	–	–	0
	Azerbaijan	0	0	0	0	0	0	0	0	0
	Georgia	0	0	0	0	0	0	0	0	–
	Kyrgyzstan	0	0	0	0	0	0	0	0	0
	Russian Federation	1	1	4	1	3	2	3	4	3
	Tajikistan	–	–	–	–	–	–	–	7	0
	Turkey	0	0	0	0	0	0	0	0	0
	Turkmenistan[1]	0	0	0	0	0	0	0	0	0
	Uzbekistan	0	1	0	1	0	0	0	0	0
South-East Asia	Bangladesh	50	132	402	382	1 278	1 393	794	469	528
	Bhutan	2	36	49	62	48	39	25	14	17
	Democratic People's Republic of Korea	–	–	–	–	–	–	–	–	–
	India	353	421	422	354	1 122	1 151	2 803	879	666
	Indonesia	–	–	–	–	–	–	148	199	45
	Myanmar	5 127	5 231	4 739	4 219	4 380	3 744	3 424	2 943	3 182
	Nepal	–	–	–	–	0	0	15	2	7
	Sri Lanka	14	19	9	7	50	5	26	61	115
	Thailand	1 287	1 747	1 050	997	908	856	826	764	688
	Timor-Leste	–	–	–	–	–	–	–	–	–
Western Pacific	Cambodia	1 020	1 163	1 408	1 100	1 009	614	745	811	621
	China	35	–	52	19	43	34	30	46	24
	Lao People's Democratic Republic	372	457	438	418	609	620	608	606	427
	Malaysia	43	–	25	23	28	35	40	25	27
	Papua New Guinea	457	–	500	448	281	415	514	390	651
	Philippines	913	924	864	811	784	643	536	514	561
	Republic of Korea	0	0	0	0	0	0	0	0	0
	Solomon Islands	33	46	33	40	49	51	30	27	33
	Vanuatu	32	32	26	13	8	12	8	1	9
	Viet Nam	3 340	4 646	2 632	1 026	604	348	203	152	183
Regional summary	African	64 831	6 964	4 397	5 444	7 473	3 562	5 405	44 792	24 470
	Region of the Americas	1 423	1 269	805	645	837	558	445	428	481
	Eastern Mediterranean	1 434	1 898	1 935	2 404	2 487	2 761	1 954	1 853	1 986
	European	1	2	4	2	3	2	3	11	3
	South-East Asia	6 833	7 586	6 671	6 021	7 786	7 188	8 061	5 331	5 248
	Western Pacific	6 245	7 268	5 978	3 898	3 415	2 772	2 714	2 572	2 536
	Total	**80 767**	**24 987**	**19 790**	**18 414**	**22 001**	**16 843**	**18 582**	**54 987**	**34 724**

■ Less than 18% of countries reported in Africa during 1990–1999

Deaths reported before 2000 can be presumed and confirmed or only confirmed depending on the country

[1] Armenia, Morocco and Turkmenistan are certified malaria-free-countries, but are included in this listing for historical purposes

[2] There is no local malaria transmission

[3] Where national totals for the United Republic of Tanzania are unavailable, refer to the sum of Mainland and Zanzibar

* In May 2013 South Sudan was reassigned to the Who African Region (WHA resolution 66.21 http://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R21-en.pdf). Nonetheless, since most data in this report precede 2013, South Sudan is placed in Eastern Mediterranean Region

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
–	–	–	–	–	–	–	73	–	–	38	92	75	72
0	–	0	0	0	0	0	0	0	0	0	0	–	–
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	–	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	2	3	2	4	5	3	4	2	2	1	0	0	–
–	–	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	3	1	0	0	–
0	0	0	0	0	0	0	0	0	0	0	0	–	–
0	0	0	0	0	0	0	0	1	0	0	0	0	0
552	484	470	598	574	505	501	508	228	154	47	37	36	11
16	15	14	11	14	7	5	7	2	2	4	2	1	1
–	–	–	–	–	–	–	–	0	0	0	0	0	0
1 048	892	1 015	973	1 006	949	963	1 708	1 311	1 055	1 144	1 018	754	519
–	833	–	–	–	508	88	494	–	669	900	432	388	252
3 331	2 556	2 814	2 634	2 476	1 982	1 707	1 647	1 261	1 087	972	788	581	403
–	–	1	3	5	7	10	42	3	–	8	6	2	0
–	77	52	30	4	1	0	1	1	0	0	0	0	0
740	625	424	361	204	230	161	113	97	101	70	80	43	37
–	–	–	–	–	65	71	68	60	33	53	58	16	3
891	608	476	457	492	382	296	396	241	209	279	151	94	45
52	31	27	42	52	31	48	37	18	23	10	19	33	14
338	350	242	195	187	105	77	21	14	11	5	24	17	44
21	35	46	38	21	35	33	21	18	30	26	13	12	12
567	617	562	647	537	619	725	668	559	628	604	616	431	301
755	536	439	71	162	167	145	124	73	56	24	30	12	16
0	0	0	0	0	0	0	0	1	0	0	1	2	0
23	38	55	61	71	51	38	12	15	21	53	34	19	18
4	3	4	13	14	3	5	1	5	4	2	1	1	–
190	142	91	50	50	34	18	41	20	25	26	21	14	8
63 699	77 642	105 102	111 772	182 851	153 451	173 666	174 490	120 609	125 931	158 145	172 688	121 319	111 835
423	390	391	313	367	260	263	248	207	145	144	156	112	108
2 625	2 166	2 254	2 135	2 538	1 894	1 859	1 365	1 355	1 491	1 516	2 198	1 148	2 308
3	2	3	2	4	5	3	4	4	5	2	0	0	0
5 687	5 482	4 790	4 610	4 283	4 254	3 506	4 588	2 963	3 101	3 198	2 421	1 821	1 226
2 841	2 360	1 942	1 574	1 586	1 427	1 385	1 321	964	1 007	1 029	910	635	458
75 278	**88 042**	**114 482**	**120 406**	**191 629**	**161 291**	**180 682**	**182 016**	**126 102**	**131 680**	**164 034**	**178 373**	**125 035**	**115 935**

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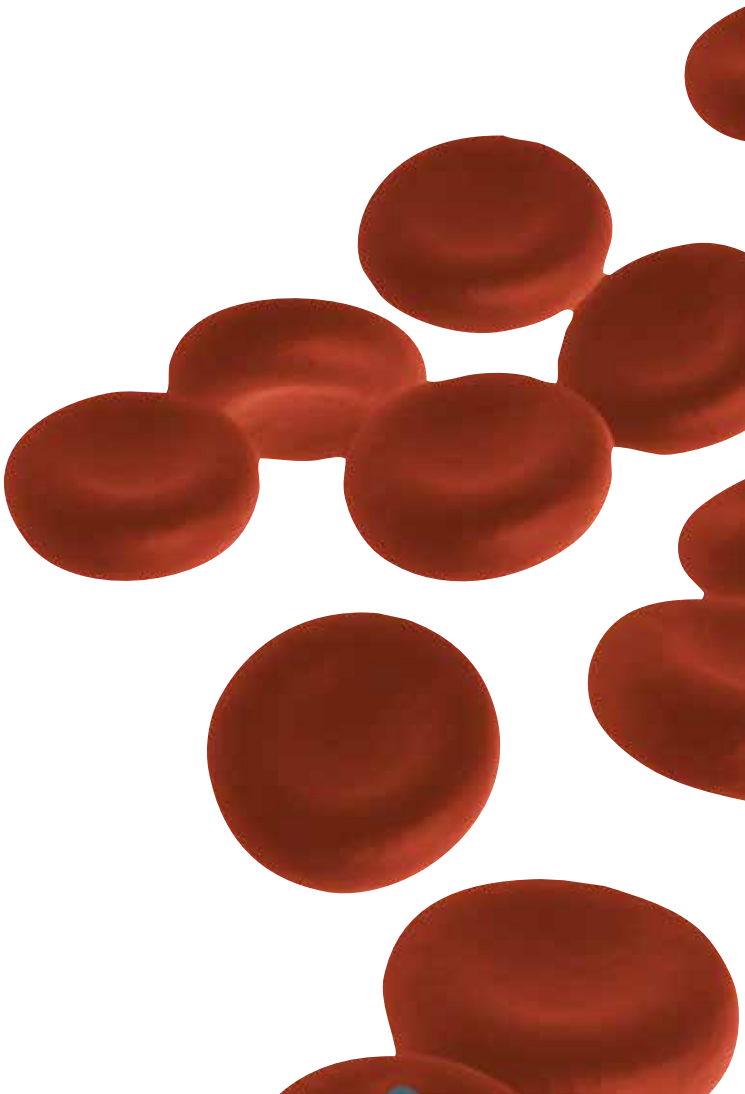

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