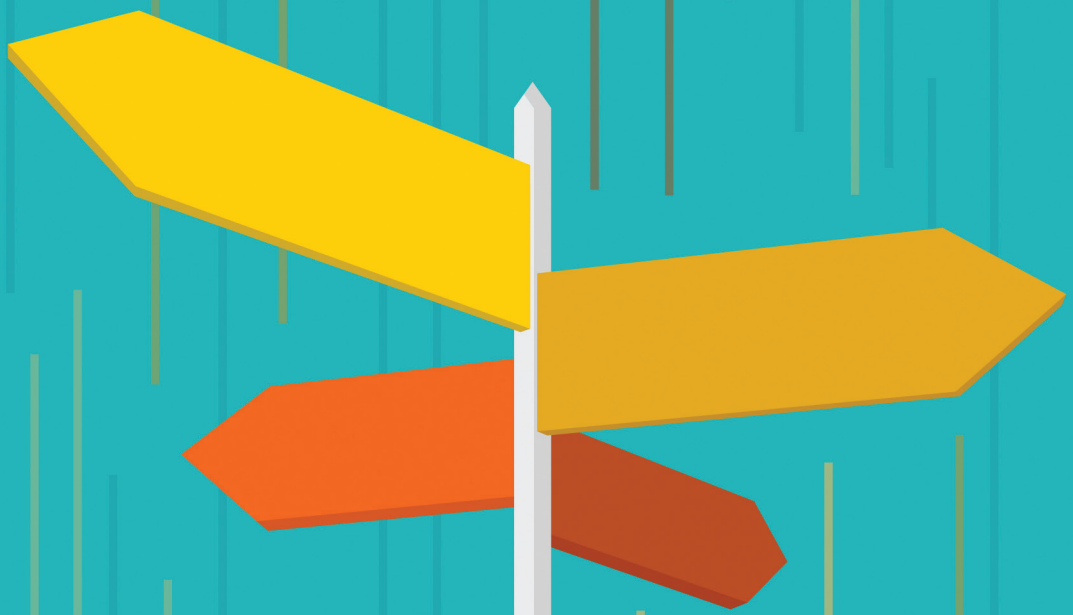
WORLD MALARIA REPORT 2017



World Health Organization

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Foreword

Dr Tedros Adhanom Ghebreyesus
Director-General
World Health Organization

For many years, the global response to malaria was considered one of the world's great public health achievements. WHO reported time and again on the massive roll-out of effective disease-cutting tools, and on impressive reductions in cases and deaths.

Last December, we noted a troubling shift in the trajectory of this disease. The data showed that less than half of countries with ongoing transmission were on track to reach critical targets for reductions in the death and disease caused by malaria. Progress appeared to have stalled.

The *World malaria report 2017* shows that this worrying trend continues. Although there are some bright spots in the data, the overall decline in the global malaria burden has unquestionably leveled off. And, in some countries and regions, we are beginning to see reversals in the gains achieved.

Global disease burden and trends

In 2016, 91 countries reported a total of 216 million cases of malaria, an increase of 5 million cases over the previous year. The global tally of malaria deaths reached 445 000 deaths, about the same number reported in 2015.

Although malaria case incidence has fallen globally since 2010, the rate of decline has stalled and even reversed in some regions since 2014. Mortality rates have followed a similar pattern.

The WHO African Region continues to account for about 90% of malaria cases and deaths worldwide. Fifteen countries – all but one in sub-Saharan Africa – carry 80% of the global malaria burden. Clearly, if we are to get the global malaria response back on track, supporting the most heavily affected countries in this region must be our primary focus.

Extending health care to all

As WHO Director-General, achieving universal health coverage is my top priority. This is based on the moral conviction that all people should be guaranteed access to the health services they need, when and where they need them, regardless of where they live or their financial status.

To this end, how have countries fared in delivering services that prevent, diagnose and treat malaria for all in need? While we have made important headway, the pace of progress must be greatly accelerated if we are to reach our global malaria targets for 2020 and beyond.

In 2016, just over half (54%) of people at risk of malaria in sub-Saharan Africa were sleeping under an insecticide-treated mosquito net – the primary prevention method. This level of coverage represents a considerable increase since 2010 but is far from the goal of universal access.

Spraying the inside walls of homes with insecticides (indoor residual spraying, IRS) is another important prevention measure. The report documents a precipitous drop in IRS coverage in the WHO African Region since 2010, as well as declines in all other WHO regions over this same period.

Prompt diagnosis and treatment is the most effective means of preventing a mild case of malaria from developing into severe disease and death. In the WHO African Region, most people who seek treatment for malaria in the public health system receive an accurate diagnosis and effective medicines.

However, access to the public health system remains far too low. National-level surveys in the WHO African Region show that only about one third (34%) of children with a fever are taken to a medical provider in this sector.

Inadequate investment

A minimum investment of US$ 6.5 billion will be required annually by 2020 in order to meet the 2030 targets of the WHO global malaria strategy. The US$ 2.7 billion invested in 2016 represents less than half of that amount. Of particular concern is that, since 2014, investments in malaria control have, on average, declined in many high-burden countries.

Malaria response at a cross-roads

The choice before us is clear. If we continue with a "business as usual" approach – employing the same level of resources and the same interventions – we will face near-certain increases in malaria cases and deaths.

It is our hope that countries and the global health community choose another approach, resulting in a boost in funding for malaria programmes, expanded access to effective interventions and greater investment in the research and development of new tools.

As I have said before, countries must be in the driver's seat; they alone are ultimately responsible for the health of their citizens. Universal health coverage is indeed a political choice – one that takes courage, compassion and long-term vision.

After spending many years fighting the scourge of malaria in Ethiopia, I know that we are up against a tough adversary. But I am also convinced that this is a winnable battle. With robust financial resources and political leadership, we can – and will – swing the pendulum back towards a malaria-free world.

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ANC
MECP
ACT
OHM
AIDS
TES
NMCP
MPAC
GTS
ICCM
SMC
IQR
DDT
AIM
IRS
GAP
RDT
SDG
MEOC
ASAO
ASMQ
IPTp
HRP
LLIN

Abbreviations

ACT	artemisinin-based combination therapy
AIDS	acquired immunodeficiency syndrome
AIM	*Action and investment to defeat malaria 2016–2030*
AL	artemether-lumefantrine
AMFm	Affordable Medicine Facility–malaria
ANC	antenatal care
AQ	amodiaquine
AS	artesunate
ASAQ	artesunate-amodiaquine
ASMQ	artesunate-mefloquine
BMGF	Bill & Melinda Gates Foundation
CI	confidence interval
CQ	chloroquine
DDT	dichloro-diphenyl-trichloroethane
DP	dihydroartemisinin-piperaquine
GAP	Global Action Plan
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GTS	*Global technical strategy for malaria 2016–2030*
HRP	histidine-rich protein
iCCM	integrated community case management
IMCI	integrated management of childhood illnesses
IPTi	intermittent preventive treatment in infants
IPTp	intermittent preventive treatment in pregnancy
IQR	interquartile range
IRS	indoor residual spraying
ITN	insecticide-treated mosquito net
LLIN	long-lasting insecticidal net
MECP	Malaria Elimination Certification Panel
MEOC	Malaria Elimination Oversight Committee
MPAC	Malaria Policy Advisory Committee
NMCP	national malaria control programme
P.	*Plasmodium*
PQ	primaquine
RDT	rapid diagnostic test
SDG	Sustainable Development Goal
SMC	seasonal malaria chemoprevention
SP	sulfadoxine-pyrimethamine
TES	therapeutic efficacy study
UNICEF	United Nations Children's Fund
USA	United States of America
WHO	World Health Organization

Abbreviations of WHO regions and 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

KEY POINTS BY SECTION

This year's report at a glance

- The 2017 *World malaria report* presents a comprehensive state of play in global progress in the fight against malaria up to the end of 2016. It tracks progress in investments in malaria programmes and research, malaria prevention, diagnosis and treatment, surveillance, trends in malaria disease burden, malaria elimination, and threats in tackling malaria and safeguarding the investments made.
- This year's report comes 1 year after the launch of three time-bound milestones to accelerate progress towards malaria control and elimination: the WHO *Global technical strategy for malaria 2016–2030* (GTS); the Roll Back Malaria advocacy plan, *Action and investment to defeat malaria 2016-2030* (AIM); and the Sustainable Development Goals (SDGs), with Target 3.3 focused on AIDS, tuberculosis, malaria and neglected tropical diseases.
- The GTS and AIM are aligned with the SDGs, with targets set for the years 2020, 2025 and 2030, compared with a baseline of 2015. For malaria, achieving SDG Target 3.3 by 2030 is interpreted as the attainment of the GTS and AIM targets.
- The primary sources of information for this year's edition of the *World malaria report* are reports from 94 countries. This information is supplemented by data from nationally representative household surveys and databases held by other partner organizations.

INVESTMENTS IN MALARIA PROGRAMMES AND RESEARCH

Malaria control and elimination investments

- In 2016, an estimated US$ 2.7 billion was invested in malaria control and elimination efforts globally by governments of malaria endemic countries and international partners.
- The majority (74%) of investments in 2016 were spent in the WHO African Region, followed by the WHO regions of South-East Asia (7%), the Eastern Mediterranean and the Americas (each 6%), and the Western Pacific (4%).
- Governments of endemic countries contributed 31% of total funding (US$ 800 million) in 2016.
- The United States of America (USA) was the largest international source of malaria financing in 2016, providing US$ 1 billion (38%), followed by the United Kingdom of Great Britain and Northern Ireland (United Kingdom) and other international donors, including France, Germany and Japan.
- More than half (57%) of resources in 2016 were channelled through the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund).

Investment outlook

- Although funding for malaria has remained relatively stable since 2010, the level of investment in 2016 is far from what is required to reach the first milestone of the GTS, which is a reduction of at least 40% in malaria case incidence and mortality rates globally when compared to 2015 levels.
- To reach this milestone, the GTS estimated that annual funding would need to increase to US$ 6.5 billion per year by 2020. The US$ 2.7 billion invested in malaria in 2016 represents less than half (41%) of that amount.
- Stepping up investments in malaria research and development is key to achieving the GTS targets. In 2015, US$ 572 million was spent in this area, representing 83% of the estimated annual need for research and development.

Deliveries of malaria commodities

Insecticide-treated mosquito nets

- Between 2014 and 2016, a total of 582 million insecticide-treated mosquito nets (ITNs) were reported by manufacturers as having been delivered globally.
- Of this amount, 505 million ITNs were delivered in sub-Saharan Africa, compared with 301 million bednets in the preceding 3-year period (2011–2013).
- Data from national malaria control programmes (NMCPs) in Africa indicate that, between 2014 and 2016, 75% of ITNs were distributed through mass distribution campaigns.

Rapid diagnostic tests

- An estimated 312 million rapid diagnostic tests (RDTs) were delivered globally in 2016. Of these, 269 million were delivered in the WHO African Region.
- The number of RDTs distributed by NMCPs increased between 2010 and 2015, but fell from 247 million in 2015 to 221 million in 2016. The decrease was entirely in sub-Saharan Africa, where distributions dropped from 219 million to 177 million RDTs over the 2015–2016 period.

Artemisinin-based combination therapy

- An estimated 409 million treatment courses of artemisinin-based combination therapy (ACT) were procured by countries in 2016, an increase from 311 million in 2015. Over 69% of these procurements were reported to have been made for the public sector.
- The number of ACT treatments distributed by NMCPs to the public sector increased from 192 million in 2013 to 198 million in 2016. Most of the NMCP distributions of ACTs (99%) in 2016 occurred in the WHO African Region.

PREVENTING MALARIA

Vector control

- Across sub-Saharan Africa, household ownership of at least one ITN increased from 50% in 2010 to 80% in 2016. However, the proportion of households with sufficient nets (i.e. one net for every two people) remains inadequate, at 43% in 2016.
- More people at risk of malaria in Africa are sleeping under an ITN. In 2016, 54% of the population was protected by this intervention, an increase from 30% in 2010.
- Fewer people at risk of malaria are being protected by indoor residual spraying (IRS), a prevention method that involves spraying the inside walls of dwellings with insecticides. Globally, IRS protection declined from a peak of 5.8% in 2010 to 2.9% in 2016, with decreases seen across all WHO regions. In the WHO African Region, coverage dropped from 80 million people at risk in 2010 to 45 million in 2016.
- The declines in IRS coverage are occurring as countries change or rotate insecticides to more expensive chemicals.

Preventive therapies

- To protect women in areas of moderate and high malaria transmission in Africa, WHO recommends "intermittent preventive treatment in pregnancy" (IPTp) with the antimalarial drug sulfadoxine-pyrimethamine. Among 23 African countries that reported on IPTp coverage levels in 2016, an estimated 19% of eligible pregnant women received the recommended three or more doses of IPTp, compared with 18% in 2015 and 13% in 2014.
- In 2016, 15 million children in 12 countries in Africa's Sahel subregion were protected through seasonal malaria chemoprevention (SMC) programmes. However, about 13 million children who could have benefited from this intervention were not covered, mainly due to a lack of funding. Since 2012, SMC has been recommended by WHO for children aged 3-59 months living in areas of highly seasonal malaria transmission in this subregion.

DIAGNOSTIC TESTING AND TREATMENT

Accessing care

- Prompt diagnosis and treatment is the most effective means of preventing a mild case of malaria from developing into severe disease and death. Among national-level surveys completed in 18 countries in sub-Saharan Africa between 2014 and 2016 (representing 61% of the population at risk), a median of 47% (interquartile range [IQR]: 38–56%) of children with a fever (febrile) were taken to a trained medical provider for care. This includes public sector hospitals and clinics, formal private sector facilities and community health workers.
- More febrile children sought care in the public sector (median: 34%, IQR: 28–44%) than in the private sector (median: 22%, IQR: 14–34%). However, the surveys from Africa also indicate that a high proportion of febrile children did not receive medical attention (median: 39%, IQR: 29–44%). Possible reasons include poor access to health-care providers or lack of awareness among caregivers.

Diagnosing malaria

- Among 17 national-level surveys completed in sub-Saharan Africa between 2014 and 2016, the proportion of children with a fever who received a finger or a heel stick – suggesting that a malaria diagnostic test may have been performed – was greater in the public sector (median: 52%, IQR: 34–59%) than in both the formal and informal private sector.
- Testing of suspected cases in the public health system increased in most WHO regions since 2010. The WHO African Region recorded the biggest rise, with diagnostic testing in the public health sector increasing from 36% of suspected cases in 2010 to 87% in 2016.

Treating malaria

- Among 18 household surveys conducted in sub-Saharan Africa between 2014 and 2016, the proportion of children aged under 5 years with a fever who received any antimalarial drug was 41% (IQR: 21–49%).
- A majority of patients (70%) who sought treatment for malaria in the public health sector received ACTs, the most effective antimalarial drugs. Children are more likely to be given ACTs if medical care is sought at public health facilities than in the private sector.
- To bridge the treatment gap among children, WHO recommends the uptake of integrated community case management (iCCM). This approach promotes integrated management of common life-threatening conditions in children – malaria, pneumonia and diarrhoea – at health facility and community levels. In 2016, 26 malaria-affected countries had iCCM policies in place, of which 24 had started implementing those policies. An evaluation from Uganda found that districts with iCCM experienced a 21% increase in care-seeking for fever compared with districts without an iCCM policy in place.
- Outside the WHO African Region, only a handful of countries in each of the other regions reported having such policies in place, though data on the level of implementation are unavailable for most countries.

MALARIA SURVEILLANCE SYSTEMS

- Effective surveillance of malaria cases and deaths is essential for identifying the areas or population groups that are most affected by malaria, and for targeting resources for maximum impact. A strong surveillance system requires high levels of access to care and case detection, and complete reporting by all health sectors, whether public or private.
- In 2016, 37 out of 46 countries in the WHO African Region indicated that at least 80% of public health facilities had reported data on malaria through their national health information system. Rates vary within other WHO regions. For example, in the WHO Eastern Mediterranean Region, only three out of eight countries had 80% or more public health facilities reporting in 2016.
- Among 55 countries where the burden of malaria was estimated, 31 countries have a malaria case reporting rate by surveillance systems of less than 50%. This includes the high-burden countries of India and Nigeria.

GLOBAL AND REGIONAL MALARIA TRENDS IN NUMBERS

Malaria cases

- In 2016, an estimated 216 million cases of malaria occurred worldwide (95% confidence interval [CI]: 196–263 million), compared with 237 million cases in 2010 (95% CI: 218–278 million) and 211 million cases in 2015 (95% CI: 192–257 million).
- Most malaria cases in 2016 were in the WHO African Region (90%), followed by the WHO South-East Asia Region (7%) and the WHO Eastern Mediterranean Region (2%).
- Of the 91 countries reporting indigenous malaria cases in 2016, 15 countries – all in sub-Saharan Africa, except India – carried 80% of the global malaria burden.
- The incidence rate of malaria is estimated to have decreased by 18% globally, from 76 to 63 cases per 1000 population at risk, between 2010 and 2016. The WHO South-East Asia Region recorded the largest decline (48%) followed by the WHO Region of the Americas (22%) and the WHO African Region (20%).
- Despite these reductions, between 2014 and 2016, substantial increases in case incidence occurred in the WHO Region of the Americas, and marginally in the WHO South-East Asia, Western Pacific and African regions.
- *Plasmodium falciparum* is the most prevalent malaria parasite in sub-Saharan Africa, accounting for 99% of estimated malaria cases in 2016. Outside of Africa, *P. vivax* is the predominant parasite in the WHO Region of the Americas, representing 64% of malaria cases, and is above 30% in the WHO South-East Asia and 40% in the Eastern Mediterranean regions.
- New data from improved surveillance systems in several countries in the WHO African Region indicate that the number of malaria cases presented in this year's report are conservative estimates. WHO will review its malaria burden estimation methods for sub-Saharan Africa in 2018.

Malaria deaths

- In 2016, there were an estimated 445 000 deaths from malaria globally, compared to 446 000 estimated deaths in 2015.
- The WHO African Region accounted for 91% of all malaria deaths in 2016, followed by the WHO South-East Asia Region (6%).
- Fifteen countries accounted for 80% of global malaria deaths in 2016; all of these countries are in sub-Saharan Africa, except for India.
- All regions recorded reductions in mortality in 2016 when compared with 2010, with the exception of the WHO Eastern Mediterranean Region, where mortality rates remained virtually unchanged in the period. The largest decline occurred in the WHO regions of South-East Asia (44%), Africa (37%) and the Americas (27%).
- However, between 2015 and 2016, mortality rates stalled in the WHO regions of South-East Asia, the Western Pacific and Africa, and increased in the Eastern Mediterranean and the Americas.

MALARIA ELIMINATION

- Globally, more countries are moving towards elimination: in 2016, 44 countries reported fewer than 10 000 malaria cases, up from 37 countries in 2010.
- Kyrgyzstan and Sri Lanka were certified by WHO as malaria free in 2016.
- In 2016, WHO identified 21 countries with the potential to eliminate malaria by the year 2020. WHO is working with the governments in these countries – known as "E-2020 countries" – to support their elimination acceleration goals.
- Although some of E-2020 countries remain on track to achieve their elimination goals, 11 have reported increases in indigenous malaria cases since 2015, and five countries reported an increase of more than 100 cases in 2016 compared with 2015.

CHALLENGES TO ACHIEVING A MALARIA FREE WORLD

- Some of the challenges impeding countries' abilities to stay on track and advance towards elimination include lack of sustainable and predictable international and domestic funding, risks posed by conflict in malaria endemic zones, anomalous climate patterns, the emergence of parasite resistance to antimalarial medicines and mosquito resistance to insecticides.
- WHO is supporting malaria emergency responses in Nigeria, South Sudan, Venezuela (Bolivarian Republic of) and Yemen, where ongoing humanitarian crises pose serious health risks. In Nigeria's Borno State, WHO supported the launch of a mass antimalarial drug administration campaign that reached an estimated 1.2 million children aged under 5 years in targeted areas. Early results point to a reduction in malaria cases and deaths in this state.

Funding

- In 34 out of 41 high-burden countries, which rely mainly on external funding for malaria programmes, the average level of funding available per person at risk in the past 3 years (2014–2016) reduced when compared with 2011–2013. Exceptions were Democratic Republic of the Congo, Guinea, Mauritania, Mozambique, Niger, Pakistan and Senegal, which recorded increases.
- Among the 41 high-burden countries, overall, funding per person at risk of malaria remains below US$ 2.

Histidine-rich protein 2 deletions

- In some settings, increasing levels of histidine-rich protein 2 gene (HRP2) deletions threaten the ability to diagnose and appropriately treat people infected with falciparum malaria. An absence of the HRP2 gene enables parasites to evade detection by HRP2-based RDTs, resulting in a false-negative test result. Although the prevalence of HRP2 gene deletions in most high-transmission countries remains low, further monitoring is required.

Drug resistance

- ACTs have been integral to the recent success of global malaria control, and protecting their efficacy for the treatment of malaria is a global health priority.
- Although multidrug resistance, including artemisinin (partial) resistance and partner drug resistance, has been reported in five countries of the Greater Mekong subregion (GMS), there has been a massive reduction in malaria cases and deaths in this subregion. Monitoring the efficacy of antimalarial drugs has led to timely treatment policy updates across the GMS.
- In Africa, artemisinin (partial) resistance has not been reported to date and first-line ACTs remain efficacious in all malaria endemic settings.

Insecticide resistance

- Of the 76 malaria endemic countries that provided data for 2010 to 2016, resistance to at least one insecticide in one malaria vector from one collection site was detected in 61 countries. In 50 countries, resistance to two or more insecticide classes was reported.
- In 2016, resistance to one or more insecticides was present in all WHO regions, although the extent of monitoring varied.
- Resistance to pyrethroids – the only insecticide class currently used in ITNs – is widespread. The proportion of malaria endemic countries that monitored and subsequently reported pyrethroid resistance increased from 71% in 2010 to 81% in 2016. The prevalence of confirmed resistance to pyrethroids differed between regions, and was highest in the WHO African and Eastern Mediterranean regions, where it was detected in malaria vectors in over two thirds of all sites monitored.
- ITNs continue to be an effective tool for malaria prevention, even in areas where mosquitoes have developed resistance to pyrethroids. This was evidenced in a large multicountry evaluation coordinated by WHO between 2011 and 2016, which did not find an association between malaria disease burden and pyrethroid resistance across study locations in five countries.

Avant-propos

Dr Tedros Adhanom Ghebreyesus
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Pendant plusieurs années, la lutte engagée au niveau mondial face au paludisme a été considérée comme l'une des réussites majeures en matière de santé publique. Maintes fois, l'OMS a fait état du déploiement massif des interventions préventives et thérapeutiques, et de la diminution impressionnante du nombre de cas de paludisme et de décès associés.

En décembre dernier, nous avions noté que la lutte antipaludique suivait une trajectoire inquiétante. En effet, les données indiquaient que moins de la moitié des pays d'endémie palustre étaient en passe d'atteindre les objectifs de baisse de la morbidité et de la mortalité liées au paludisme. Les progrès semblaient alors s'arrêter.

Le *Rapport sur le paludisme dans le monde 2017* montre que cette trajectoire inquiétante se poursuit. Même si les données révèlent quelques points vraiment positifs, la baisse du poids du paludisme au niveau mondial s'est incontestablement ralentie. Par ailleurs, dans certaines régions et dans certains pays, la lutte contre cette maladie est même en recul.

Le poids du paludisme et les tendances au niveau mondial

En 2016, 216 millions de cas de paludisme ont été rapportés dans 91 pays au total, soit une augmentation de 5 millions par rapport à l'année précédente. Le nombre de décès associés a atteint 445 000, quasiment comme en 2015.

Même si l'incidence du paludisme a diminué au niveau mondial depuis 2010, cette tendance ralentit, voire s'inverse dans certaines régions depuis 2014, et l'évolution de la mortalité liée au paludisme est similaire.

La mortalité liée au paludisme a suivi la même tendance, à savoir une baisse de 2010 à 2014, puis une hausse en 2015 et 2016. D'après ce rapport, c'est dans la région Afrique de l'OMS que l'augmentation des cas de paludisme et des décès associés a été la plus significative.

La région Afrique concentre toujours quelque 90 % des cas de paludisme et des décès associés dans le monde. Quinze pays, tous en Afrique subsaharienne sauf un, représentent 80 % du poids du paludisme au niveau mondial. De toute évidence, pour corriger le tir et ramener la lutte contre le paludisme dans la bonne direction, notre priorité doit être d'aider les pays les plus durement touchés dans cette région.

La couverture sanitaire universelle

En tant que Directeur général de l'OMS, atteindre la couverture universelle des soins de santé est ma priorité. Cet objectif repose sur la conviction morale que toutes les personnes et toutes les

communautés doivent accéder à des services de santé de qualité, partout et à tout moment, indépendamment de leur lieu de résidence et situation financière.

À cet égard, où en sont les pays par rapport à la prestation de services de prévention, de dépistage et de traitement du paludisme pour tous ceux qui en ont besoin ? Même si des avancées considérables ont été réalisées sur cette voie, les progrès doivent nettement s'accentuer pour que nous puissions atteindre nos cibles mondiales pour 2020 et au-delà en matière de paludisme.

En 2016, à peine plus de la moitié (54 %) de la population exposée au risque de paludisme en Afrique subsaharienne dormait sous moustiquaire imprégnée d'insecticide, la principale mesure préventive. Ce taux de couverture est largement supérieur à celui de 2010, mais reste loin de l'objectif d'accès universel.

La pulvérisation intradomiciliaire d'insecticides à effet rémanent (PID) est une autre mesure importante de prévention du paludisme. Le présent rapport révèle néanmoins que la couverture en PID a diminué dans toutes les régions de l'OMS depuis 2010, et qu'elle est en chute libre dans la région Afrique.

Un diagnostic précoce et un traitement rapide sont les moyens les plus efficaces de prévenir l'aggravation des cas de paludisme et les décès associés. Dans la région Afrique de l'OMS, la plupart des personnes qui sollicitent des soins dans le secteur public reçoivent un diagnostic précis et un traitement efficace.

Néanmoins, l'accès au système de santé publique reste très limité. Des enquêtes nationales réalisées dans la région Afrique de l'OMS indiquent que seulement un tiers environ (34 %) des enfants fiévreux consultent un prestataire médical qualifié.

Un niveau d'investissement inadéquat

Un niveau d'investissement annuel de l'ordre de US$ 6,5 milliards au moins est requis d'ici à 2020 pour atteindre les cibles de la *Stratégie technique mondiale de lutte contre le paludisme* de l'OMS. Or, les US$ 2,7 milliards investis en 2016 représentent moins de la moitié de ce montant. Depuis 2014, les investissements dans le contrôle du paludisme ont, en moyenne, diminué dans de nombreux pays où le poids de la maladie est le plus lourd ; il s'agit là d'un élément très préoccupant.

La lutte contre le paludisme à la croisée des chemins

Le choix est clair à présent. Si nous continuons comme si de rien n'était, à savoir nous dégageons le même niveau de ressources et utilisons les mêmes interventions, le nombre de cas de paludisme et de décès associés augmentera à coup sûr.

Nous espérons que les pays et la communauté sanitaire mondiale choisiront une autre approche, laquelle permettra d'entraîner une augmentation des financements pour les programmes de lutte contre le paludisme, un accès plus étendu aux interventions efficaces et des investissements plus importants pour la recherche et le développement de nouveaux outils.

Comme je l'ai dit précédemment, les pays doivent être aux commandes. Ce sont eux qui, au bout du compte, sont seuls responsables de la santé de leurs citoyens. La couverture sanitaire universelle est en effet un choix politique qui demande du courage, de la compassion et une vision à long terme.

Après avoir combattu pendant de nombreuses années le fléau du paludisme en Éthiopie, je sais que nous sommes face à un adversaire coriace. Je reste cependant convaincu que nous pouvons gagner cette bataille. Avec des ressources financières adéquates et une direction politique forte, nous pouvons et nous allons repartir dans le bon sens, sur la voie d'un monde sans paludisme.

POINTS ESSENTIELS PAR CHAPITRE

Le rapport de cette année en un clin d'œil

- Le *Rapport sur le paludisme dans le monde 2017* fournit un état des lieux complet des progrès réalisés au niveau mondial en matière de lutte contre le paludisme jusque fin 2016. Il suit les progrès dans les domaines suivants : investissements dans les programmes et la recherche antipaludiques ; prévention, diagnostic et traitement du paludisme ; surveillance ; morbidité et mortalité palustres ; élimination du paludisme et surveillance. Enfin, il fait état des problématiques qui menacent la lutte antipaludique et les investissements consentis à ce jour.

- Le rapport de cette année paraît un an après l'introduction i) de la *Stratégie technique de lutte contre le paludisme 2016-2030* (GTS) et ses trois objectifs assortis d'échéances précises pour l'accélération des progrès vers le contrôle et l'élimination du paludisme, ii) du plan de plaidoyer *Action et Investissement pour vaincre le paludisme 2016-2030 – pour un monde sans paludisme* (AIM) élaboré par le Partenariat RBM, et iii) des Objectifs de développement durable (ODD) et la cible 3.3 visant à mettre fin à l'épidémie de sida, à la tuberculose, au paludisme et aux maladies tropicales négligées.

- Le GTS et l'AIM sont cohérents avec les ODD, avec des cibles définies pour 2020, 2025 et 2030 par rapport à un point de référence qui est 2015. Dans le domaine du paludisme, l'atteinte de la cible 3.3. des ODD d'ici 2030 est interprétée comme la réalisation des cibles du GTS et de l'AIM.

- Les principales sources d'informations pour cette édition 2017 sont les rapports émanant de 94 pays. Ces informations sont complétées par des données issues d'enquêtes nationales réalisées auprès des ménages et des bases de données d'autres organisations partenaires.

INVESTISSEMENTS DANS LES PROGRAMMES ET LA RECHERCHE ANTIPALUDIQUES

Investissements dans le contrôle et l'élimination du paludisme

- En 2016, US$ 2,7 milliards ont été investis par les gouvernements des pays endémiques et les partenaires internationaux pour le contrôle et l'élimination du paludisme.
- En 2016, la majorité (74 %) des investissements ont été dirigés vers la région Afrique de l'OMS, suivie par les régions Asie du Sud-Est (7 %), Méditerranée orientale et Amériques (6 % chacune), et Pacifique occidental (4 %).
- En 2016, les gouvernements des pays endémiques sont à l'origine de 31 % du financement total (US$ 800 millions).
- Les États-Unis ont été le premier bailleur de fonds international pour les programmes de lutte contre le paludisme en 2016 avec US$ 1 milliard investis (38 % du total), suivis d'autres bailleurs de fonds internationaux, notamment la France, l'Allemagne et le Japon.
- En 2016, plus de la moitié (57 %) des ressources financières ont transité par le Fonds mondial de lutte contre le sida, la tuberculose et le paludisme (Fonds mondial).

Perspectives d'investissement

- Même si le financement de la lutte contre le paludisme est relativement stable depuis 2010, l'investissement de 2016 est loin d'atteindre le niveau requis pour réaliser le premier objectif intermédiaire du GTS, à savoir réduire d'au moins 40 % l'incidence du paludisme et la mortalité associée au plan mondial par rapport à 2015.
- Pour atteindre cet objectif, le GTS a estimé que les financements devaient passer à US$ 6,5 milliards par an d'ici 2020. Les US$ 2,7 milliards investis pour lutter contre le paludisme en 2016 représentent moins de la moitié (41 %) de ce montant.
- Pour réaliser les objectifs du GTS, il est essentiel d'augmenter les investissements dans la recherche et le développement sur le paludisme. En 2015, US$ 572 millions ont été dépensés dans ce domaine, soit 83 % des besoins annuels estimés.

Livraison de produits antipaludiques

Moustiquaires imprégnées d'insecticide

- Les fabricants de moustiquaires imprégnées d'insecticide (MII) ont indiqué en avoir livré 582 millions dans le monde entre 2014 et 2016.
- À elle seule, l'Afrique subsaharienne en a reçu 505 millions, par rapport à 301 millions sur la précédente période de trois ans (2011-2013).
- En Afrique, les données issues des programmes nationaux de lutte contre le paludisme (PNLP) indiquent qu'entre 2014 et 2016, 75 % des MII ont été distribuées par le biais des campagnes de distribution de masse.

Tests de diagnostic rapide

- En 2016, 312 millions de tests de diagnostic rapide (TDR) ont été livrés dans le monde, dont 269 millions dans la région Afrique de l'OMS.
- Le nombre de TDR distribués par les PNLP a augmenté entre 2010 et 2015, mais a baissé entre 2015 et 2016, passant de 247 à 221 millions. Cette diminution est uniquement causée par la baisse des livraisons en Afrique subsaharienne sur cette période, de 219 millions de TDR en 2015 à 177 millions en 2016.

Combinaisons thérapeutiques à base d'artémisinine

- En 2016, les pays ont acheté 409 millions de traitements par combinaison thérapeutique à base d'artémisinine (ACT), contre 311 millions en 2015. Plus de 69 % de ces achats auraient été effectués pour le secteur public.
- Le nombre de traitements par ACT distribués par les PNLP au secteur public a augmenté de 192 millions en 2013 à 198 millions en 2016. Quasiment tous (99 %) les ACT distribués l'ont été dans la région Afrique de l'OMS.

PRÉVENTION DU PALUDISME

Lutte antivectorielle

- En Afrique subsaharienne, le pourcentage des ménages ayant au moins une MII a augmenté, passant de 50 % en 2010 à 80 % en 2016. Néanmoins, la part des ménages ayant un nombre de MII suffisant (une MII pour deux membres du foyer) est encore trop faible (43 %) en 2016.
- En Afrique, la population à risque est plus nombreuse à dormir sous MII. En 2016, la part de la population protégée par cette intervention était de 54 %, contre 30 % en 2010.
- La part de la population à risque protégée par pulvérisation intradomiciliaire d'insecticides à effet rémanent (PID), une mesure préventive qui consiste à pulvériser d'insecticides les murs intérieurs des habitations, a diminué. Au niveau mondial, le taux de couverture de cette intervention a baissé, d'un pic de 5,8 % en 2010 à 2,9 % en 2016, et cette tendance a été observée dans toutes les régions de l'OMS. Dans la région Afrique, la population à risque protégée par PID est passé de 80 millions en 2010 à 45 millions en 2016.
- Le taux de couverture en PID diminue dès lors que les pays changent de classe d'insecticides pour utiliser des produits moins onéreux.

Traitements préventifs

- En Afrique, pour protéger les femmes vivant dans des zones de transmission modérée à élevée, l'OMS recommande le traitement préventif intermittent pendant la grossesse (TPIp) par sulfadoxine-pyriméthamine. Sur 23 pays africains ayant communiqué des données de couverture en TPIp en 2016, 19 % des femmes enceintes éligibles avaient reçu au moins trois doses de TPIp (comme recommandé par l'OMS), contre 18 % en 2015 et 13 % en 2014.
- En 2016, 15 millions d'enfants vivant dans 12 pays d'Afrique sahélienne ont été protégés par des programmes de chimioprévention du paludisme saisonnier (CPS). Cependant, quelque 13 millions d'enfants qui auraient pu bénéficier de cette intervention n'ont pas été couverts, principalement à cause d'un manque de financements. Depuis 2012, la CPS est recommandée par l'OMS pour les enfants âgés de 3 à 59 mois vivant dans des zones de cette sous-région où la transmission du paludisme a un caractère fortement saisonnier.

DIAGNOSTIC ET TRAITEMENT

Accès aux soins

- Un diagnostic précoce et un traitement rapide sont les moyens les plus efficaces de prévenir l'aggravation des cas de paludisme et les décès associés. D'après les enquêtes nationales réalisées dans 18 pays d'Afrique subsaharienne entre 2014 et 2016 (représentant 61 % de la population à risque), une médiane de 47 % (écart interquartile [ÉI] : 38 %-56 %) des enfants ayant eu de la fièvre ont sollicité des soins auprès d'un prestataire formé, à savoir qu'ils se sont rendus dans un hôpital ou une clinique du secteur public, un établissement privé formel ou ont consulté un agent de santé communautaire.
- Les enfants ayant eu de la fièvre et ayant sollicité des soins ont été plus nombreux à se rendre dans un établissement public (médiane de 34 %, ÉI : 28 %-44 %) que dans un établissement privé (médiane de 22 %, ÉI : 14 %-34 %). Toutefois, les enquêtes réalisées en Afrique indiquent également qu'une part importante des enfants n'ont pas reçu de soins médicaux (médiane de 39 %, ÉI : 29 %-44 %), ce qui s'explique peut-être par un accès limité aux prestataires de santé ou par un manque de connaissances de la part du personnel soignant.

Diagnostic

- Sur 17 enquêtes nationales réalisées en Afrique subsaharienne entre 2014 et 2016, la part des enfants fiévreux ayant subi un prélèvement sanguin au doigt ou au talon (laissant penser qu'un test de dépistage du paludisme a été réalisé) a été plus élevée dans le secteur public (médiane de 52 %, ÉI : 34 %-59 %) que dans le secteur privé formel et informel.
- Le dépistage des cas suspectés de paludisme a augmenté dans le secteur public depuis 2010 et ce, dans la plupart des régions de l'OMS. La hausse la plus prononcée est observée dans la région Afrique de l'OMS, avec un taux de dépistage passé de 36 % en 2010 à 87 % en 2016.

Traitement

- Sur 18 enquêtes nationales réalisées en Afrique subsaharienne auprès des ménages entre 2014 et 2016, le pourcentage d'enfants de moins de 5 ans, fiévreux et ayant reçu un médicament antipaludique, a atteint 41 % (ÉI : 21 %–49 %).
- La majorité des patients (70 %) ayant sollicité un traitement antipaludique dans le secteur public ont reçu un ACT, le médicament le plus efficace. Lorsque les soins sont sollicités dans un établissement public, les enfants sont plus susceptibles de recevoir un traitement antipaludique par ACT que lorsqu'ils sont orientés vers le secteur privé.
- Pour combler les écarts de traitement parmi les enfants, l'OMS recommande la prise en charge intégrée des cas dans la communauté (PEC-C). Cette approche favorise la gestion intégrée des causes de mortalité infantile, à savoir paludisme, pneumonie et diarrhée, au niveau des établissements de santé et de la communauté. En 2016, 26 pays d'endémie palustre avaient des politiques de PEC-C en place, et leur mise en œuvre avait commencé dans 24 d'entre eux. D'après une évaluation réalisée en Ouganda, les districts où la PEC-C est en place enregistrent des taux de sollicitation des soins en cas de fièvre 21 % plus élevés qu'ailleurs.
- En dehors de la région Afrique de l'OMS, seuls quelques pays dans chacune des autres régions ont indiqué avoir cette politique en place. Les données quant à leur niveau de mise en œuvre ne sont cependant pas disponibles pour la plupart de ces pays.

SYSTÈMES DE SURVEILLANCE DU PALUDISME

- Des systèmes efficaces pour la surveillance des cas de paludisme et des décès associés sont essentiels pour identifier les groupes de population ou les zones les plus touché(e)s par le paludisme et pour cibler les ressources en vue d'un impact optimal. Un système de surveillance solide requiert des niveaux élevés d'accès aux soins et au dépistage des cas, et présuppose que les secteurs public et privé de la santé communiquent des rapports exhaustifs.
- En 2016, 37 des 46 pays de la région Afrique ont indiqué qu'au moins 80 % des établissements publics avaient rapporté des données sur le paludisme par le biais de leur système national d'information sanitaire. Ce pourcentage est variable au sein des différentes régions : par exemple, il n'est supérieur ou égal à 80 % que dans seulement trois des huit pays de la région Méditerranée orientale de l'OMS en 2016.
- Sur les 55 pays pour lesquels le poids du paludisme a fait l'objet d'une estimation, 31 ont un taux de déclaration des cas par les systèmes de surveillance inférieur à 50 %. Parmi eux on retrouve deux pays où le paludisme pèse lourdement : l'Inde et le Nigéria.

CHIFFRES SUR L'ÉVOLUTION DU PALUDISME AU NIVEAU RÉGIONAL ET MONDIAL

Cas de paludisme

- Au niveau mondial, le nombre de cas de paludisme est estimé à 216 millions en 2016 (intervalle de confiance [IC] de 95 % : 196-263 millions), contre 237 millions en 2010 (IC de 95 % : 218-278 millions) et 211 millions en 2015 (IC de 95 % : 192-257 millions).
- La plupart des cas (90 %) ont été enregistrés dans la région Afrique de l'OMS, loin devant la région Asie du Sud-Est (7 %) et la région Méditerranée orientale (2 %).
- Sur les 91 pays ayant rapporté des cas de paludisme indigène en 2016, 15 représentent 80 % du nombre de cas de paludisme dans le monde et tous, sauf l'Inde, sont en Afrique subsaharienne.
- Au niveau mondial, l'incidence du paludisme est estimée en baisse de 18 % ; elle passe en effet de 76 cas de paludisme pour 1 000 habitants exposés au risque de paludisme en 2010 à 63 pour 1 000 en 2016. La région Asie du Sud-Est de l'OMS enregistre la baisse la plus prononcée (48 %), suivie des régions Amériques (22 %) et Afrique (20 %).
- En dépit de ces progrès, l'incidence du paludisme a augmenté de façon significative entre 2014 et 2016 dans la région Amériques de l'OMS, et de manière plus marginale, dans les régions Afrique, Asie du Sud-Est et Pacifique occidental de l'OMS.

- *P. falciparum* est le parasite du paludisme le plus prévalent en Afrique subsaharienne ; il est en effet à l'origine de 99 % des cas de paludisme estimés en 2016. Hors Afrique, *P. vivax* prédomine dans la région Amériques (64 % des cas) de l'OMS, et représente plus de 30 % des cas dans la région Méditerranée orientale et plus de 40 % dans la région Asie du Sud-Est de l'OMS.
- Les nouvelles données issues des systèmes de surveillance améliorés dans plusieurs pays d'Afrique subsaharienne laissent apparaître que le nombre de cas de paludisme, tel qu'indiqué dans le présent rapport, reflète une estimation conservatrice. En 2018, l'OMS reverra ses méthodes d'estimation du poids du paludisme en Afrique subsaharienne.

Mortalité associée

- Au niveau mondial, le nombre de décès dus au paludisme a été estimé à 445 000, contre 446 000 en 2015.
- En 2016, la plupart de ces décès sont survenus dans la région Afrique (91 %) de l'OMS, loin devant la région Asie du Sud-Est (6 %).
- L'an passé, 80 % des décès dus au paludisme dans le monde ont été concentrés dans 15 pays et tous, sauf l'Inde, sont en Afrique subsaharienne.
- Par rapport à 2010, la mortalité liée au paludisme diminue dans toutes les régions de l'OMS en 2016, sauf dans la région Méditerranée orientale où elle demeure quasiment inchangée. Les baisses les plus prononcées ont été observées dans les régions Asie du Sud-Est (44 %), Afrique (37 %) et Amériques (27 %).
- Toutefois, entre 2015 et 2016, la baisse de la mortalité liée au paludisme a connu un coup d'arrêt dans les régions Asie du Sud-Est, Pacifique occidental et Afrique, et elle a augmenté dans les régions Amériques et Méditerranée orientale.

ÉLIMINATION DU PALUDISME

- Au niveau mondial, les pays qui avancent sur la voie de l'élimination sont plus nombreux : en 2016, 44 pays ont rapporté moins de 10 000 cas de paludisme, contre 37 en 2010.
- En 2016, le Kirghizistan et le Sri Lanka ont été certifiés exempts de paludisme par l'OMS.
- En 2016, l'OMS a identifié 21 pays ayant le potentiel pour éliminer le paludisme d'ici 2020. L'OMS travaille avec les gouvernements de ces pays « E-2020 » pour les aider à atteindre leurs objectifs d'élimination.
- Même si certains de ces pays restent sur la bonne voie pour atteindre leurs objectifs d'élimination du paludisme, 11 ont rapporté une augmentation des cas de paludisme indigène depuis 2015 et 5 ont recensé une augmentation de plus de 100 cas en 2016 par rapport à 2015.

DÉFIS SUR LA VOIE D'UN MONDE SANS PALUDISME

- Certaines des problématiques empêchant les pays d'avancer sur la voie de l'élimination sont, en particulier, le manque de financements nationaux et internationaux durables et prévisibles, les risques liés aux conflits dans les zones d'endémie, les schémas climatiques anormaux, l'émergence de la résistance du parasite aux médicaments antipaludiques et la résistance du moustique aux insecticides.
- L'OMS apporte son soutien aux opérations d'urgence au Nigéria, Soudan du Sud, Venezuela (République bolivarienne du) et Yémen, là où les crises humanitaires posent de sérieux problèmes sanitaires. Dans l'état de Borno au Nigéria, l'OMS a contribué au lancement d'une campagne d'administration de masse de médicaments auprès de quelque 1,2 million d'enfants de moins de 5 ans dans les zones ciblées. Des résultats préliminaires laissent supposer une réduction du nombre de cas et de décès dans cet état.

Financement

- Dans 34 des 41 pays où le paludisme sévit le plus, lesquels dépendent en grande partie des financements externes pour leurs programmes de lutte contre le paludisme, le niveau moyen de financement disponible par personne à risque au cours des trois dernières années (2014 à 2016) a diminué par rapport à la période 2011-2013. Les exceptions sont la Guinée, la Mauritanie, le Mozambique, le Niger, le Pakistan, la République démocratique du Congo et le Sénégal qui ont enregistré des augmentations.
- Dans l'ensemble des 41 pays où le paludisme sévit le plus, le financement par personne à risque reste en deçà de US$ 2.

Suppression de la protéine riche en histidine 2

- Dans certaines zones, des niveaux croissants de suppression de la protéine riche en histidine 2 (HRP2) menacent la capacité à dépister et à traiter de manière appropriée les personnes infectées par le parasite *P. falciparum*. Le gène HRP2 manquant permet au parasite d'échapper au dépistage par un TDR courant, ce qui produit un faux résultat de test négatif. Même si la prévalence de la suppression du gène HRP2 reste faible dans la plupart des zones à forte transmission, un renforcement du suivi est nécessaire.

Résistance aux antipaludiques

- Les ACT ont un rôle important dans le succès de la lutte contre le paludisme au niveau mondial, et protéger leur efficacité de traitement est une priorité mondiale en matière de santé.
- Même si la multirésistance, qui inclut la résistance (partielle) aux artémisinines et aux médicaments partenaires, a été détectée dans cinq pays de la sous-région du Grand Mékong, on a pu observer une réduction massive du nombre de cas de paludisme et de décès associés dans cette sous-région. La surveillance de l'efficacité des médicaments antipaludiques a permis une mise à jour rapide des politiques de traitement dans la sous-région.
- En Afrique, aucune résistance (partielle) aux artémisinines n'a été rapportée à ce jour, et les ACT de première ligne restent efficaces dans toutes les zones d'endémie palustre.

Résistance aux insecticides

- Sur les 76 pays d'endémie palustre ayant fourni des données pour la période 2010-2016, la résistance à au moins un insecticide chez l'un des vecteurs du paludisme sur un site de collecte a été détectée dans 61 pays. Dans 50 pays, la résistance a été rapportée à au moins deux classes d'insecticides.
- En 2016, la résistance à au moins un insecticide a été observée dans toutes les régions de l'OMS, malgré des niveaux de suivi variables d'une région à l'autre.
- La résistance aux pyréthoïdes, la seule classe d'insecticides actuellement utilisés dans les MII, est étendue. La part des pays d'endémie palustre ayant effectué un suivi et rapporté une résistance aux pyréthoïdes a augmenté de 71 % en 2010 à 81 % en 2016. La prévalence d'une résistance confirmée aux pyréthoïdes diffère d'une région à l'autre ; elle est ainsi plus élevée dans les régions Afrique et Méditerranée orientale là où elle a été détectée chez les vecteurs du paludisme sur les deux tiers des sites suivis.
- Les MII restent efficaces pour la prévention du paludisme, même dans les zones où les moustiques ont développé une résistance aux pyréthoïdes. Il s'agit là du résultat d'une large évaluation coordonnée par l'OMS dans plusieurs pays entre 2011 et 2016, et n'ayant établi d'association entre poids du paludisme et résistance aux pyréthoïdes sur aucun site d'essai dans cinq pays.

Prefacio

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Durante muchos años, la respuesta mundial al paludismo fue considerada uno de los grandes logros mundiales de la salud pública. La OMS informó una y otra vez sobre la distribución masiva de herramientas efectivas para cortar con la enfermedad y sobre reducciones impresionantes en casos y muertes.

En diciembre pasado, notamos un cambio preocupante en la trayectoria de esta enfermedad. Los datos mostraron que menos de la mitad de los países con transmisión continua, estaban en camino de alcanzar los objetivos críticos para la reducción en muertes y casos causados por el paludismo. El progreso parecía haberse estancado.

El *Informe Mundial sobre el Paludismo de 2017* muestra que esta preocupante tendencia continúa. Si bien hay algunas excepciones, la tendencia general de disminución de la carga mundial del paludismo se ha estancado sin lugar a dudas. Y, en algunos países y regiones, estamos comenzando a ver retrocesos en los logros.

Carga y tendencias globales de la enfermedad

En 2016, 91 países reportaron un total de 216 millones de casos de paludismo, un incremento de 5 millones de casos con relación al año anterior. El total de muertes a nivel global llegó a 445 000, similar a lo reportado en 2015.

Si bien la incidencia de casos de paludismo ha disminuido a nivel mundial desde 2010, la tasa de disminución se ha estancado e incluso revertido en algunas regiones desde 2014. Las tasas de mortalidad han seguido un patrón similar.

La Región de África continúa representando alrededor del 90% de los casos de paludismo y muertes en todo el mundo. Quince países, todos menos uno en el África subsahariana, tienen el 80% de la carga mundial de paludismo. Claramente, si queremos volver a encarrilar la respuesta mundial al paludismo, nuestro foco principal debe ser respaldar a los países más gravemente afectados en esta región.

Extender la atención médica a todos

Como Director General de la OMS, lograr la cobertura universal en salud es mi principal prioridad. Esto se basa en la convicción moral de que se debe garantizar a todas las personas el acceso a los servicios de salud que necesitan, cuando y donde los necesiten, independientemente de dónde vivan o de su situación financiera.

Con este fin, ¿cómo han avanzado los países en la prestación de servicios para prevenir, diagnosticar y tratar el paludismo a todos los que lo necesitan? Si bien hemos avanzado mucho, el ritmo del progreso debe acelerarse enormemente si queremos alcanzar nuestros objetivos mundiales contra el paludismo para 2020 y posteriormente.

En 2016, poco más de la mitad (54%) de las personas en riesgo de contraer paludismo en el África subsahariana dormían bajo un mosquitero tratado con insecticida, el método principal de prevención. Este nivel de cobertura representa un aumento considerable desde 2010, pero está lejos del objetivo de acceso universal.

Rociar las paredes interiores de las casas con insecticidas (RRI) es otra medida de prevención importante. El informe documenta una caída precipitada en la cobertura del RRI en la región de África desde 2010, así como una disminución en todas las demás regiones de la OMS en este mismo período.

El diagnóstico y el tratamiento oportunos son los medios más eficaces para prevenir que un caso leve de paludismo se convierta en una enfermedad grave y en la muerte. En la región de África de la OMS, la mayoría de las personas que buscan tratamiento para el paludismo en el sistema de salud pública reciben un diagnóstico preciso y medicamentos efectivos.

Sin embargo, el acceso al sistema de salud pública sigue siendo demasiado bajo. Las encuestas a nivel nacional en la región de África de la OMS muestran que solo alrededor de un tercio (34%) de los niños con fiebre son llevados a un proveedor médico en este sector.

Inversión inadecuada

Se requerirá una inversión mínima de 6,5 mil millones de dólares anuales para 2020 a fin de cumplir los objetivos 2030 de la estrategia mundial de la OMS contra el paludismo. Los US $ 2,7 mil millones invertidos en 2016 representan menos de la mitad de esa cantidad. De particular preocupación: desde 2014, las inversiones en control del paludismo han disminuido, en promedio, en muchos países de alta carga.

Respuesta al paludismo en una encrucijada

La elección que tenemos ante nosotros es clara. Si continuamos con un enfoque de "negocios normales", empleando el mismo nivel de recursos y las mismas intervenciones, tendremos que enfrentar aumentos en los casos de paludismo y muertes.

Es nuestra esperanza que los países y la comunidad de salud global elijan otro enfoque, lo que resultará en un impulso en el financiamiento de los programas contra el paludismo, un mayor acceso a intervenciones efectivas y una mayor inversión en investigación y en desarrollo de nuevas herramientas.

Como he dicho antes, los países deben estar en el asiento del conductor; ellos son los últimos responsables de la salud de sus ciudadanos. La cobertura universal de salud es de hecho una opción política, una que requiere coraje, compasión y visión a largo plazo.

Después de pasar muchos años luchando contra el flagelo del paludismo en Etiopía, sé que nos enfrentamos a un adversario duro. Pero también estoy convencido de que esta es una batalla que se puede ganar. Con sólidos recursos financieros y liderazgo político, podemos, y lo haremos, volver el péndulo hacia un mundo libre de paludismo.

PUNTOS CLAVE POR CAPITULO

El informe de este año de un vistazo

- El *Informe Mundial sobre el Paludismo de 2017* presenta el estado actual del progreso global en la lucha contra el paludismo hasta el final de 2016. Hace un seguimiento del progreso de las inversiones en los programas y de las investigaciones sobre el paludismo; su prevención; diagnóstico y tratamiento; vigilancia; tendencias en la carga de la enfermedad; eliminación del paludismo y amenazas para enfrentar esta enfermedad y salvaguardar las inversiones realizadas.

- El informe de este año llega un año después del lanzamiento de tres hitos, con plazos definidos, para acelerar el progreso hacia el control y la eliminación del paludismo: la *Estrategia Técnica Mundial contra la Malaria 2016–2030 (ETM)* de la OMS, el plan de acción para Hacer Retroceder el Paludismo, *Acción e Inversión para derrotar el Paludismo 2016-2030 (AIP) y los Objetivos de Desarrollo Sostenible* (ODS) con la meta 3.3 centrada en el SIDA, la tuberculosis, el paludismo y las enfermedades tropicales desatendidas.

- El ETM y el AIP están alineados con los ODS, con los objetivos establecidos para los años 2020, 2025 y 2030, tomando como referencia el 2015. Para el paludismo, lograr el objetivo 3.3 de los ODS en 2030 se interpreta como el logro de los objetivos de la ETM y el AIP.

- Las principales fuentes de información para la edición de este año son los informes de 94 países. Esta información se complementa con datos de encuestas de hogares representativas a nivel nacional y bases de datos de otras organizaciones asociadas.

INVERSIONES EN LOS PROGRAMAS DE PALUDISMO E INVESTIGACIÓN

Inversiones para el control y eliminación del paludismo

- En 2016, los gobiernos de países con paludismo endémico y socios internacionales invirtieron aproximadamente 2,7 mil millones de dólares estadounidenses para el control de paludismo y esfuerzos de eliminación a nivel mundial.
- La mayoría de los recursos (74%) se invirtieron, en 2016, en la región de África de la OMS, seguido por la región de Asia Sudoriental (7%), el Mediterráneo Oriental y la región de las Américas (cada uno con 6%) y el Pacifico Occidental (4%).
- Los gobiernos de países endémicos proporcionaron el 31% del financiamiento total (US $ 800 millones) en 2016.
- Los Estados Unidos de América (EE. UU.) fueron el principal financiador internacional en 2016, aportando mil millones de dólares estadounidenses (38%), seguidos por el Reino Unido de Gran Bretaña e Irlanda del Norte (Reino Unido), y otros socios internacionales, incluyendo a Francia, Alemania y Japón.
- Más de la mitad (57%) de los recursos en 2016 se canalizaron a través del Fondo Mundial de Lucha contra el SIDA, la Tuberculosis y el Paludismo (Fondo Mundial).

Perspectiva de inversión

- Si bien la financiación para el paludismo se ha mantenido relativamente estable desde 2010, el nivel de inversión en 2016 está lejos de lo requerido para alcanzar el primer hito del EMT, que es lograr una reducción del 40% en la incidencia de casos y mortalidad por paludismo a nivel mundial en comparación con 2015.
- Para alcanzar este hito, el EMT estimó que la financiación anual tendría que aumentar a 6.500 millones de dólares estadounidenses por año para 2020. Los 2.700 millones de dólares invertidos en paludismo en 2016 representan menos de la mitad (41%) de esa cantidad.
- Intensificar las inversiones en investigación del paludismo y desarrollo es clave para lograr el EMT. En 2015, se gastaron US $ 572 millones en esta área, lo que representa el 83% del estimado anual necesario para investigación y desarrollo.

Entrega de productos básicos para el paludismo

Mosquiteros tratados con insecticida

- Entre 2014 y 2016, los fabricantes informaron de que un total de 582 millones de mosquiteros tratados con insecticida (MTI) han sido entregados en todo el mundo.
- De esta cantidad, se entregaron 505 millones de MTI en el África subsahariana, en comparación con 301 millones de mosquiteros durante los tres años anteriores (2011-2013).
- Los datos de los programas nacionales de control del paludismo (PNCP) en África indican que entre 2014 y 2016, el 75% de los MTI se distribuyeron a través de campañas de distribución masiva.

Pruebas de diagnóstico rápido

- Un estimado de 312 millones de pruebas de diagnóstico rápido (PDR) se entregaron a nivel mundial en 2016. De éstos, 269 millones se entregaron en la región de África de la OMS.
- El número de PDR distribuidas por los PNCP aumentó entre 2010 y 2015, pero disminuyó de 247 millones en 2015 a 221 millones en 2016. La disminución se produjo completamente en el África subsahariana, donde las distribución disminuyó de 219 millones a 177 millones de PDR durante el período 2015 -2016.

Terapia combinada basada en artemisinina

- Un estimado de 409 millones de tratamientos de terapia combinada basada en artemisinina (TCA) fueron adquiridos por los países en 2016, un aumento comparado con 311 millones en 2015. Se informó que más del 69% de estas adquisiciones se hicieron por el sector público.
- El número de tratamientos de TCA distribuidos por los PNCP al sector público aumentó de 192 millones en 2013 a 198 millones en 2016. La mayoría de las distribuciones de TCA (99%) por los PNCP en 2016 ocurrieron en la región de África de la OMS.

PREVENCIÓN DEL PALUDISMO

Control de vectores

- En el África subsahariana, las viviendas con al menos un MTI aumentó del 50% en 2010 al 80% en 2016. Sin embargo, la proporción de viviendas con mosquiteros suficientes (un mosquitero por cada dos personas) sigue siendo inadecuado, 43% en 2016.
- Más personas en riesgo de paludismo en África están durmiendo bajo un MTI. En 2016, el 54% de la población estaba protegida por esta intervención, aumentando del 30% en 2010.
- Menos personas en riesgo de paludismo están siendo protegidas por el rociamiento residual intradomiciliar (RRI), un método de prevención que consiste en rociar con insecticidas las paredes interiores de las viviendas. A nivel mundial, la protección con RRI disminuyó de un pico del 5,8% en 2010 al 2,9% en 2016, con disminuciones en todas las regiones de la OMS. En la región de África de la OMS, la cobertura disminuyó de 80 millones de personas protegidas en 2010 a 45 millones en 2016.
- Las reducciones en la cobertura del RRI ocurren a medida que los países cambian o rotan la clase de insecticidas a químicos más caros.

Terapias preventivas

- Para proteger a las mujeres en áreas de transmisión alta y moderada de paludismo en África, la OMS recomienda "tratamiento preventivo intermitente en el embarazo" (TPI) con el medicamento antipalúdico sulfadoxina-pirimetamina. Entre los 23 países africanos que informaron niveles de cobertura de TPI en 2016, se estima que el 19% de las mujeres embarazadas elegibles recibieron las tres o más dosis recomendadas de TPI, en comparación con el 18% en 2015 y el 13% en 2014.
- En 2016, 15 millones de niños de 12 países de la subregión del Sahel en África fueron protegidos mediante programas de quimio-prevención estacional del paludismo (QEP). Sin embargo, alrededor de 13 millones de niños que podrían haberse beneficiado de esta intervención no se cubrieron, principalmente debido a la falta de fondos. Desde 2012, QEP ha sido recomendado por la OMS para niños de entre 3 y 59 meses que viven en áreas de transmisión altamente estacional de paludismo en esta subregión.

DIAGNÓSTICO Y TRATAMIENTO

Acceso a la atención

- El diagnóstico y el tratamiento oportunos son los medios más eficaces para prevenir que un caso leve de paludismo se convierta en una enfermedad grave y en la muerte. Entre las encuestas a nivel nacional realizadas en 18 países del África subsahariana entre 2014 y 2016 (que representan el 61% de la población en riesgo), una mediana del 47% (Rango Intercuartil (RI): 38-56%) de niños con fiebre (febriles) fueron llevados a un proveedor de atención médica capacitado para su cuidado. Esto incluye hospitales y clínicas del sector público, instalaciones formales del sector privado y trabajadores de salud comunitarios.
- Más niños febriles buscaron atención en el sector público (mediana: 34%, RI: 28-44%) que en el sector privado (mediana: 22%, RI: 14-34%). Sin embargo, las encuestas de África también indican que una alta proporción de niños febriles no recibió atención médica (mediana: 39%; RI: 29-44%). Las posibles razones incluyen acceso deficiente a los prestadores de servicios de salud o la falta de conciencia entre los cuidadores.

Diagnóstico del paludismo

- En 17 encuestas a nivel nacional realizadas en África subsahariana entre 2014 y 2016, la proporción de niños con fiebre que recibieron punción digital o de talón, lo que sugiere que se pudo haber realizado una prueba diagnóstica de paludismo, fue mayor en el sector público (mediana: 52%, RI: 34-59%) que en el sector privado formal e informal.
- Las pruebas diagnósticas en casos sospechosos en el sistema de salud pública aumentaron en la mayoría de las regiones de la OMS desde 2010. La región de África registró el mayor aumento, con pruebas diagnósticas en el sector de salud pública que aumentaron del 36% en casos sospechosos en 2010 al 81% en 2015.

Tratamiento del paludismo

- En 18 encuestas de hogares realizadas en África subsahariana entre 2014 y 2016, la proporción de niños menores de cinco años con fiebre que recibieron algún medicamento antipalúdico fue del 41% (RI: 21–49%).
- La mayoría de los pacientes (70%) que buscaron tratamiento para el paludismo en el sector público recibieron TCA, que son los medicamentos antipalúdicos más efectivos. Es más probable que los niños reciban TCA si se busca atención médica en centros de salud públicos que en el sector privado.
- Para cerrar la brecha de tratamiento entre los niños, la OMS recomienda la adopción del manejo integrado de casos comunitarios (MICC). Este enfoque promueve el manejo integrado de afecciones comunes que amenazan la vida en los niños (paludismo, neumonía y diarrea) en los establecimientos de salud y a nivel comunitario. En 2016, 26 países afectados por el paludismo tenían políticas de MICC, de los cuales en 24 comenzaron a implementarse. Una evaluación en Uganda descubrió que los distritos con MICC experimentaron un aumento del 21% en la búsqueda de atención por fiebre en comparación con los distritos sin una política de MICC.
- Fuera de la Región de África de la OMS, solo un puñado de países en cada una de las otras regiones informaron haber implementado tales políticas, aunque los datos sobre el nivel de implementación no están disponibles para la mayoría de los países.

SISTEMAS DE VIGILANCIA DEL PALUDISMO

- La vigilancia efectiva de casos y muertes por paludismo es esencial para identificar las áreas o grupos de población que se ven más afectados por esta enfermedad, y para focalizar los recursos y lograr un impacto máximo. Un sistema de vigilancia fuerte requiere altos niveles de acceso a la atención y detección de casos, y un informe completo por parte de todos los sectores de la salud, públicos y privados.
- En 2016, 37 de los 46 países de la Región de África de la OMS indicaron que al menos el 80% de los establecimientos de salud pública habían informado datos sobre paludismo a través de su sistema nacional de información de salud. Las tasas varían en otras y entre regiones de la OMS. Por ejemplo, en la Región del Mediterráneo Oriental de la OMS, solo tres de los ocho países tenían un 80% o más de instalaciones de salud pública que informaron en 2016.
- Entre los 55 países donde se calculó la carga del paludismo, 31 países tienen una tasa de notificación de casos de paludismo por sistemas de vigilancia de menos del 50%. Esto incluye a India e Nigeria, países de alta carga.

TENDENCIAS MUNDIALES Y REGIONALES DEL PALUDISMO EN CIFRAS

Casos de paludismo

- En 2016, se estima que hubo 216 millones de casos de paludismo en todo el mundo (Intervalo de Confianza (IC) 95%: 196–263 millones), en comparación con 237 millones de casos en 2010 (IC 95%: 218–278 millones) y 211 millones de casos en 2015 (95% IC: 192–257 millones).
- La mayoría de los casos de paludismo en 2016 se registraron en la Región de África de la OMS (90%), seguidos por la Región de Asia Sudoriental de la OMS (7%) y la Región del Mediterráneo Oriental de la OMS (2%).
- De los 91 países que informaron casos de paludismo autóctono en 2016, 15 países, todos en el África subsahariana, excepto India, tuvieron el 80% de la carga mundial de paludismo.
- Se estima que la tasa de incidencia del paludismo disminuyó en un 18% a nivel mundial, de 76 a 63 casos por cada 1000 habitantes en riesgo, entre 2010 y 2016. La región de Asia Sudoriental registró el mayor descenso (48%) seguido de las Américas (22%) y la región Africana (20%).
- A pesar de estas reducciones, entre 2014 y 2016 las tendencias en la incidencia de casos incrementaron sustancialmente en las Américas, y marginalmente en las regiones de Asia Sudoriental, Pacífico Occidental y África de la OMS.
- *P. falciparum* es el parásito del paludismo más prevalente en el África subsahariana, representando el 99% de los casos estimados de paludismo en 2016. Fuera de África, *P. vivax* es el parásito predominante en las Américas, representa el 64% de los casos de paludismo, y está por encima del 30% en las regiones del Asia Sudoriental y por encima del 40% en el Mediterráneo Oriental.

- Nuevos datos de sistemas de vigilancia mejorados en varios países de la región de África de la OMS indican que el número de casos de paludismo presentados en el informe de este año son estimaciones conservadoras. La OMS revisará sus métodos de estimación de la carga del paludismo para el África subsahariana en 2018.

Muertes por paludismo

- En 2016, hubo un estimado de 445 000 muertes por paludismo a nivel mundial, en comparación con 446 000 muertes estimadas en 2015.
- La región Africana de la OMS representó el 91% de todas las muertes por paludismo en 2016, seguida de la región de Asia Sudoriental (6%).
- En 15 países se presentaron el 80% de las muertes mundiales de paludismo el año pasado; todos estos países están en África subsahariana, a excepción de India.
- Todas las regiones registraron reducciones en la mortalidad en 2016 en comparación con 2010, con la excepción de la región del Mediterráneo Oriental, donde las tasas de mortalidad se mantuvieron prácticamente sin cambios en éste período. El mayor descenso se produjo en las regiones de Asia Sudoriental (44%), África (37%) y en las Américas (27%).
- Sin embargo, entre 2015 y 2016, la tendencia al descenso de la mortalidad se estancó en las regiones de la OMS de África, Asia Sudoriental y el Pacífico Occidental, se ha aumentó en las regiones del Mediterráneo Oriental y las Américas.

ELIMINACIÓN DEL PALUDISMO

- A nivel mundial, cada vez más países avanzan hacia la eliminación: en 2016, 44 países informaron menos de 10 000 casos de paludismo, en comparación con 37 países en 2010.
- Kirguistán y Sri Lanka fueron certificados por la OMS como libres de paludismo en 2016.
- En 2016, la OMS identificó 21 países con potencial para eliminar el paludismo para el año 2020. Conocidos como países "E-2020", la OMS está trabajando con los gobiernos de estos países para apoyar sus objetivos de acelerar la eliminación.
- Si bien algunos de estos países siguen encaminados a lograr sus objetivos de eliminación, 11 han informado aumentos en casos autóctonos de paludismo desde 2015, y cinco países informaron un aumento de más de 100 casos en 2016 en comparación con 2015.

DESAFÍOS PARA LOGRAR UN MUNDO LIBRE DE PALUDISMO

- Algunos de los desafíos que obstaculizan las capacidades de los países para mantenerse en el buen camino y avanzar hacia la eliminación incluyen: falta de financiamiento internacional y doméstico sostenible y predecible; los riesgos planteados por conflictos en zonas endémicas de paludismo; patrones climáticos anómalos; la aparición de resistencia parasitaria a medicamentos antipalúdicos; y la resistencia de los mosquitos a los insecticidas, entre otros.
- La OMS está apoyando respuestas de emergencia al paludismo en Nigeria, Sudán del Sur, Venezuela y Yemen, donde las crisis humanitarias en curso plantean serios riesgos para la salud. En el estado de Borno, en Nigeria, la OMS apoyó el lanzamiento de una campaña de administración masiva de medicamentos antipalúdicos que cubrió a aproximadamente 1,2 millones de niños menores de cinco años en áreas específicas. Los primeros resultados apuntan a una reducción en los casos y las muertes de paludismo en el estado.

Financiación

- En 34 de los 41 países de alta carga de la enfermedad, que dependen principalmente de financiamiento externo para los programas de paludismo, el nivel promedio de financiamiento disponible por persona en riesgo en los últimos tres años (2014-2016) se redujo en comparación con 2011-2013. Las excepciones incluyen la República Democrática del Congo, Guinea, Mauritania, Mozambique, Níger, Paquistán y Senegal, donde se registraron aumentos.

- Entre los 41 países de alta carga de la enfermedad, en general, el financiamiento por persona en riesgo permanece por debajo de 2 dólares estadounidenses.

Deleciones de la proteína 2 rica en histidina

- En algunas áreas, los niveles crecientes de deleciones del gen de la proteína 2 rica en histidina (HRP2) amenazan la capacidad de diagnosticar y tratar adecuadamente a las personas infectadas con paludismo por *P. falciparum*. La ausencia del gen HRP2 permite a los parásitos evadir la detección mediante pruebas de diagnóstico rápido (PDR) basadas en HRP2, lo que da como resultado un falso negativo en las pruebas. Si bien la prevalencia de las deleciones del gen HRP2 en la mayoría de los países de alta transmisión sigue siendo baja, se requiere una mayor vigilancia.

Resistencia a los medicamentos

- Los TCA han sido claves para el reciente éxito en el control mundial del paludismo, y proteger su eficacia para el tratamiento del paludismo es una prioridad en materia de salud pública.
- Si bien se ha detectado resistencia a múltiples fármacos, que incluye la resistencia (parcial) a las artemisininas y los medicamentos asociados, en cinco países de la subregión del Gran Mekong, se ha producido una reducción masiva en el número de casos y muertes por paludismo en esta subregión. El monitoreo de la eficacia de los medicamentos antipalúdicos ha dado lugar a una actualización rápida de las políticas de tratamiento en la subregión.
- En África, hasta la fecha no se ha reportado ninguna resistencia (parcial) a la artemisinina, y los TCA de primera línea siguen siendo efectivos en todas las áreas endémicas de paludismo.

Resistencia a los insecticidas

- De los 76 países con paludismo endémico que proporcionaron datos de 2010 a 2016, se detectó resistencia a al menos un insecticida en un vector de paludismo de un sitio en 61 países. En 50 países, se informó resistencia a dos o más clases de insecticidas.
- En 2016, la resistencia a uno o más insecticidas estuvo presente en todas las regiones de la OMS, aunque la extensión del monitoreo varió.
- La resistencia a los piretroides, la única clase de insecticida actualmente utilizada en los mosquiteros tratados con insecticidas, está muy extendida. La proporción de países endémicos de paludismo que monitorearon y posteriormente informaron resistencia a piretroides aumentó del 71% en 2010 al 81% en 2016. La prevalencia de resistencia confirmada a piretroides difirió entre las regiones, y fue más alta en las regiones de la OMS de África y del Mediterráneo Oriental, donde fue detectada en vectores de paludismo en más de dos tercios de todos los sitios evaluados.
- Los mosquiteros tratados con insecticidas siguen siendo una herramienta muy efectiva para el control del paludismo, incluso en áreas donde los mosquitos han desarrollado resistencia a los piretroides, como se puso de manifiesto en un gran estudio de evaluación multinacional de cinco países coordinado por la OMS entre el año 2011 y 2016, en el cual no se encontraron pruebas de una asociación entre la carga de la enfermedad del paludismo y la resistencia a los piretroides en las áreas de estudio.

1 GLOBAL MALARIA TARGETS AND MILESTONES

The *World malaria report 2017* summarizes global achievements in the fight against malaria up to the end of 2016. This marks a year after the launch of:

- the WHO *Global technical strategy for malaria 2016–2030* (GTS) (*1*), which sets out a vision for accelerating progress towards malaria elimination;
- the Roll Back Malaria advocacy plan, *Action and investment to defeat malaria 2016–2030* (AIM) (*2*), which builds the case for investment in malaria; and
- the Sustainable Development Goals (SDGs) (*3*), a set of interconnected global goals agreed on by United Nations member states as a 'plan of action for people, the planet and prosperity'.

The GTS and AIM are aligned with the SDGs, with targets set for the years 2020, 2025 and 2030 compared with a baseline of 2015. For malaria, Target 3.3 of the SDGs – to end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases by 2030 – is interpreted as the attainment of the GTS and AIM targets. The indicator used to track progress against Target 3.3 is malaria case incidence. In addition, universal access to malaria prevention and treatment interventions for populations at risk of malaria will contribute to SDG Goal 3.8, which is to ensure universal health coverage.

The *World malaria report* aims to track achievements towards the primary GTS goals on malaria morbidity, mortality and attainment of elimination, as presented in **Table 1.1**. To better contextualize the progress towards these goals, the report also tracks the total funding for malaria control and elimination, and for malaria research; the supply of key commodities to endemic countries (**Section 2**) and the associated population level coverage (**Sections 3** and **4**). The status of surveillance systems (Pillar 3) is presented in **Section 5**. Analysis of the global trends in malaria morbidity and mortality are presented in **Section 6** and progress towards elimination in **Section 7**. The GTS identifies several threats including inadequate funding, the biological evolution of resistance of parasites to drugs and vectors to insecticides, and the interruption of interventions due to complex situations such as insecurity. **Section 8** reports on these threats. The main text is followed by annexes that contain data sources and methods, regional profiles and data tables. Country profiles are available online at www.who.int/malaria/publications/country-profiles/en/.

The *World malaria report* is produced by the WHO Global Malaria Programme, with the support of WHO regional and country offices, ministries of health in endemic countries and a broad range of other partners. The primary sources of information are reports from national malaria control programmes (NMCPs) in the 94 countries that had malaria transmission in 2000. This information is supplemented by data from nationally representative household surveys (demographic and health surveys, malaria indicator surveys and multiple indicator cluster surveys) and databases held by other organizations: the Alliance for Malaria Prevention; the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund); the Organisation for Economic Co-operation and Development; Policy Cures Research; the US President's Malaria Initiative; and WHO. A description of data sources and methods is provided in **Annex 1**.

FIG. 1.1.

Countries and territories with indigenous cases in 2000 and their status by 2016 Countries with zero indigenous cases over at least the past 3 consecutive years are eligible to request certification of malaria free status from WHO. All countries in the WHO European Region reported zero indigenous cases in 2016. Kyrgyzstan and Sri Lanka were certified malaria free in 2016. *Source: WHO database*

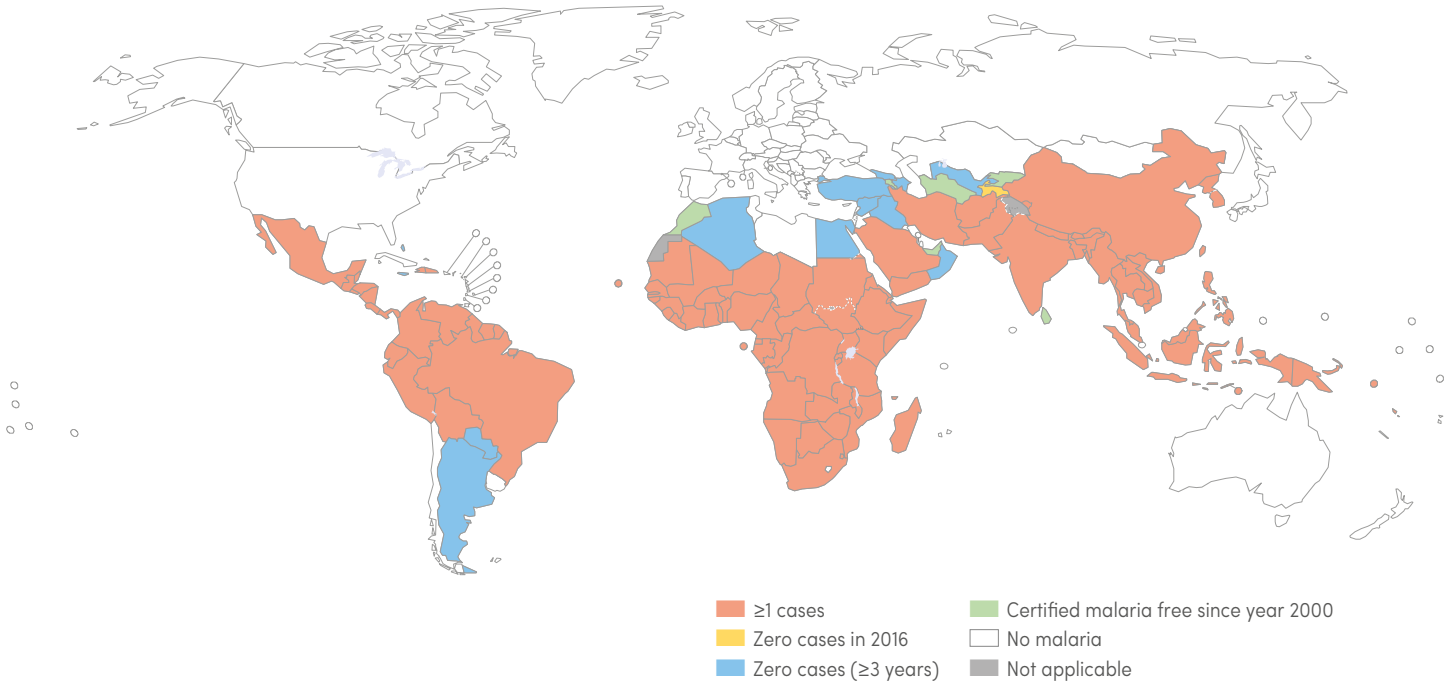


TABLE 1.1.

GTS: Global targets for 2030 and milestones for 2020 and 2025 (*1*)

Vision – A world free of malaria

Pillars	
Pillar 1	Ensure universal access to malaria prevention, diagnosis and treatment
Pillar 2	Accelerate efforts towards elimination and attainment of malaria free status
Pillar 3	Transform malaria surveillance into a core intervention

Goals	Milestones		Targets
	2020	2025	2030
1. Reduce malaria mortality rates globally compared with 2015	At least 40%	At least 75%	At least 90%
2. Reduce malaria case incidence globally compared with 2015	At least 40%	At least 75%	At least 90%
3. Eliminate malaria from countries in which malaria was transmitted in 2015	At least 10 countries	At least 20 countries	At least 35 countries
4. Prevent re-establishment of malaria in all countries that are malaria free	Re-establishment prevented	Re-establishment prevented	Re-establishment prevented

GTS, *Global technical strategy for malaria 2016–2030*

2 INVESTMENTS IN MALARIA PROGRAMMES AND RESEARCH

The period since 2000 has been one of unprecedented investment of funds in the fight against malaria. The GTS, however, estimated that annual investments in malaria control and elimination need to increase substantially – to about US$ 6.5 billion[1] by 2020 – to meet the first milestone under that strategy of a 40% reduction in malaria incidence and mortality rates (*4*). The GTS also recognized that innovations in tools and approaches are needed to achieve its targets, and estimated that an additional US$ 686 million[1] would be required annually for malaria research and development between 2016 and 2030.

This section of the report examines the trends in the financing of malaria programmes and of malaria research and development since 2010, and documents the quantities of commodities delivered as a result of some of these investments.

2.1. TOTAL EXPENDITURE FOR MALARIA CONTROL AND ELIMINATION

Fig. 2.1, **Fig. 2.2** and **Fig. 2.3** show the origin of funds for malaria control, the channels through which they are delivered and the geographical destination of funds, respectively. In 2016 total funding for malaria control and elimination was estimated to be US$ 2.7 billion, just 41% of the 2020 milestone of US$ 6.5 billion. Funding for malaria has remained relatively stable since 2010, and if this trend continues there is no prospect of the 2020 milestone being attained.

Contributions from governments of endemic countries amounted to US$ 0.8 billion in 2016, representing 31% of total funding that year (**Fig. 2.1**). Of the US$ 0.8 billion invested, US$ 586 million was spent through NMCPs, and US$ 241 million on malaria patient care services. Since 2010, government contributions through NMCPs have been relatively stable globally whereas government spending towards malaria patient care services has declined by 11%, reflecting gains in malaria control. However, the recent upward trend in the number of malaria cases translated into a 4% rise in spending on malaria patient care services, from US$ 232 million in 2015 to US$ 241 million in 2016.

The United States of America (USA) was the largest international source of malaria control financing, with bilateral and multilateral contributions of US$ 1 billion (38%) in 2016, followed by the United Kingdom of Great Britain and Northern Ireland (United Kingdom), with contributions of nearly US$ 0.3 billion (11%) Other international funding sources together represented 21% of global funding in 2016, of which nearly half originated from France, Germany and Japan (together 10%, US$ 0.27 billion) and the remainder from all other funders (11%, US$ 0.29 billion). Over the period 2010–2016 total malaria contributions from the USA have increased while those from the United Kingdom and other funders have fluctuated (**Fig. 2.1**).

More than half (57%) of international funding was channelled through the Global Fund in 2016 (**Fig. 2.2**). The USA and United Kingdom bilateral channels accounted for most of the remainder of international funding received by endemic countries in 2016 (34% and 7%, respectively).

The majority (74%) of funds were spent in the WHO African Region followed by the WHO regions of South-East Asia (7%), Eastern Mediterranean and the Americas (each 6%) and Western Pacific (4%) (**Fig. 2.3**).

[1] Published estimate (*1*) converted into US$ 2016 equivalent.

FIG. 2.1.

Investments in malaria control and elimination by source of funds[1] (constant 2016 US$), 2010–2016

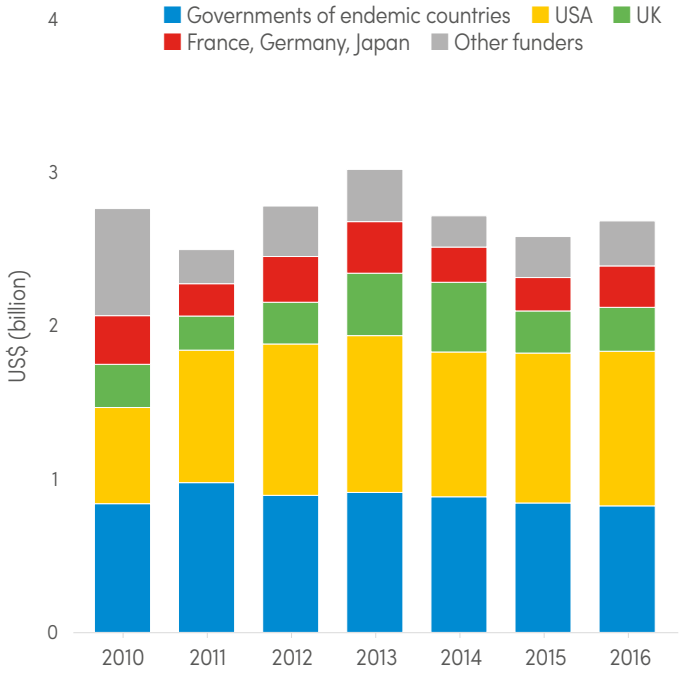


FIG. 2.2.

Investments in malaria control and elimination by channel delivered (constant 2016 US$), 2010–2016

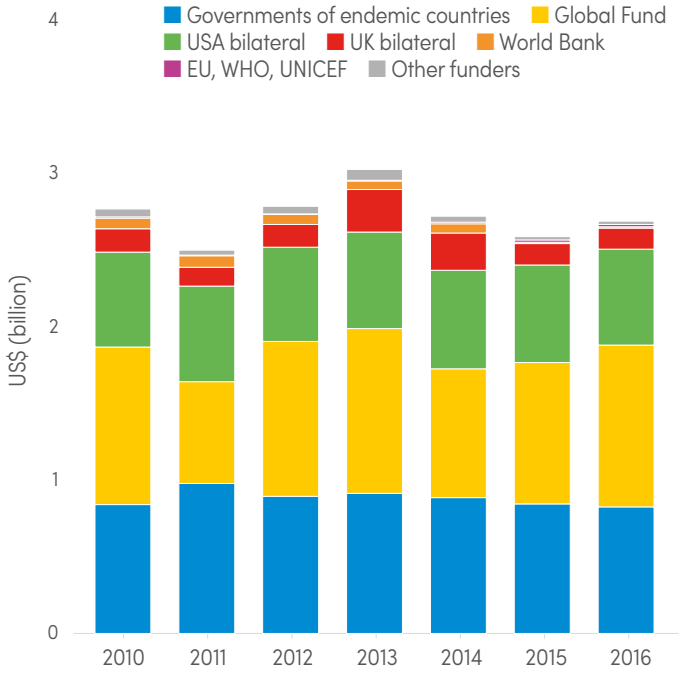
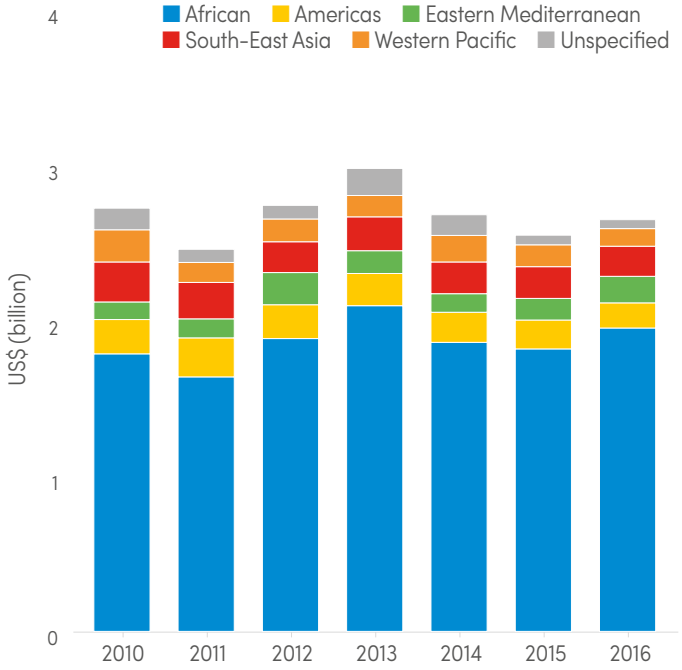


FIG. 2.3.

Investments in malaria control and elimination by WHO region (constant 2016 US$), 2010–2016



EU, European Union; Global Fund, Global Fund to Fight AIDS, Tuberculosis and Malaria; UK, United Kingdom of Great Britain and Northern Ireland; UNICEF, United Nations Children's Fund; USA, United States of America; WHO, World Health Organization

Recipient category "Unspecified" refers to funding flows with no information on the geographical localization of their recipient (under 3% of total flow in 2016)

Sources: *ForeignAssistance.gov, Global Fund, national malaria control programmes, Organisation for Economic Co-operation and Development creditor reporting system, the World Bank Data Bank, Department for International Development and estimated government spending on malaria patient care services*

[1] For detailed information on data sources and methodology, refer to Annex 1 of this report.

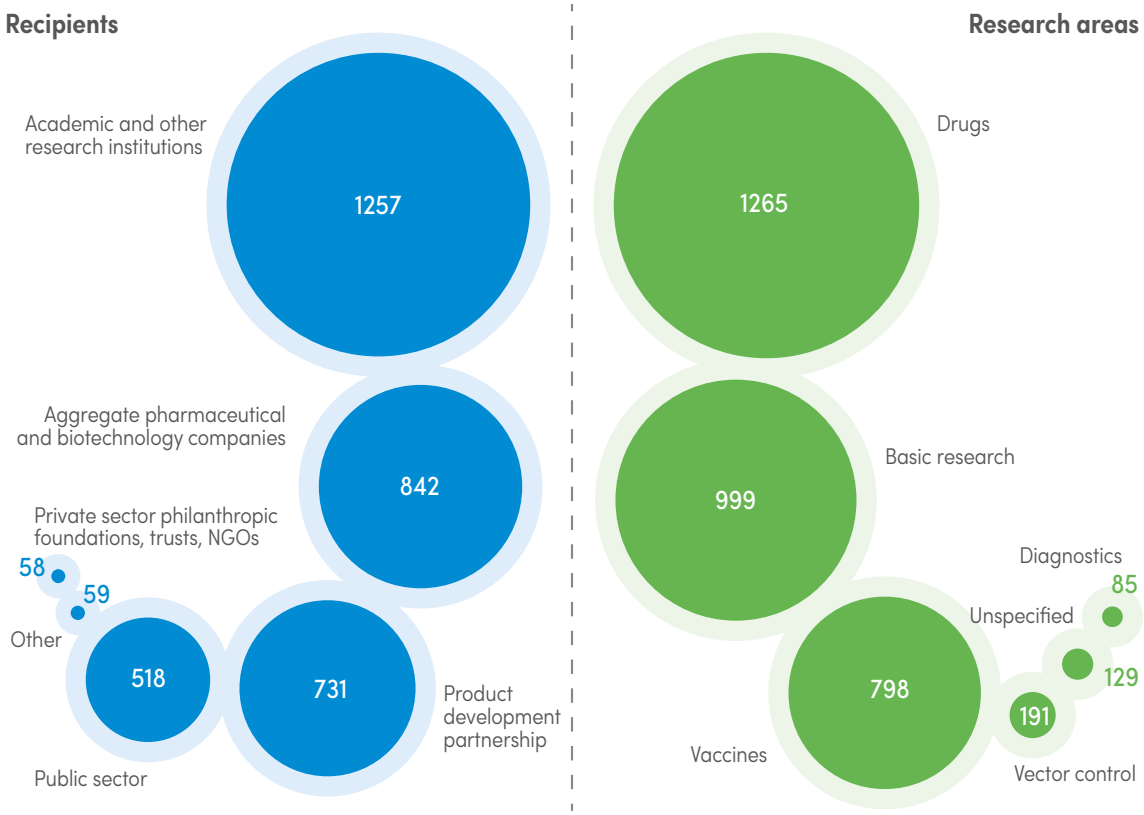
2.2 TOTAL EXPENDITURE FOR MALARIA RESEARCH AND DEVELOPMENT

Total research and development funding for malaria was estimated at US$ 572 million in 2015[1] (constant 2016 US$). This represents 83% of the estimated annual funding required for research and development of US$ 686 million.[2] Among funders who reported in both years, research and development funding decreased by 3% in 2015 compared with 2014.[3] This was partly due to large disbursements for vaccine research in 2014 from the Bill & Melinda Gates Foundation returning to previous levels.[3] Other major funders of malaria research also decreased their funding, including the Australian National Health and Medical Research Council, the Wellcome Trust and the European Union. An increase in research and development funding from the private sector and US Government agencies was mostly for drug development. Over the past 3 years, the three main funding channels were the US Government National Institutes of Health, the Bill & Melinda Gates Foundation, and pharmaceutical and biotechnology companies, representing 27%, 22% and 21% of total funding, respectively.

[1] http://www.policycuresresearch.org/g-finder-2016/#. This section reports on the year 2015 because all the data available are for 2015 only.
[2] Published estimate (*1*) converted into US$ 2016 equivalent

FIG. 2.4.

Investments in malaria research and development by recipient and by research area[3], 2010–2015 (in US$ million) *Source: G-FINDER Public Search Tool Policy Cures Research.* https://gfinder.policycuresresearch.org/PublicSearchTool



NGO, nongovernmental organization

[3] Public sector category includes governments, government agencies and government-affiliated research institutions.

2.3 DELIVERIES OF INSECTICIDE-TREATED MOSQUITO NETS

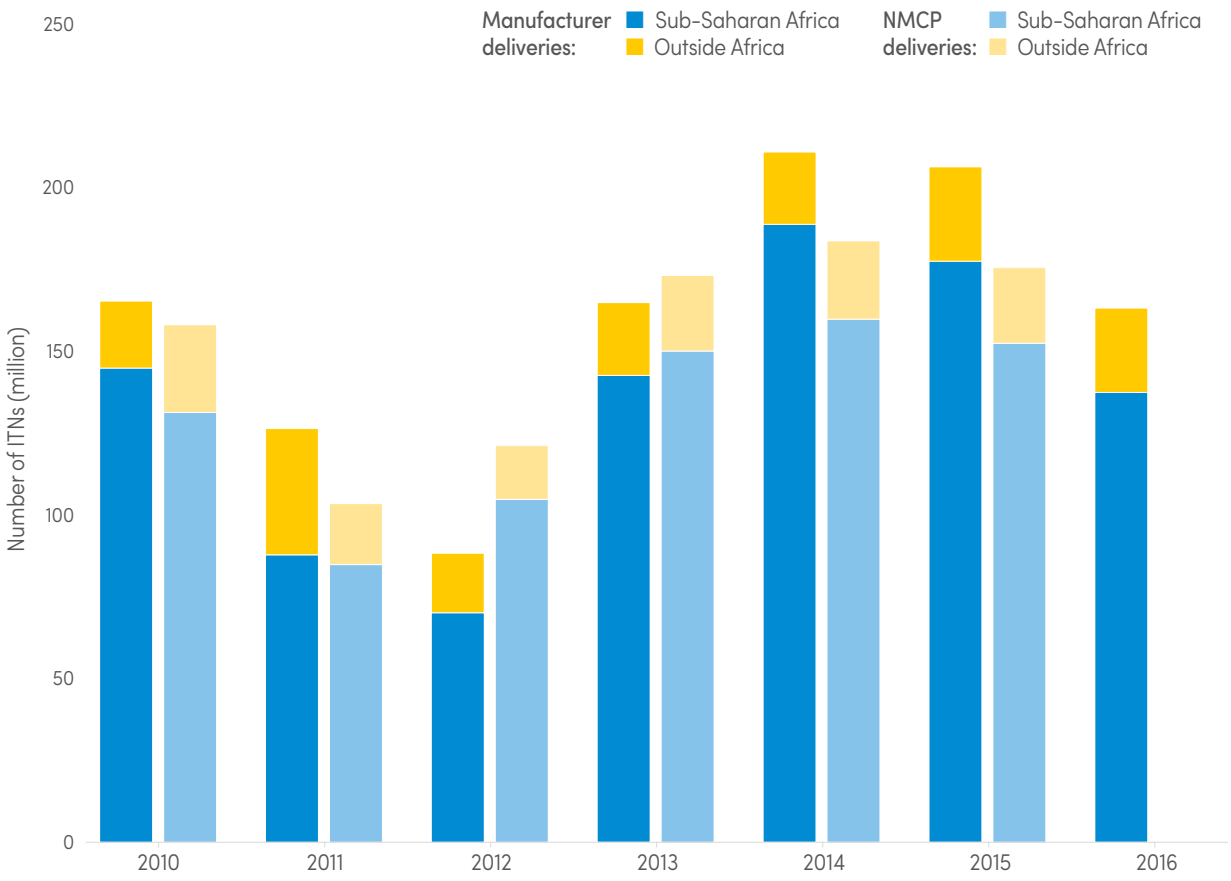
Between 2014 and 2016, a total of 582 million insecticide-treated mosquito nets (ITNs) were reported by manufacturers as having been delivered globally, of which almost 505 million ITNs (87%) were delivered to countries in sub-Saharan Africa (**Fig. 2.5**). During the preceding 3-year period (2011–2013), 301 million ITNs were delivered in sub-Saharan Africa. This marks a substantial increase of ITNs delivered by manufacturers over the past 3-year period relative to the preceding 3 years.

In sub-Saharan Africa, 16 countries accounted for more than 80% of deliveries in the period 2014–2016. These countries were Nigeria (78.0 million), Democratic Republic of the Congo (61.2 million), Uganda (35.6 million), Ethiopia (33.0 million), United Republic of Tanzania (29.2 million), Ghana (19.6 million), Mozambique (17.6 million), Côte d'Ivoire (16.9 million), Kenya (16.9 million), Senegal (15.1 million), Burkina Faso (14.6 million), Mali (14.1 million), Sudan (13.6 million), Cameroon (13.6 million), Madagascar (12.7 million) and Malawi (12.4 million).

Outside sub-Saharan Africa, most deliveries of ITNs were accounted for by eight countries: India, 15.5 million ITNs; Myanmar, 11.0 million; Indonesia, 7.7 million; Pakistan, 5.1 million; Cambodia, 5.0 million; Afghanistan, 4.4 million; Bangladesh, 4.4 million; and Yemen, 2.9 million.

FIG. 2.5.

Number of ITNs delivered by manufacturers and delivered by NMCPs, 2010–2016 *Sources: Milliner Global Associates and national malaria control programme reports*



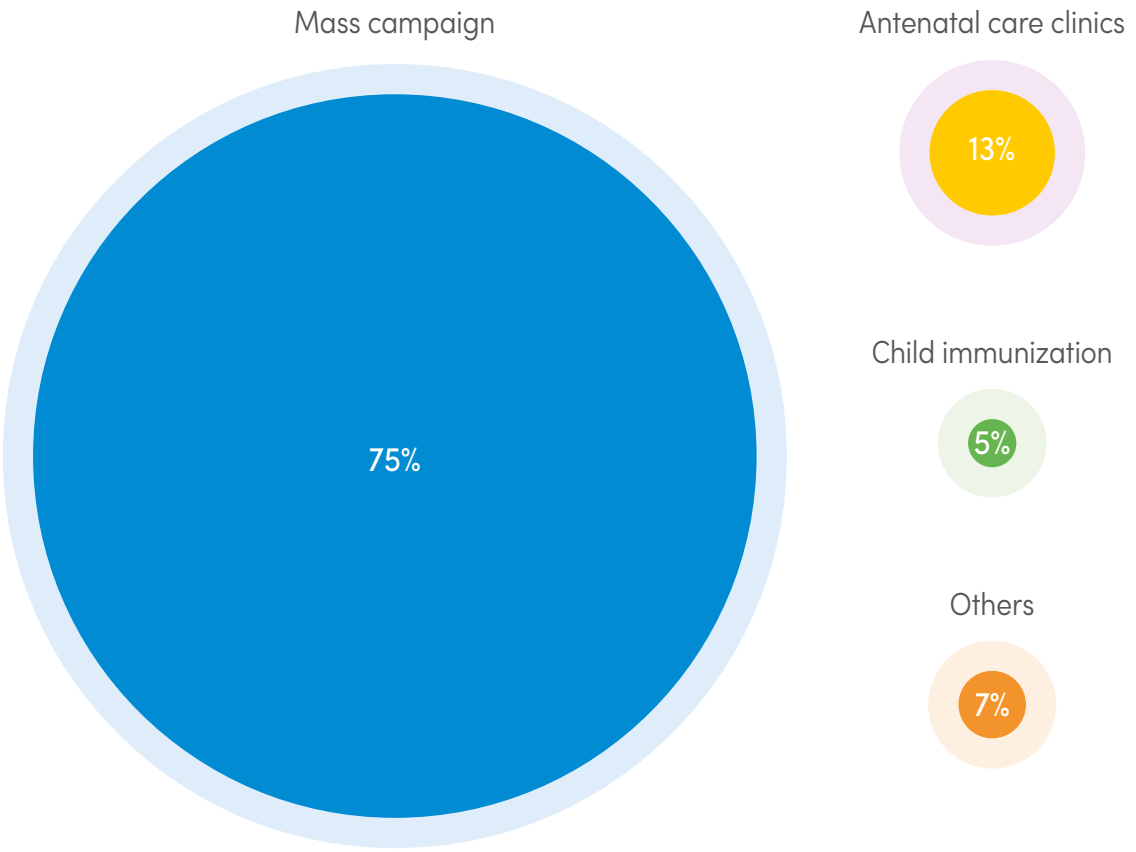
ITN, insecticide-treated mosquito net; NMCP, national malaria control programme

NMCP distributions of ITNs to households generally happen between 6 months and 1 year after the nets have been delivered to countries by the manufacturer. Hence, it is expected that some of the reported manufacturer deliveries for the year 2016 will be reported as NMCP distributions in 2017. In the final quarter of 2016, almost 138 million ITNs were reported by manufacturers as deliveries to sub-Saharan Africa, and a considerable proportion of these nets may be distributed in 2017.

WHO recommends the universal scale-up of ITNs through mass distribution campaigns. Such campaigns should be supplemented with continuous distribution of ITNs to all pregnant women attending antenatal care (ANC) facilities and all infants attending child immunization clinics, to ensure the most vulnerable populations are protected (*5*). Data reported by NMCPs indicate that, between 2014 and 2016, mass campaigns accounted for 75% of ITNs distributed in sub-Saharan Africa, while antenatal clinics accounted for 13% and immunization clinics for 5% (**Fig. 2.6**). Other channels account for 7% of all ITN distribution in sub-Saharan Africa; these other channels remain undefined in country reports, but may include distribution through schools, to refugees or to special groups such as armed forces.

FIG. 2.6.

Proportion of ITNs distributed through different delivery channels in sub-Saharan Africa, 2014–2016
Source: National malaria control programme reports



ITN, insecticide-treated mosquito net

2.4 DELIVERIES OF RAPID DIAGNOSTIC TESTS

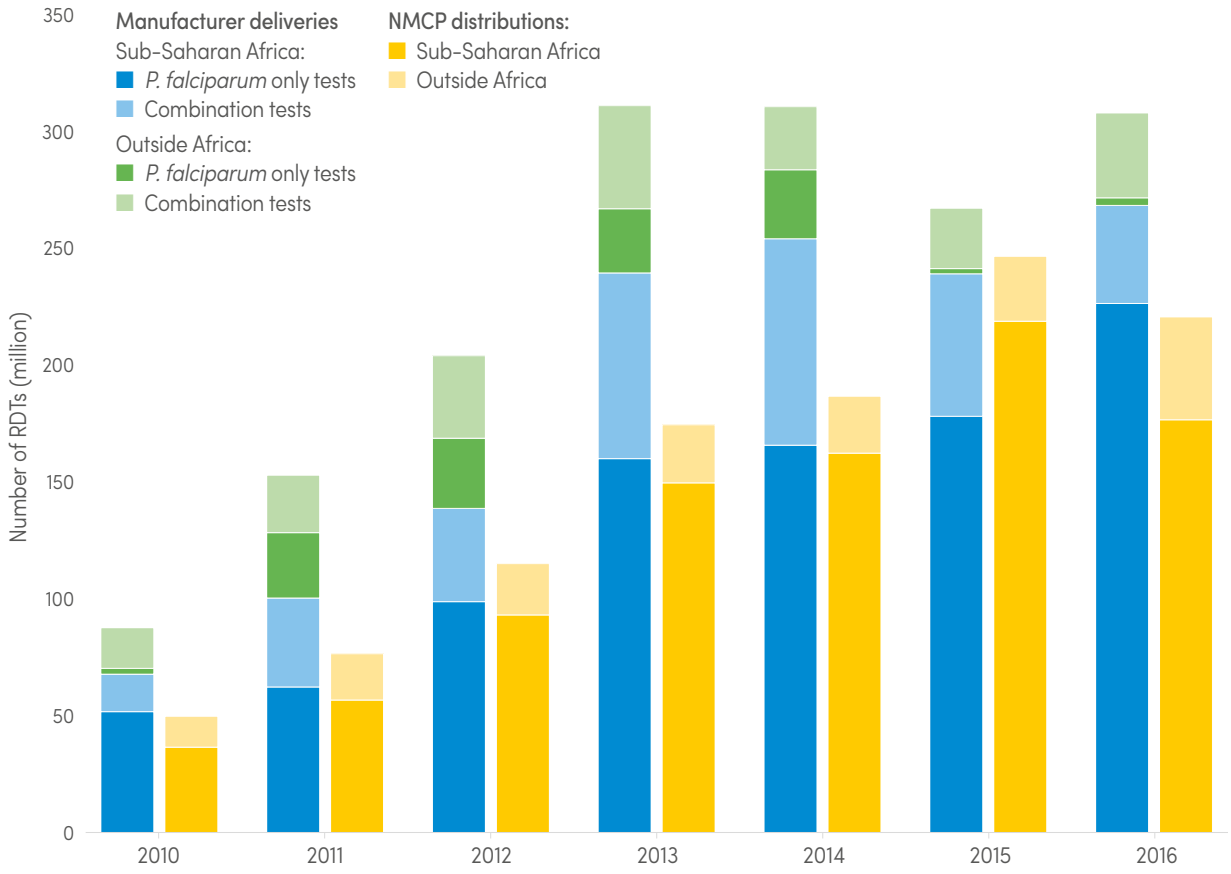
In the period 2010–2016, 1.66 billion rapid diagnostic tests (RDTs) were sold globally by manufacturers eligible for the Malaria RDT Product Testing Programme. The peak year for RDT deliveries was 2013, when almost 320 million were delivered, declining to 270 million in 2015 before rising to almost 312 million in 2016 (**Fig. 2.7**). Compared to 2015, manufacturer deliveries of RDTs increased from 240 million to 269 million in 2016 in Africa. In the same period, deliveries to the Asian region decreased from almost 47 million to 24 million RDTs, mainly due to reduced sales of RDTs for falciparum only. RDTs manufacturer delivery data are collected on a regional level, and country-specific splits are not available.

The number of RDTs distributed by NMCPs rose between 2010 and 2015, but fell from 247 million in 2015 to 221 million in 2016. The decrease was entirely in sub-Saharan Africa, where distributions fell from 219 million to 177 million RDTs in the same period. In all other regions combined, RDT distributions by NMCPs rose from 28 million in 2015 to 44 million in 2016. The sharp reductions in NMCP distributions of RDTs in sub-Saharan Africa between 2015 and 2016 occurred despite increases in reported manufacturer deliveries.

When NMCP distributions in sub-Saharan Africa were analysed by country, 22 countries had a total increase of RDT distributions of 33 million tests,

FIG. 2.7.

Number of RDTs sold by manufacturers and distributed by NMCPs, 2010–2016 *Sources: National malaria control programme reports and sales data from manufacturers eligible for the Malaria Rapid Diagnostic Test Product Testing Programme run by WHO*



NMCP, national malaria control programme; *P. falciparum*, *Plasmodium falciparum*; RDT, rapid diagnostic test

whereas 21 countries had a total reduction of 75 million tests. Among the latter, over 95% of these reductions were reported from Nigeria (29.9 million), Uganda (26.0 million), Kenya (4.0 million), Madagascar (3.6 million), Ethiopia (3.4 million), Rwanda (2.0 million), Sudan (2.0 million) and Mali (1.1 million).

Several factors could account for differences between manufacturer sales and NMCP distributions. The differences may arise because:

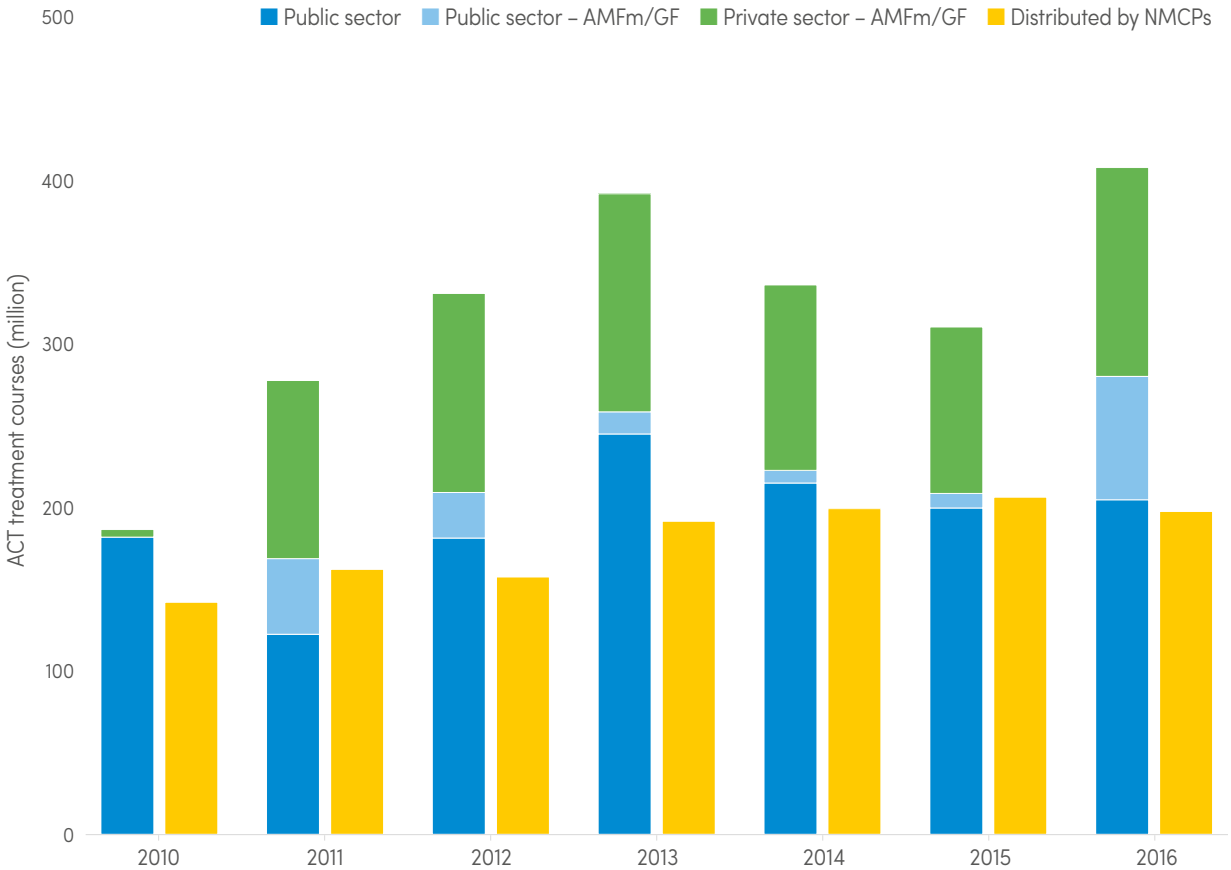
- manufacturer data include both public and private health sector sales, whereas RDTs distributed by NMCPs represent tests in the public sector only;
- a high distribution may be followed by a lower one as countries use commodities procured the previous year;
- of misreporting, in cases where RDTs in ministry of health central stores are not included in NMCP distributions; and
- of weak reporting systems or manufacturer data representing recent orders that are yet to arrive in the country.

2.5 DELIVERIES OF ARTEMISININ-BASED COMBINATION THERAPIES

Manufacturer delivery reports show that the number of treatment courses of artemisinin-based combination therapy (ACT) procured by countries fell from 393 million in 2013 to 337 million in 2014

FIG. 2.8.

Number of ACT treatment courses delivered by manufacturers and distributed by NMCPs, 2010–2016
AMFm/GF indicates AMFm operated from 2010 to 2013, and GF co-payment mechanism from 2014.
Sources: Companies eligible for procurement by WHO/United Nations Children's Fund (UNICEF) and national malaria control programme reports



ACT, artemisinin-based combination therapy; AMFm, Affordable Medicines Facility–malaria; GF, Global Fund to Fight AIDS, Tuberculosis and Malaria; NMCP, national malaria control programme

and 311 million in 2015, before rising again to 409 million in 2016 (**Fig. 2.8**). Over 69% of these procurements were reported to have been made for the public sector.

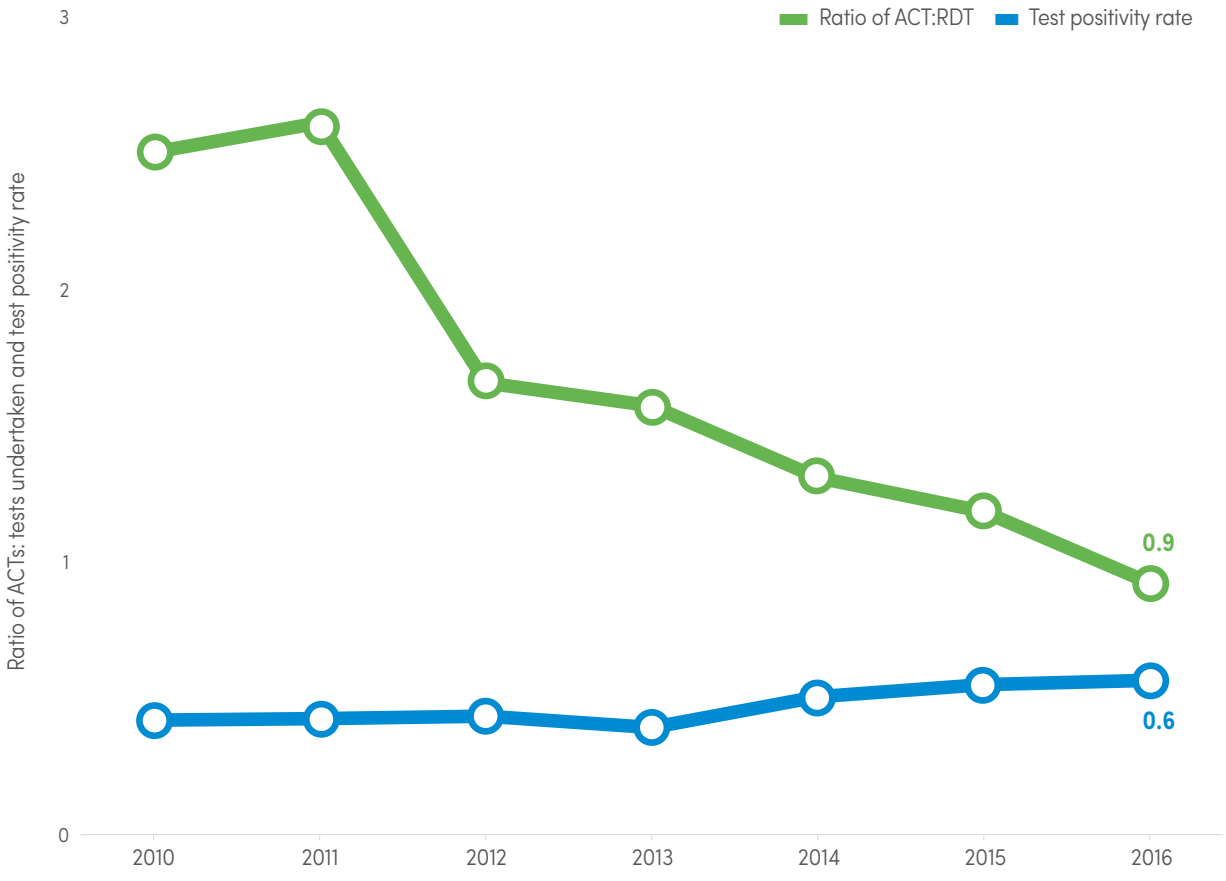
The number of ACT treatments distributed by NMCPs to the public sector increased from 192 million in 2013 to 198 million in 2016. Most of the NMCP distributions of ACTs (99%) in 2016 occurred in the WHO African Region.

Despite the increase in reported procurements, the ratio of manufacturer to NMCP deliveries has remained between 1.5 and 2.1, with less than half of the number of treatment courses reported by manufacturers as deliveries in 2016 distributed by NMCPs. The discrepancy between manufacturer deliveries to the public sector and the number of courses distributed through public facilities can be accounted for, in part, by incomplete reporting by NMCPs.

According to the WHO recommendations, each patient who is suspected of having malaria should be tested using RDT or microscopy, and only those who are positive for the *Plasmodium* parasite should be treated with ACTs or other recommended first-line treatment (*6*). Where adherence to such a recommendation is high, the number of ACT treatments should be roughly equal to the number of malaria positive cases. The ratio of tests to treatments will therefore also be roughly equal to the test positivity rate. In 2010, the ratio of tests (RDTs and microscopy) to ACT treatments reported by countries was 2.5, reducing to 0.9 in 2016, while the test positivity rate changed from 0.4 to 0.6 in the same period (**Fig. 2.9**). This shows that although ACT treatments are increasingly targeted only at malaria positive cases, about 30% of ACT treatments may have been given to patients who were either not tested or were negative for malaria.

FIG. 2.9.

Ratio of ACT treatment courses distributed to diagnostic tests performed (RDTs or microscopy) and test positivity rate, WHO African Region, 2010–2016 *Source: National malaria control programme reports*



ACT, artemisinin-based combination therapy; RDT, rapid diagnostic test

3 PREVENTING MALARIA

WHO recommends the use of vector control (i.e. stopping mosquitoes from biting human beings) or chemoprevention (i.e. providing drugs that suppress infections) in specific population subgroups (i.e. pregnant women, children and other high-risk groups) or for specific contexts (elimination). This section presents trends in the population level coverage of ITNs, indoor residual spraying (IRS), intermittent preventive treatment of malaria in pregnancy (IPTp) and seasonal malaria chemoprevention (SMC). Analysis of coverage indicators for ITNs is limited to sub-Saharan Africa, where there are sufficient household survey data to measure progress. IPTp and SMC are also reported only for sub-Saharan Africa, where these interventions are applicable. The coverage of intermittent preventive treatment of infants (IPTi) is not reported because of its current limited adoption.

Vector control

The most commonly used methods to prevent mosquito bites are sleeping under an ITN and spraying the inside walls of a dwelling with an insecticide – an intervention known as IRS. Use of ITNs has been shown to reduce malaria case incidence rates by 50% in a range of settings, and to reduce malaria mortality rates by 55% in children aged under 5 years in sub-Saharan Africa (*7,8*).

Historical and programme documentation suggest a similar impact for IRS, but randomized trial data are limited (*9*). These two core vector-control interventions – use of ITNs and IRS – are considered to have made a major contribution to the reduction in malaria burden since 2000 (*10*). In a few specific settings and circumstances, ITNs and IRS can be supplemented by larval source management (*11*) or other environmental modifications that reduce suitability of environments as mosquito habitats, or that otherwise reduce mosquito biting of humans.

Chemoprevention

In sub-Saharan Africa, IPTp with sulfadoxine-pyrimethamine (SP) has been shown to reduce maternal anaemia (*12*), low birth weight (*13*) and perinatal mortality (*14*). IPTi with SP provides protection against clinical malaria and anaemia (*15*); however, as of 2015, no countries have reported implementation of an IPTi policy. SMC with amodiaquine (AQ) plus SP (AQ+SP) for children aged 3–59 months reduces the incidence of clinical attacks and severe malaria by about 75% (*16,17*), and could avert millions of cases and thousands of deaths among children living in areas of highly seasonal malaria transmission in the Sahel subregion (*18*). Since March 2012, SMC has been recommended by WHO for children aged 3–59 months living in areas of highly seasonal malaria transmission in the Sahel subregion of Africa. Mass drug administration – defined as the time-limited administration of antimalarial treatment to all age groups of a defined population or every person living in a defined geographical area (except those for whom the medicine is contraindicated) at about the same time and often at repeated intervals – is recommended as a potential accelerator in elimination settings and a means of rapidly reducing malaria burden among restricted high-risk groups (*19*).

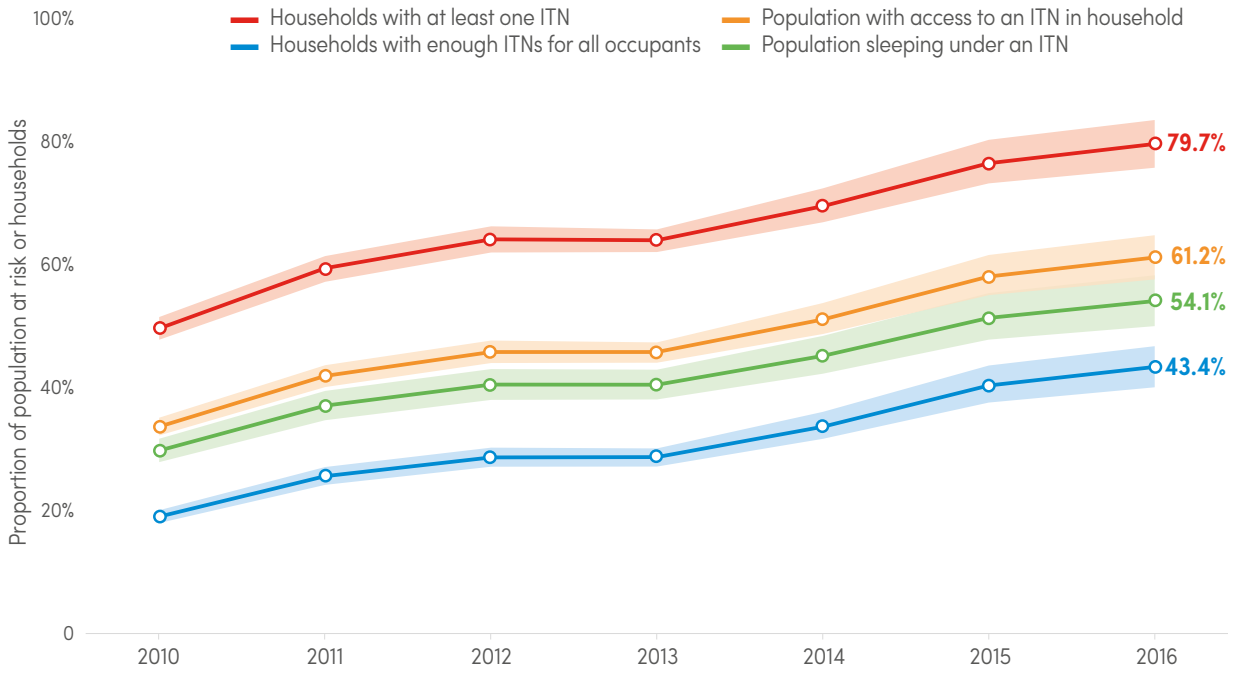
3.1 POPULATION AT RISK SLEEPING UNDER AN INSECTICIDE-TREATED MOSQUITO NET

Indicators of population-level coverage of ITNs were estimated for countries in sub-Saharan Africa in which ITNs are the main method of vector control. Long-lasting insecticidal nets (LLINs) are the predominant type of ITNs distributed by countries and are estimated to have an effective lifespan of 3 years (*5*). In 2016 in sub Saharan Africa, 54% of the population at risk slept under an ITN (95% confidence interval [CI]: 50–58%), increasing from 30% in 2010 (95% CI: 28–32%) (**Fig. 3.1**). Household ownership of at least one ITN was high (80%) in 2016 (95% CI: 76–84%), rising from 50% in 2010 (95% CI: 48–52%). This result suggests that the channels NMCPs use for delivery of ITNs can reach most households; hence, individual access to ITNs increased from 34% in 2010 (95% CI: 32–35%) to 61% in 2016 (95% CI: 58–65%).

The proportion of households with sufficient nets, however, was only 43% in 2016 (95% CI: 40–47%), up from 19% in 2010 (95% CI: 18–20%), but still substantially lower than the universal coverage targets. This relatively low level in the adequacy of available nets explains, in part, the relatively low use rates. The map in **Fig. 3.2** shows the rate of access to ITNs in sub-Saharan Africa by country. Twelve countries had populations with less than 50% access to ITNs in 2016.

FIG. 3.1.

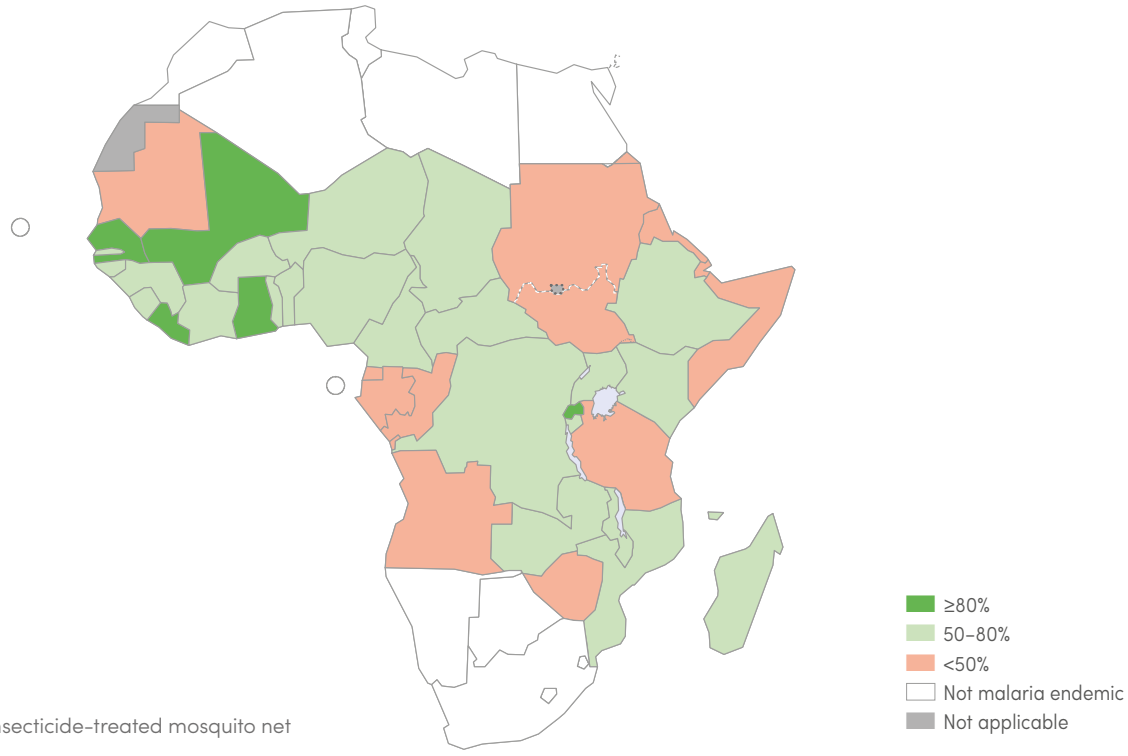
Proportion of population at risk with access to an ITN and sleeping under an ITN, and proportion of households with at least one ITN and enough ITNs for all occupants, sub-Saharan Africa, 2010–2016
Source: Insecticide-treated mosquito net coverage model from Malaria Atlas Project[1]



ITN, insecticide-treated mosquito net

FIG. 3.2.

Proportion of population at risk with access to an ITN, sub-Saharan Africa, 2010–2016 *Source: Insecticide-treated mosquito net coverage model from Malaria Atlas Project*[1]



ITN, insecticide-treated mosquito net

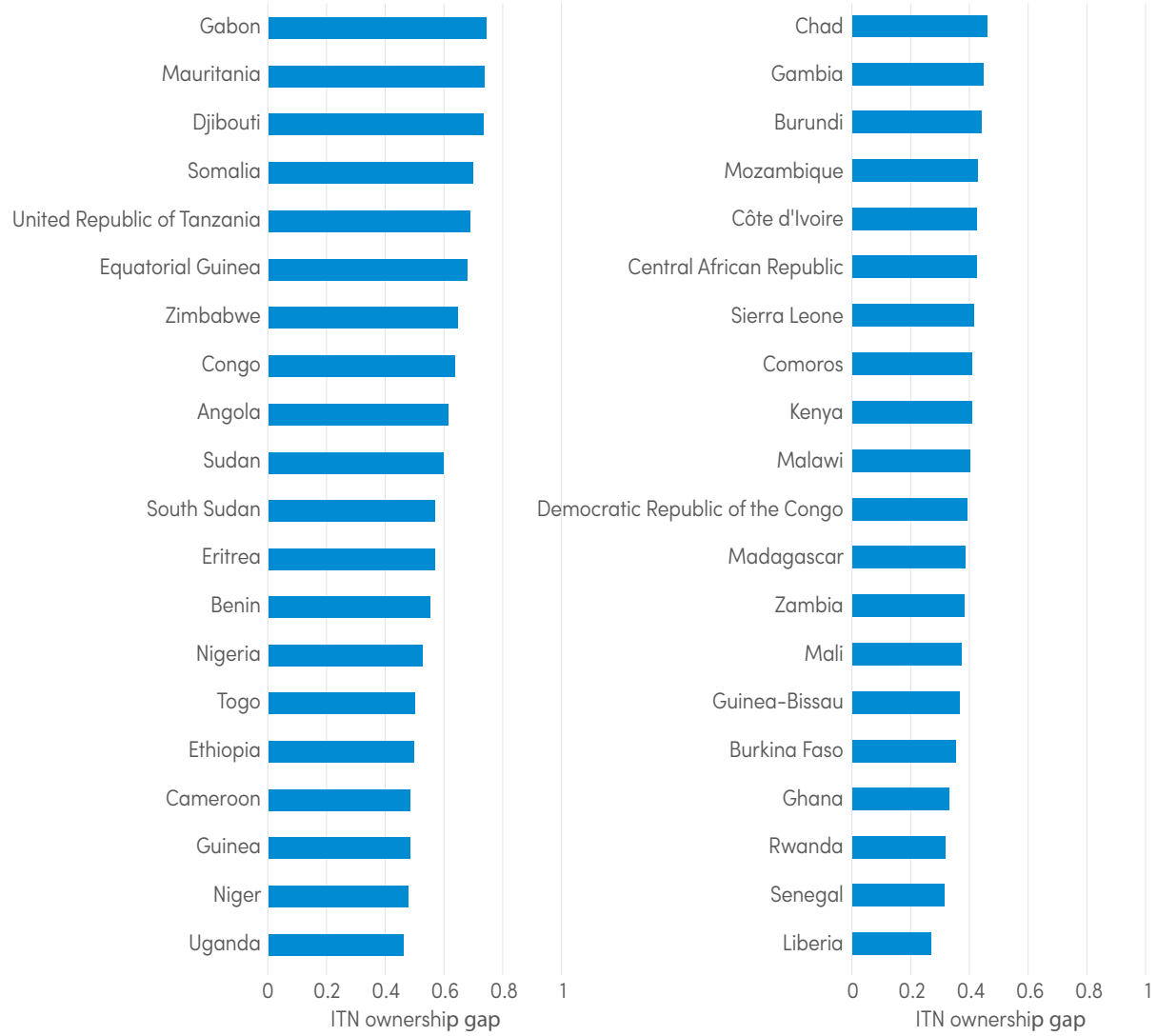
[1] http://www.map.ox.ac.uk/

An analysis of the ownership gap for household ITNs is presented in **Fig. 3.3**. The indicator is computed as 1 minus the ratio of households with one net for two people, and the households with at least one net. It reflects the ITN gap in households that have some nets but not enough nets for every two occupants.

The closer the value is to 1, the higher the ITN ownership gap; the analysis suggests that all countries in sub-Saharan Africa had an ITN ownership gap over the study period, and that 14 of those 40 countries had a gap of more than 0.5.

FIG. 3.3.

Household ITN ownership gap, 2016 *Source: Insecticide-treated mosquito net coverage model from Malaria Atlas Project*[1]



ITN, insecticide-treated mosquito net

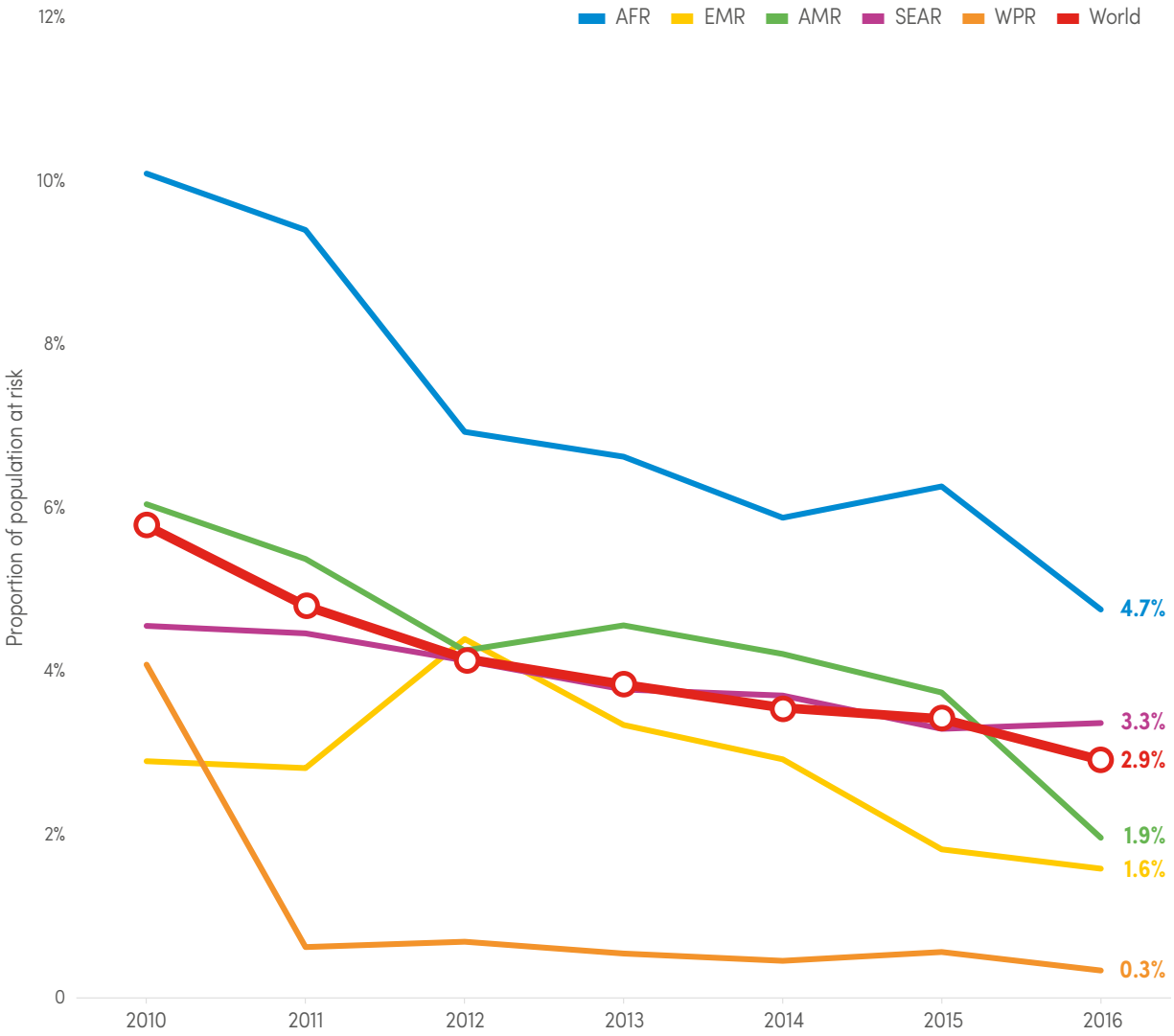
[1] http://www.map.ox.ac.uk/

3.2 POPULATION AT RISK PROTECTED BY INDOOR RESIDUAL SPRAYING

The proportion of the population at risk protected by IRS declined globally from a peak of 5.8% in 2010 to 2.9% in 2016, with decreases seen in all WHO regions (**Fig. 3.4**). The number of people protected in 2010 was 180 million globally, reducing to about 100 million in 2016. The WHO African Region had the highest number of populations at risk protected by IRS, but also had the largest reduction in IRS coverage (from 80 million in 2010 to 45 million in 2016).

FIG. 3.4.

Proportion of the population at risk protected by IRS by WHO region, 2010–2016 *Source: National malaria control programme reports*



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

In the WHO African Region, 25 out of 47 countries that reported some level of IRS implementation between 2010 and 2016 also reported either zero implementation of IRS in a given year since 2010, or reducing populations at risk protected with IRS relative to a preceding year (**Table 3.1**). Nearly all of these countries had fewer populations protected with IRS in 2016 relative to 2015, or in 2015 relative to 2014. It is unclear whether the populations who were no longer protected with IRS had universal access to ITNs and, for those that did, whether at some period there was a gap in vector control that could have led to increases in transmission.

The numbers of countries implementing IRS globally have also declined since 2012 (**Fig. 3.5**). These reductions in overall IRS coverage may be attributed to reduced reliance on pyrethroids, and a corresponding switch to more expensive chemicals to manage vector insecticide resistance, resulting in lower coverage.

TABLE 3.1.

Countries and territories of sub-Saharan Africa that have reported reduced IRS coverage in any year between 2010 and 2016 Years shaded orange represent zero population protected by IRS in that year or reduction relative to preceding year. Population presented as x1000. *Source: National malaria control programme reports*

Country/territory	2010	2011	2012	2013	2014	2015	2016
Angola	651	690	676	419	58	0	0
Botswana	251	208	164	177	206	143	116
Burkina Faso	113	117	116	0	0	0	0
Burundi	255	224	59	0	0	0	0
Comoros	0	32	0	31	22	20	0
Equatorial Guinea	0	0	148	129	166	0	0
Ethiopia	27 029	20 866	15 469	23 150	16 709	16 147	15 050
Gambia	387	747	484	800	350	438	399
Ghana	850	927	2117	2936	2155	1326	1410
Guinea	35	0	0	0	0	0	0
Kenya	1487	1832	2436	0	0	0	0
Liberia	421	835	960	0	0	0	0
Madagascar	9806	10 013	1597	1580	1307	1327	2857
Malawi	2036	322	1873	0	0	0	0
Mali	441	698	758	826	837	494	789
Mayotte	41	24	4	0.381	0.45	0	0
Mozambique	7513	8533	1789	9647	5598	3660	0
Namibia	566	600	559	599	468	387	486
Nigeria	200	177	2416	132	316	0	130
Sao Tome and Principe	65	116	147	154	125	144	150
Senegal	952	887	1095	690	709	515	497
Sierra Leone	308	851	987	0	0	0	0
South Africa	5000	5000	5000	2318	5650	1179	1166
South Sudan	0	0	170	333	737	297	0
United Republic of Tanzania	7531	7190	6774	3793	2225	14 685	2405

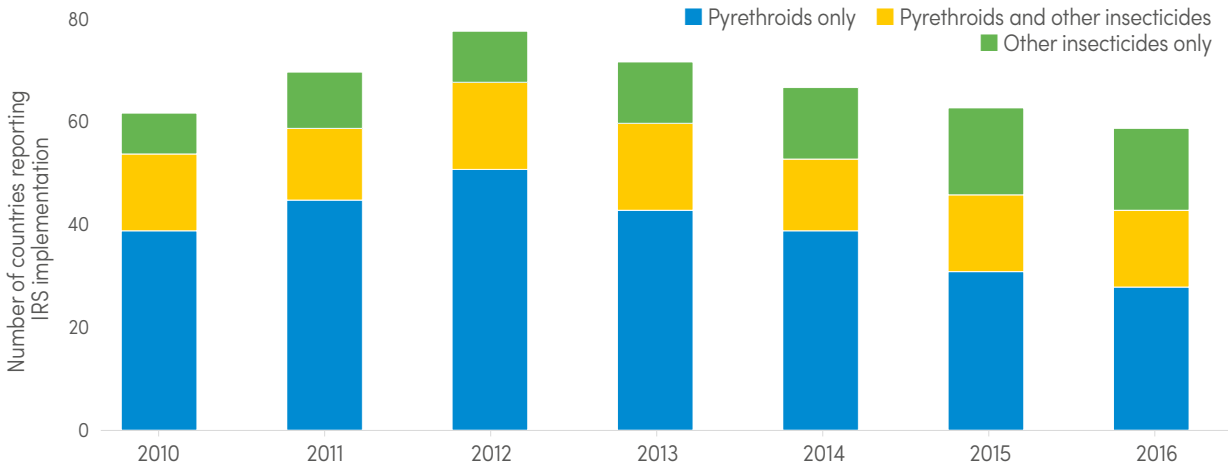
IRS, indoor residual spraying

3.3 POPULATION AT RISK SLEEPING UNDER AN INSECTICIDE-TREATED MOSQUITO NET OR PROTECTED BY INDOOR RESIDUAL SPRAYING

Combining data on the proportion of the population sleeping under an ITN with information on the proportion protected by IRS – and accounting for households that may receive both interventions – the proportion of the population in sub-Saharan Africa protected by vector control was estimated at 58% in 2016 compared with 27% in 2010 (**Fig. 3.6**).

FIG. 3.5.

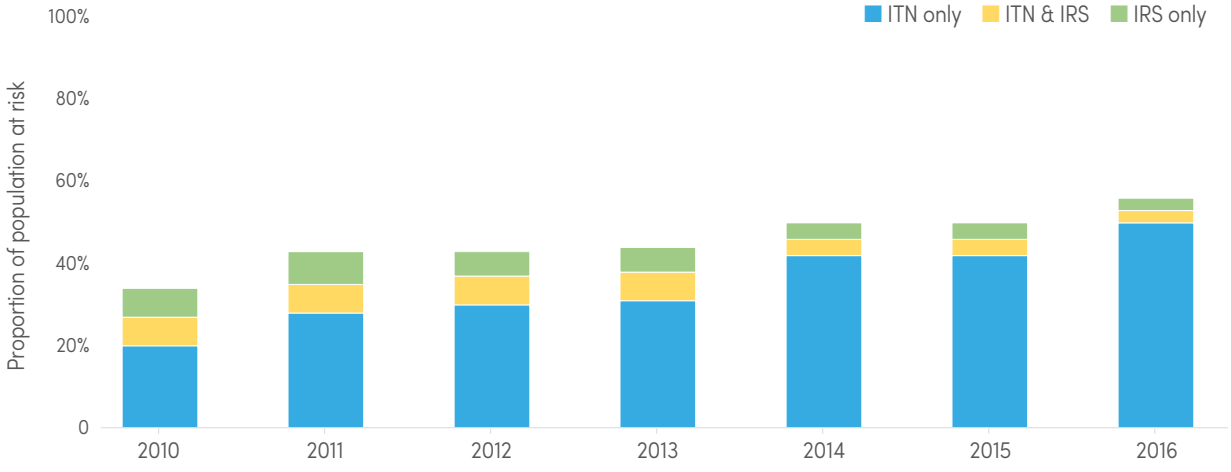
Chemical class used for IRS, 2010–2016 *Source: National malaria control programme reports*



IRS, indoor residual spraying

FIG. 3.6.

Proportion of the population protected by IRS or sleeping under an ITN in sub-Saharan Africa, 2010–2016 *Sources: Insecticide-treated mosquito net coverage model from Malaria Atlas Project (20), national malaria control programme reports and further analysis by WHO*



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

3.4 PREGNANT WOMEN RECEIVING THREE OR MORE DOSES OF INTERMITTENT PREVENTIVE TREATMENT

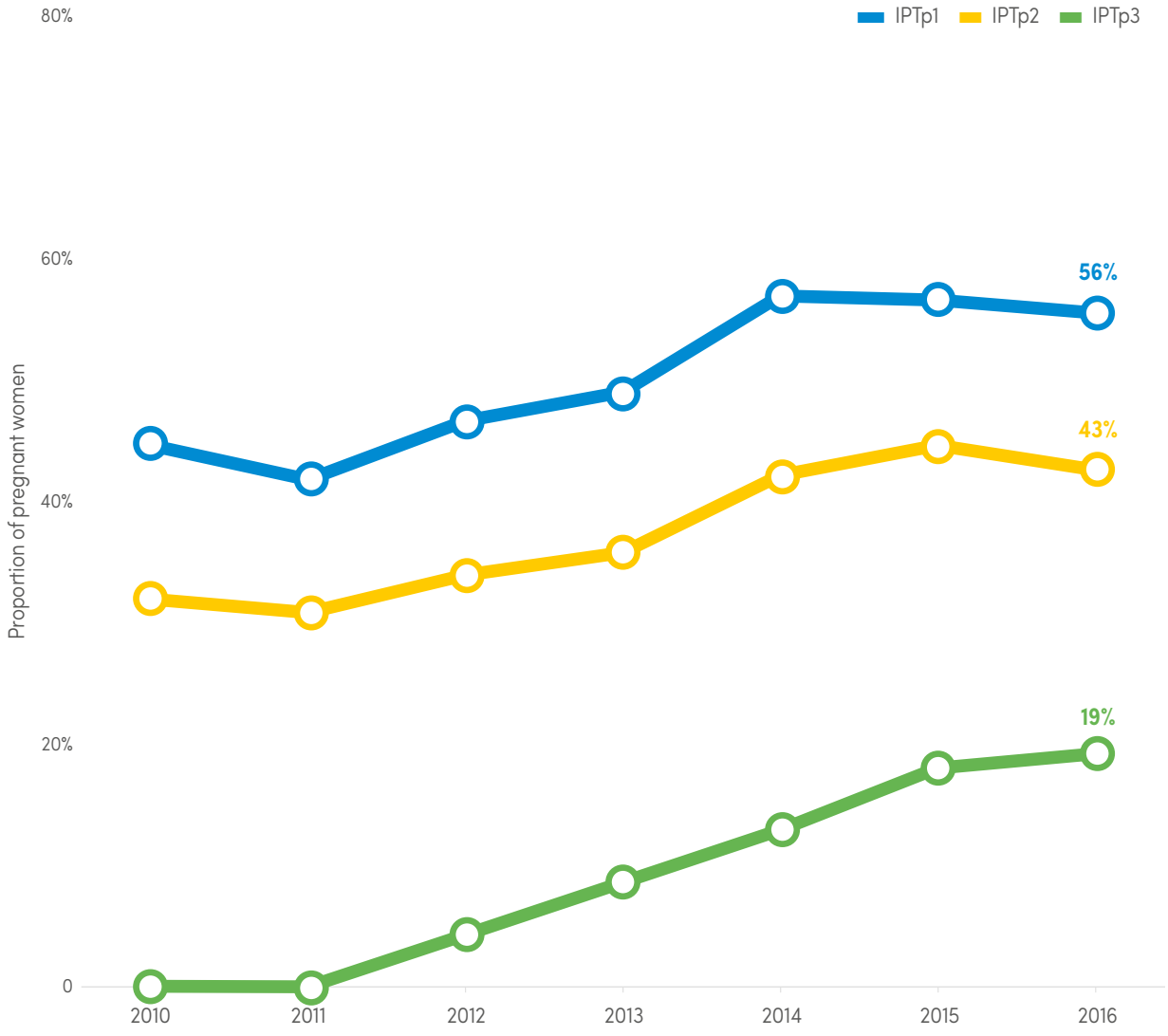
Since October 2012, WHO has recommended that IPTp be given to all pregnant women at ANC visits, starting as early as possible in the second trimester (i.e. not during the first trimester). Each IPTp-SP dose should be given at least 1 month apart, with at least three doses during each pregnancy (*21*).

As of 2016, 36 African countries have adopted a policy of providing three or more doses of IPTp to pregnant women. Progress in adherence to this policy has increased marginally: among 23 countries that reported in 2016, an estimated 19% of eligible pregnant women received three or more doses of IPTp, compared with 18% in 2015 and 13% in 2014 (**Fig. 3.7**).

In 2016, at least 50% of pregnant women reportedly received one or more doses of IPTp in 20 countries, two or more doses in 13 countries, and three or more doses in two countries. In 2015, only one country reported that at least 50% of pregnant women received three or more doses of IPTp. Similar to

FIG. 3.7.

Proportion of pregnant women attending ANC at least once and receiving IPTp, by dose, sub-Saharan Africa, 2010–2016 IPTp3 estimates for this report are different from the 31% reported in the *World malaria report 2016* due to corrections to data and slight changes in the quantification of the denominator. *Source: National malaria control programme reports*



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

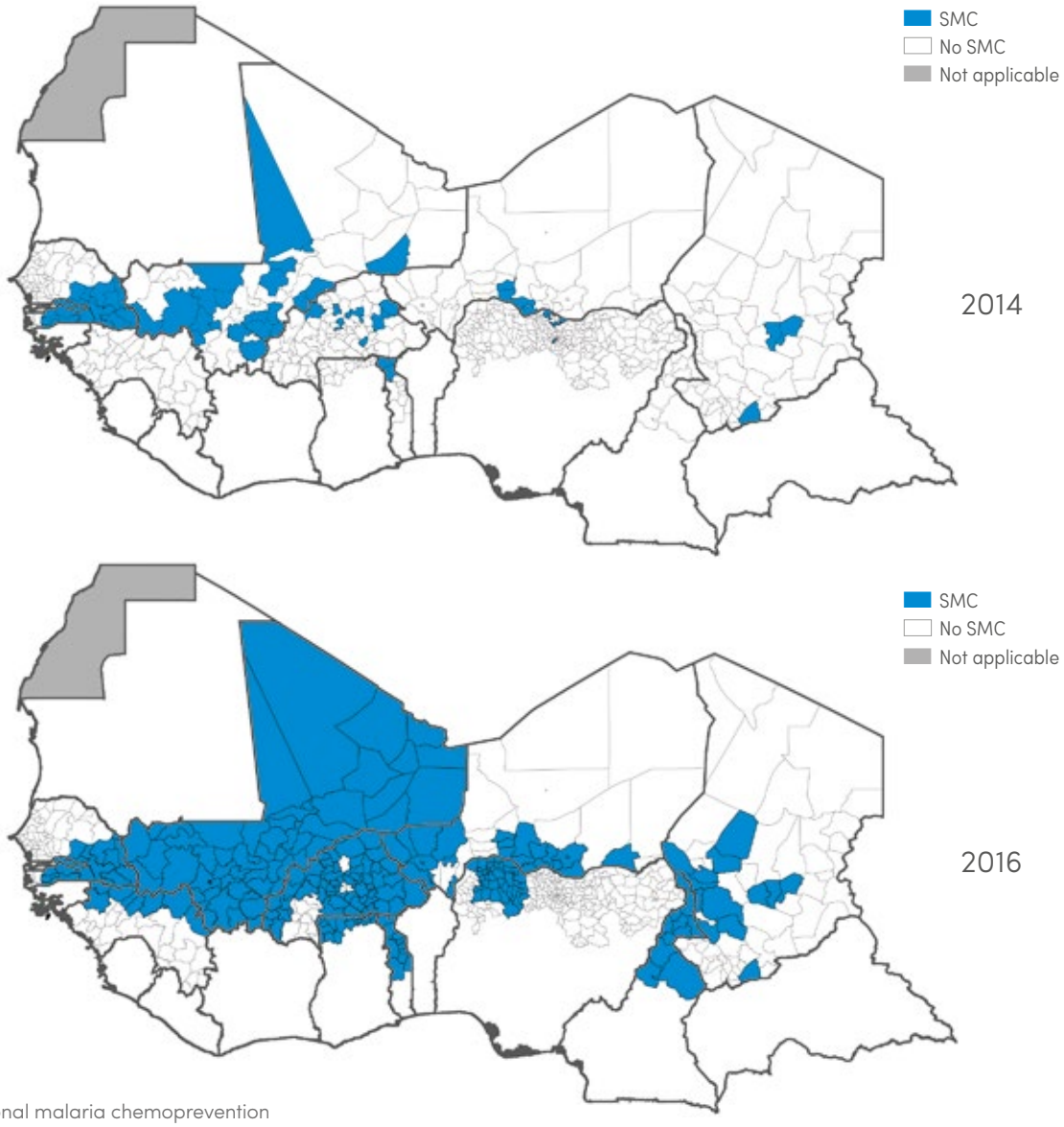
previous years, many pregnant women did not attend ANC facilities (approximately 26% in 2016 and 29% in 2015). Among women who did attend ANC, an estimated 75% received at least one dose of IPTp.

3.5 SEASONAL MALARIA CHEMOPREVENTION

Following the WHO policy recommendation on SMC for falciparum malaria control in highly seasonal transmission areas of the Sahel subregion in Africa in March 2012 and dissemination of a field implementation guide in November 2012 (*22*), countries were quick to adopt SMC and include its implementation in their strategic plans for malaria control (**Fig. 3.8**). Implementation of SMC was scaled up in 2015 and 2016, supported by financing from Unitaid through the ACCESS-SMC initiative and from other partners. Delivery is primarily door-to-door in most countries – an approach that has been shown to achieve higher and more equitable coverage than delivery through fixed distribution points, which was implemented in Mali.

FIG. 3.8.

Maps of countries and subnational areas where SMC has been scaled up, 2014–2016 *Source: Seasonal Malaria Chemoprevention Working Group*



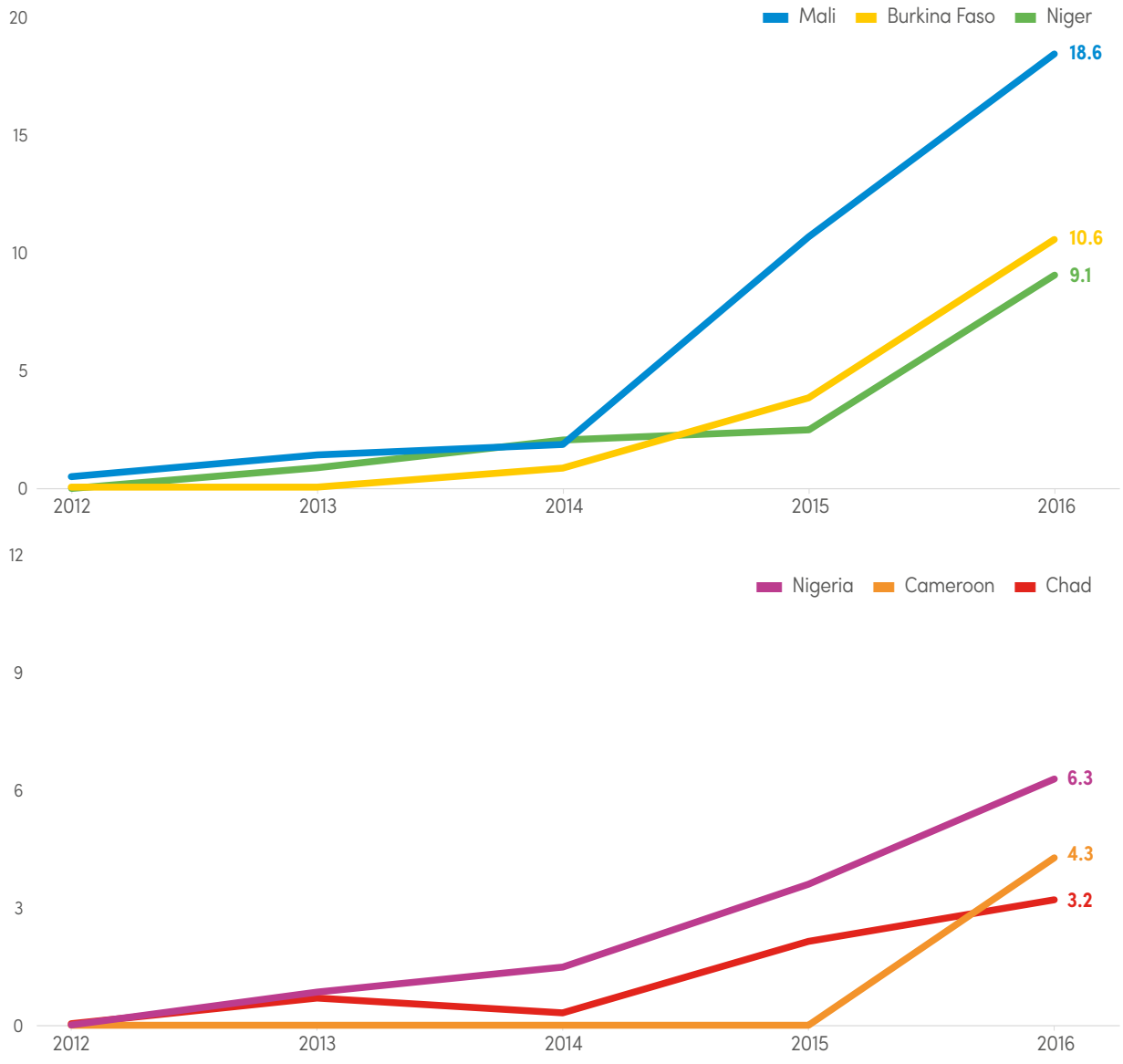
SMC, seasonal malaria chemoprevention

In 2016, about 15 million children were included in SMC programmes in 12 countries (Burkina Faso, Cameroon, Chad, Gambia, Ghana, Guinea, Guinea-Bissau, Mali, Niger, Nigeria, Senegal and Togo) and about 60 million monthly treatments were administered (**Fig. 3.9**).

Coverage surveys conducted in seven countries for the ACCESS-SMC project in 2016 found that, in areas where SMC was implemented through the project, 91% of eligible children were included in SMC programmes and received SMC at least once, and 70% received SMC at least three times. In practice, children aged over 5 years often receive SMC along with their younger siblings. In Senegal, SMC policy specifically provides for SMC for children aged up to 10 years, and those aged 6–10 years receive a dose appropriate for their age. SMC in older children has been piloted in Mali.

FIG. 3.9.

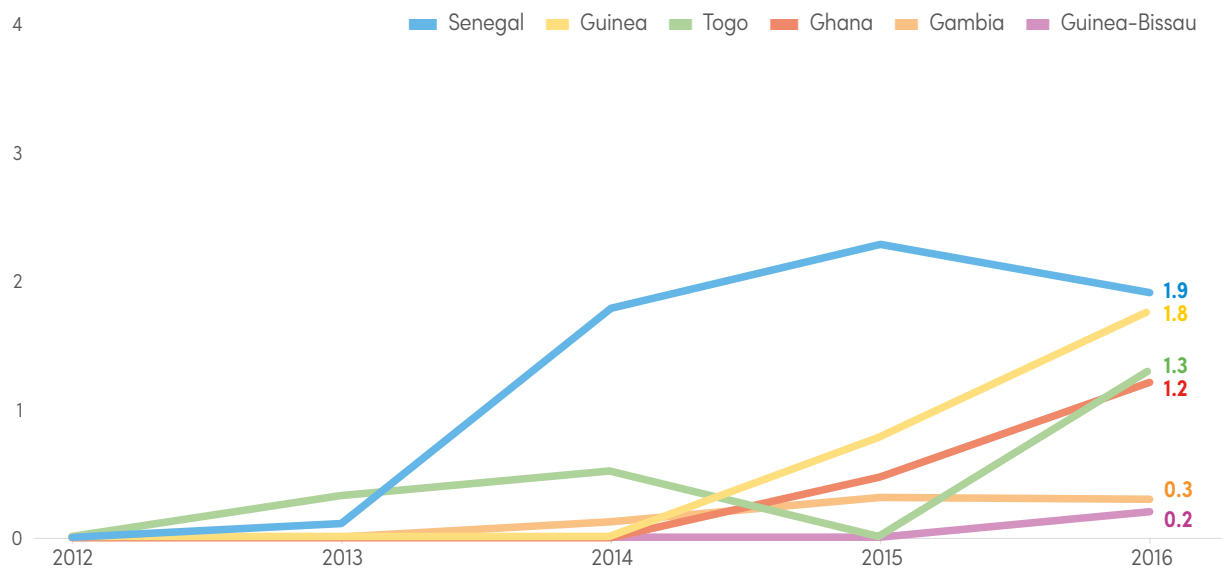
Number of SMC treatments administered in scale-up countries, 2012–2016 (in million) *Source: Seasonal Malaria Chemoprevention Working Group*



SMC, seasonal malaria chemoprevention

Within each country SMC has been funded from a variety of sources including Unitaid, the Global Fund, the World Bank, the United Nations Children's Fund (UNICEF), the US President's Malaria Initiative/ United States Agency for International Development (USAID), the Islamic Development Bank, national governments and other agencies. The scale-up of SMC in 2015 and 2016 was organized largely through the ACCESS-SMC project, funded by Unitaid, in seven countries (Burkina Faso, Chad, Gambia, Guinea, Mali, Niger and Nigeria).

In the 12 countries that are currently implementing SMC, the estimated target population of children was 28.1 million in 2016, of whom 15.3 million were reached, accounting for 58.7 million treatments. Hence, the gap in these countries for 2016 was 53.8 million treatments, to cover the children who were not reached. Extending the analysis to all eligible countries – including Benin, Mauritania, Sierra Leone, South Sudan and Sudan – the gap in 2016 was 18.7 million children, or an additional 77.2 million treatments.



4 DIAGNOSTIC TESTING AND TREATMENT

Prompt diagnosis and treatment of malaria patients is the most effective intervention to ensure that a mild case of malaria does not develop into severe disease and probable death. High levels of access to effective malaria case management may also help to reduce the pool of individuals who can contribute to onward transmission.

WHO recommends that every suspected malaria case be confirmed by microscopy or an RDT before treatment (*6*). Accurate diagnosis improves the management of febrile illnesses and ensures that antimalarial medicines are used only when necessary. Only in areas where parasite-based diagnostic testing is not possible should malaria treatment be initiated solely on clinical suspicion. WHO recommends ACTs for the treatment of uncomplicated falciparum malaria. ACTs have been estimated to reduce malaria mortality in children aged 1–23 months by 99% (range: 94–100%), and in children aged 24–59 months by 97% (range: 86–99%) (*23*).

This section of the report discusses indicators covering the trends in the proportion of children with fever for whom care is sought, and the rates of diagnostic testing and treatment among them.

4.1 CHILDREN AGED UNDER 5 YEARS WITH FEVER FOR WHOM ADVICE OR TREATMENT WAS SOUGHT FROM A TRAINED PROVIDER

Malaria is a febrile disease, and in most malaria endemic countries the disease is often suspected in children (or older patients) with fevers who seek treatment at health facilities. The WHO recommendation is that such patients are first tested for malaria and, if positive, treated appropriately by a trained health worker. Hence, the extent to which patients with fever seek treatment has been used as a measure for treatment seeking for malaria; however, this approach has some limitations. For example, what constitutes a "fever" varies by cultural context, which means that making comparisons across cultural groups can be problematic. In addition, not all fevers are due to malaria, and there is no conclusive evidence that the household and individual level decision-making processes for treatment seeking for malaria fevers are the same as for other fevers or across different ages. The proportion of fevers attributable to malaria may therefore differ among those who seek treatment and those who do not. Surveys of households often only document one source of treatment for fever to be linked to reported use of medicines, but individuals may receive treatment from more than one source for the same episode of fever. Finally, a proportion of respondents may not recall the medication they received, resulting in misclassification of the drugs that were prescribed.

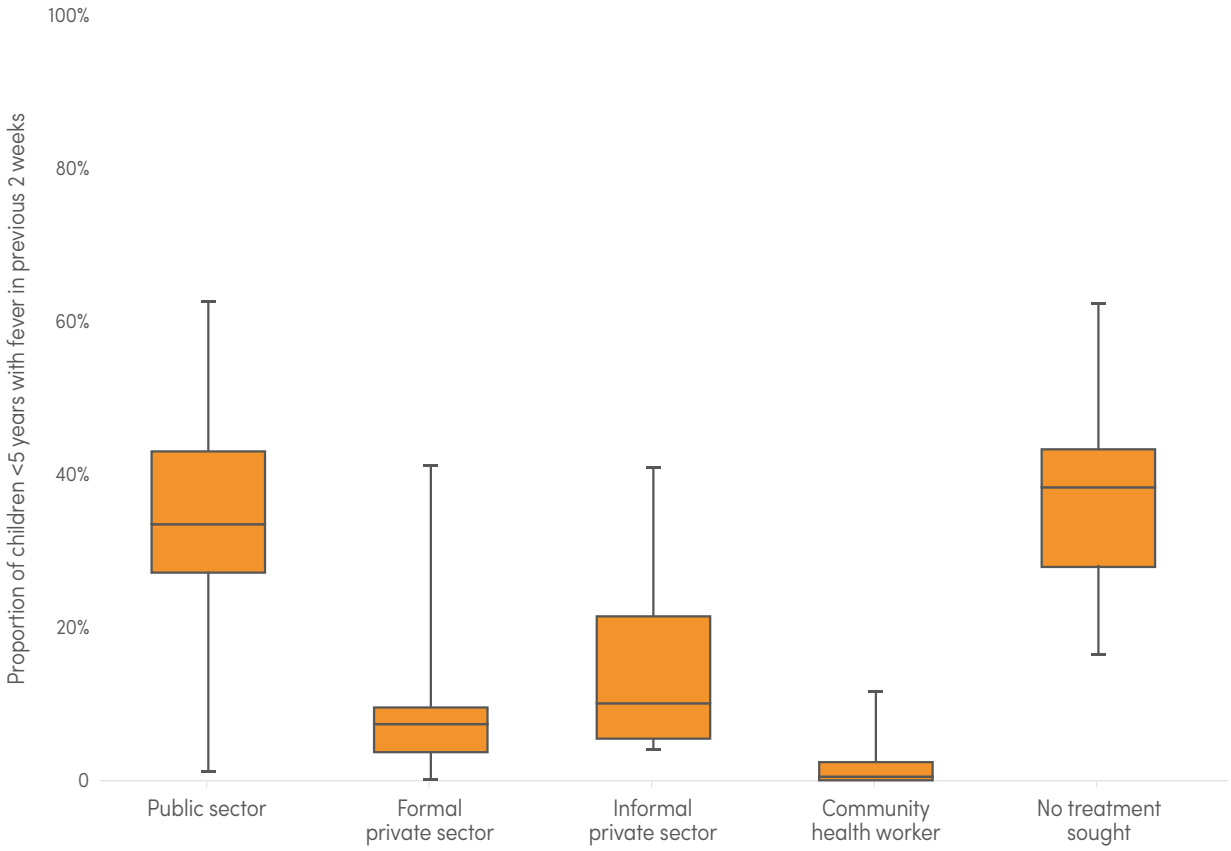
Despite the limitations, treatment seeking for fever remains the most consistently measured proxy of treatment seeking for malaria, particularly for sub-Saharan Africa, which accounts for more than 90% of global malaria cases, and in children aged under 5 years – the age group in which most cases are reported.

Among 18 nationally representative surveys completed in sub-Saharan Africa between 2014 and 2016 (representing 61% of the population at risk), care was sought for a higher proportion of febrile children (with reported fever in the past 2 weeks) in the public sector (median: 34%, interquartile range [IQR]: 28–44%) than in the private sector (median: 22%, IQR: 14–34%), as shown in **Fig. 4.1**. Most visits to the private sector were to the informal sector (median: 11%, IQR: 6–22%), which comprises pharmacies, kiosks, traditional healers, friends and relatives, and other non-medical facilities, rather than to the formal private sector (median: 8%, IQR: 5–10%), which comprises private hospitals and clinics. Overall, a median of 47% (IQR: 38–56%) of febrile children were taken to a trained provider (i.e. to public sector health facilities, formal private sector facilities or community health workers).

A large proportion of febrile children were not brought for care (median: 39%, IQR: 29–44%). Possible reasons for this are poor access to healthcare providers or a lack of awareness among caregivers about necessary care for febrile children.

FIG. 4.1.

Proportion of febrile children for whom care was sought, by health sector, sub-Saharan Africa, 2014–2016
Sources: Nationally representative household survey data from demographic and health surveys, and malaria indicator surveys



4.2 SUSPECTED MALARIA CASES RECEIVING A PARASITOLOGICAL TEST

Seventeen nationally representative surveys completed in sub-Saharan Africa between 2014 and 2016 asked questions on diagnostic testing. Among these surveys, the proportion of febrile children who received a finger or a heel stick – suggesting that a malaria diagnostic test may have been performed – was greater in the public sector (median: 52%, IQR: 34–59%) than in both the formal private sector (median: 36%, IQR: 29–67%) and the informal private sector (median: 10%, IQR: 6–13%), as shown in **Fig. 4.2**.

Although the proportion of children seeking care from a community health worker was low, about a third received a diagnostic test (median: 30%, IQR: 16–39%). Combining the proportion of febrile children aged under 5 years for whom care was sought with the proportion of those for whom care was sought who received a parasitological test, a median of 30% of febrile children received a parasitological test among the 21 nationally representative household surveys analysed between 2014 and 2016 (IQR: 16–36%).

A trend of increased testing in the public sector is notable in the results of household surveys, where the proportion of febrile children who received a malaria diagnostic test in the public sector rose from a median of 28% in 2010 (IQR: 19–50%) to a median of 52% in 2016 (IQR: 34–59%) (**Fig. 4.3**).

FIG. 4.2.

Proportion of febrile children seeking care that received a blood test, by health sector, sub-Saharan Africa, 2014–2016 *Sources: Nationally representative household survey data from demographic and health surveys, and malaria indicator surveys*

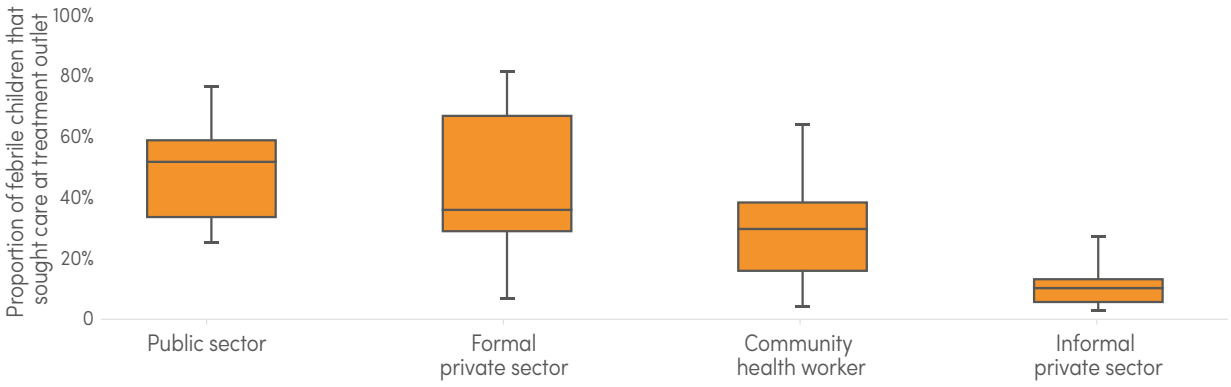
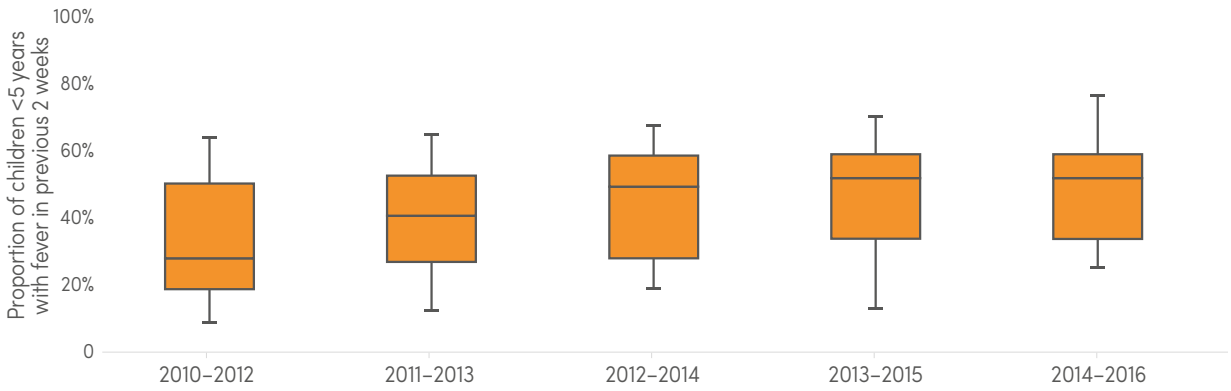


FIG. 4.3.

Proportion of febrile children attending public health facilities that received a blood test, sub-Saharan Africa, 2010–2016 *Sources: Nationally representative household survey data from demographic and health surveys, and malaria indicator surveys*

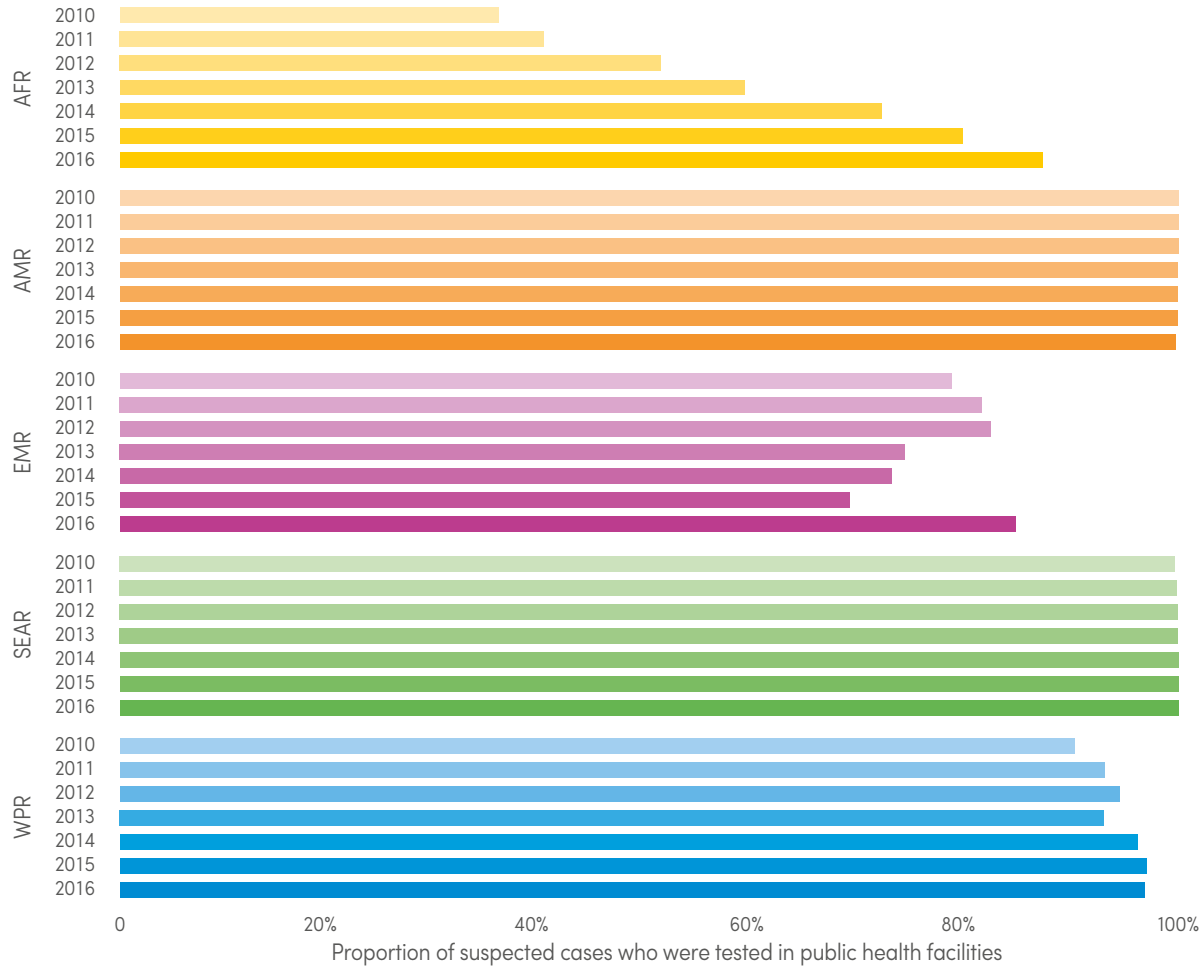


In comparison, data reported by NMCPs indicate that the proportion of suspected malaria cases receiving a parasitological test among patients presenting for care in the public sector has increased in most WHO regions since 2010 (**Fig. 4.4**). The largest increase has been in the WHO African Region, where diagnostic testing increased from 36% of suspected malaria cases in 2010 to 87% in 2016, mainly owing to an increase in the use of RDTs, which accounted for 63% of diagnostic testing among suspected cases in 2016.

The household survey estimates may underestimate the testing rate in the public sector, due to both respondent recall problems and misclassification of the type of testing. On the other hand, the reported testing rate from public health facilities may overestimate the true extent of diagnostic testing in the public sector. This is partly because the rate relies on accurate reporting of suspected malaria cases, and reporting completeness may be higher in countries with stronger surveillance systems and higher testing rates. In addition, the two sources of information are not always directly comparable because the numbers reported by NMCPs relate to all age groups, and because household surveys are undertaken in only a limited number of countries each year and are not representative of the regional estimates. It is encouraging, however, that both sources of data show a similar trend.

FIG. 4.4.

Proportion of suspected malaria cases attending public health facilities who received a diagnostic test by WHO region, 2010–2016 *Source: National malaria control programme reports*



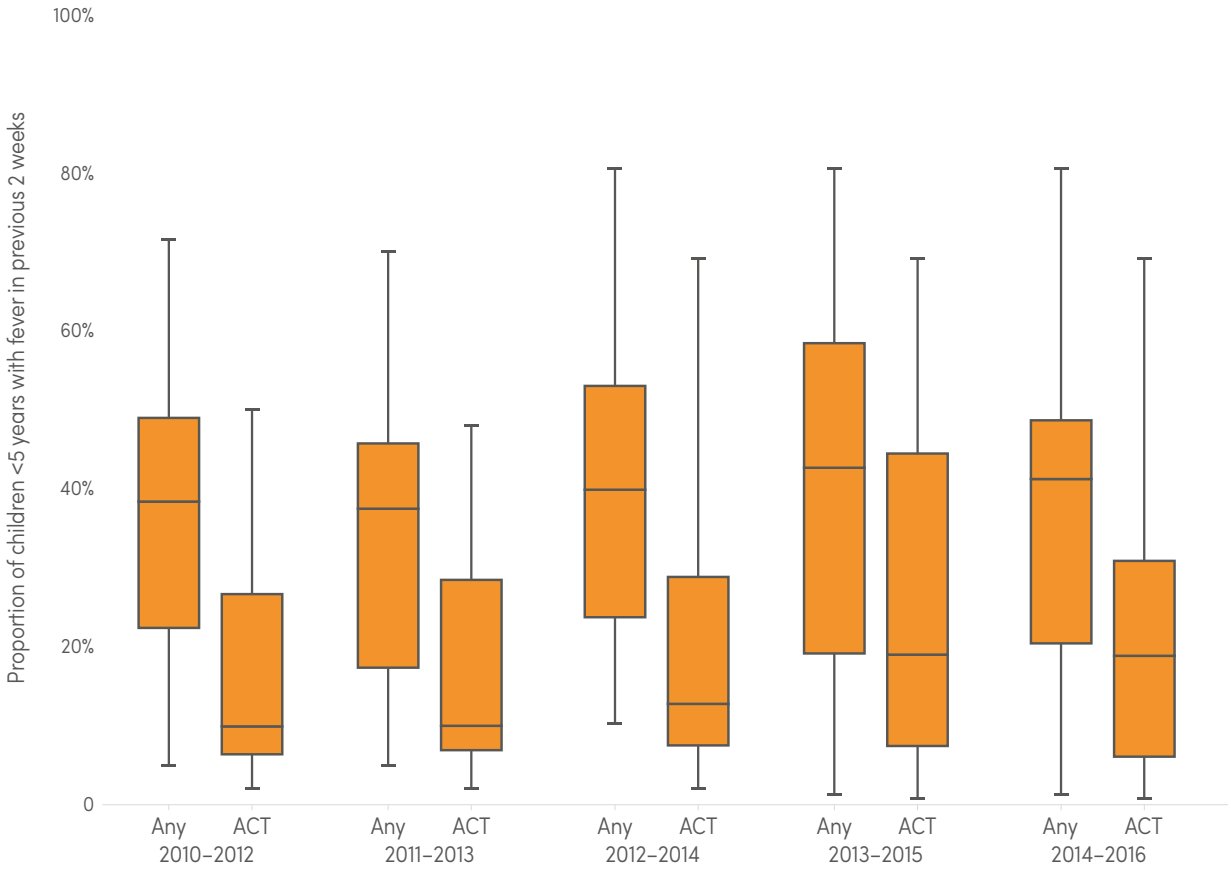
AFR, WHO African Region; AMR, WHO Region of the Americas; EMR, WHO Eastern Mediterranean Region; SEAR, WHO South-East Asia Region; WPR, WHO Western Pacific Region

4.3 MALARIA CASES RECEIVING FIRST-LINE ANTIMALARIAL TREATMENT ACCORDING TO NATIONAL POLICY

The median proportion of children aged under 5 years for whom care was sought and who received any antimalarial drug was 41% among 18 household surveys conducted in sub-Saharan Africa in 2014–2016 (IQR: 21–49%). The median proportion receiving an ACT was 19% (IQR: 6–31%) (**Fig. 4.5**). The low values can be attributed to two factors: many febrile children are not taken for care to a qualified provider (**Section 4.1**) and, in cases where children are taken for care, a significant proportion of antimalarial treatments dispensed are not ACTs, especially in the private sector (**Section 4.4**). The apparent proportions and trends indicated are uncertain because the IQRs of the medians are wide, indicating considerable variation among countries. Moreover, the number of household surveys is comparatively small, covering an average of 37% of the population at risk in sub-Saharan Africa in any one 3-year period.

FIG. 4.5.

Proportion of febrile children seeking care that received antimalarial medicines, sub-Saharan Africa, 2010–2016 *Sources: Nationally representative household survey data from demographic and health surveys, and malaria indicator surveys*



ACT, artemisinin-based combination therapy; Any, any antimalarial

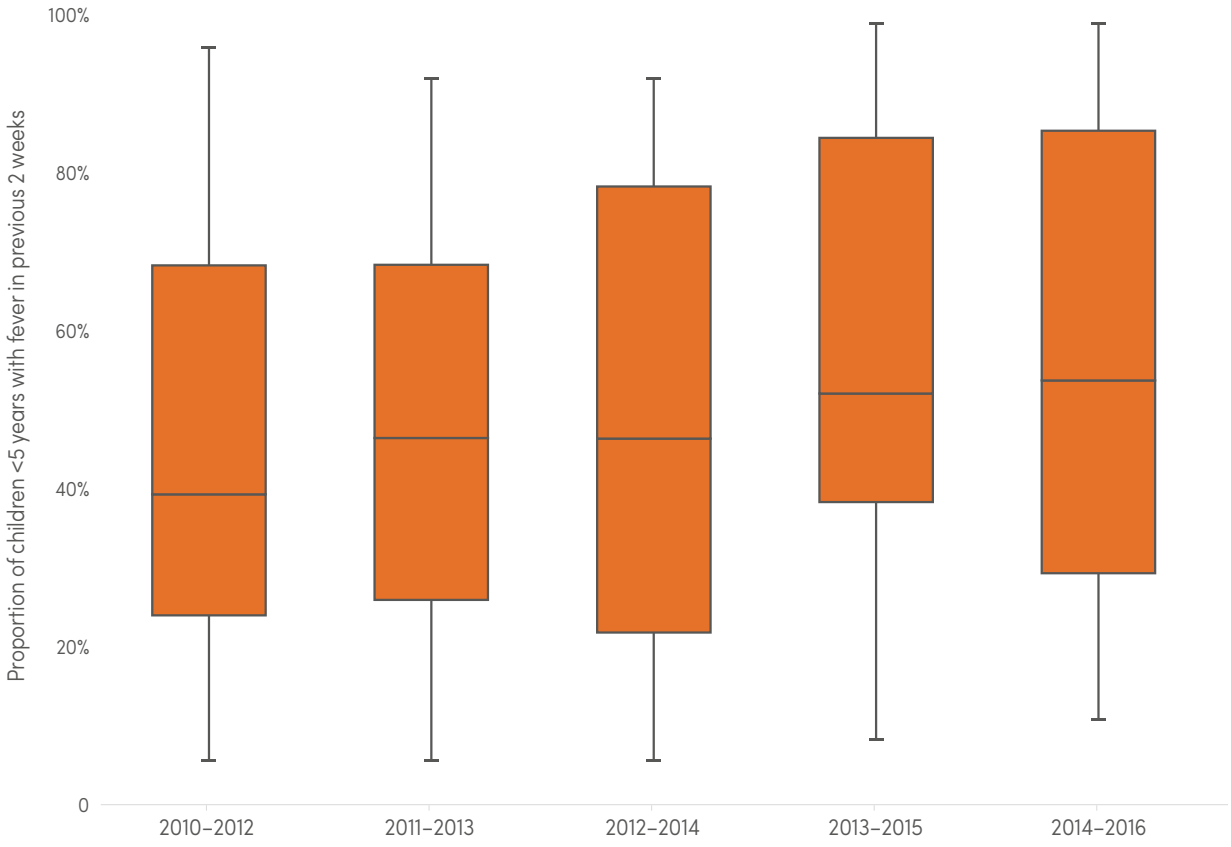
Further investments are needed to better track malaria treatment at health facilities (through routine reporting systems and surveys) and at community level, to gain a greater understanding of the extent of barriers to accessing malaria treatment. Analysis should be focused on the apparent mismatch between the large number of tests reported and the ACTs distributed by NMCPs, the relatively low levels of ACT prescriptions reported by patients who sought treatment, and the relatively low use of the public health sector reported from household surveys.

4.4 ARTEMISININ-BASED COMBINATION THERAPY TREATMENTS AMONG ALL MALARIA TREATMENTS

Based on nationally representative household surveys, the proportion of antimalarial treatments that were ACTs (for children with both a fever in the previous 2 weeks and for whom care was sought) increased from a median of 39% in 2010–2012 (IQR: 24–68%) to 54% in 2014–2016 (IQR: 29–86%) (**Fig. 4.6**).

FIG. 4.6.

Proportion of febrile children seeking care and treated with antimalarial medicines that received an ACT, sub-Saharan Africa, 2010–2016 *Sources: Nationally representative household survey data from demographic and health surveys, and malaria indicator surveys*



ACT, artemisinin-based combination therapy

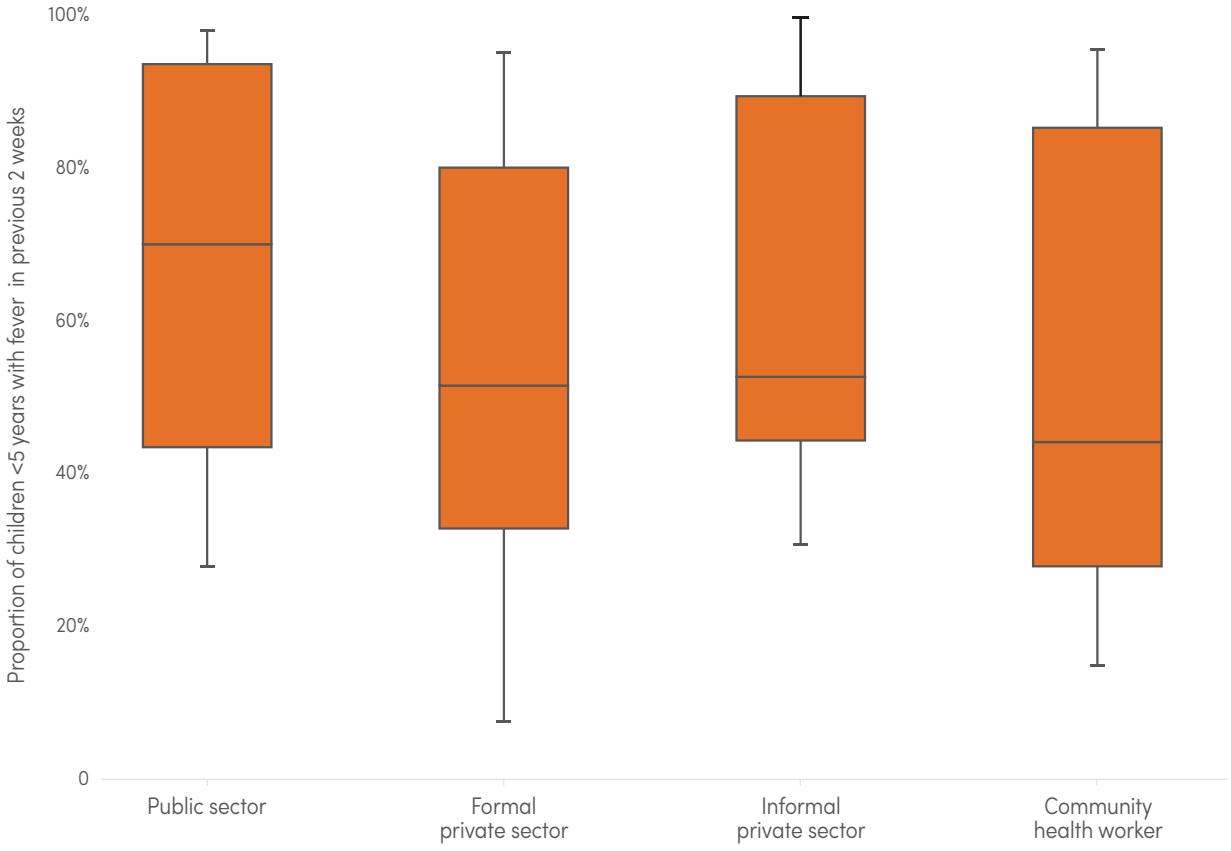
However, the ranges associated with the medians are wide, indicating large variation between countries, and the number of household surveys covering any one 3-year period is relatively small. Antimalarial treatments are more likely to be ACTs if treatment is sought for children at public health facilities (70% in 2014–2016, IQR: 43–94%) than if treatment is sought in the private sector (52% in 2010–2012, IQR: 33–80%) (**Fig. 4.7**).

4.5 INTEGRATED COMMUNITY CASE MANAGEMENT

A considerable proportion of the population, particularly those in rural remote areas, do not have access to prompt diagnosis and effective treatment of malaria. Integrated management of childhood illnesses (IMCI) and integrated community case management (iCCM) promote the integrated management of common life-threatening conditions in children at health facility and community levels. The introduction and increased availability of reliable malaria RDTs and effective malaria treatment (ACTs), together with training of local community health workers, has made it possible to improve access to malaria case management in remote communities (*24*). For over a decade, WHO and UNICEF have been supporting and documenting the implementation of iCCM: the diagnosis and treatment of malaria, pneumonia and diarrhoea at community level, because these are responsible for over one third of deaths in children aged under 5 years.

FIG. 4.7.

Proportion of febrile children with a positive RDT at time of survey and treated with antimalarial medicines who received an ACT, by health sector, sub-Saharan Africa, 2014–2016 *Sources: Nationally representative household survey data from demographic and health surveys, and malaria indicator surveys*



ACT, artemisinin-based combination therapy; RDT, rapid diagnostic test

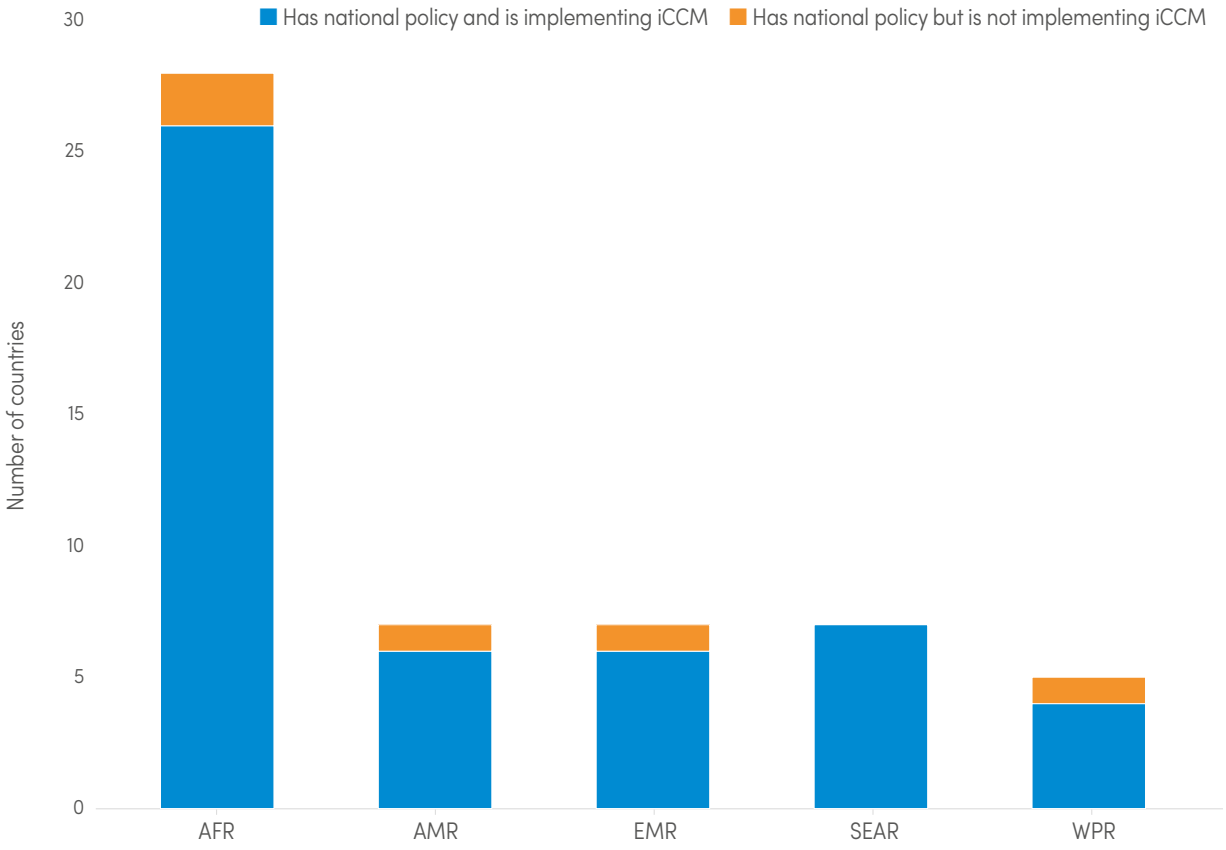
iCCM has been shown to increase (up to twofold) the treatment rate for malaria when treatment services for malaria are delivered with treatment for two other illnesses (*25*). iCCM also increases care seeking, as demonstrated by a recent evaluation from Uganda (*26*), which found that districts with iCCM experienced a 21% increase in care seeking for fever compared with districts without iCCM. Other advantages include reduced burden on health-care facilities; in one study, these have been shown to reduce costs of care by up to 31% (*27*).

The scale of iCCM implementation varies greatly (**Fig. 4.8**). As of 2016, 26 malaria affected countries in Africa had policies in place, of which 24 had started national or subnational implementation. In each of the WHO regions of South-East Asia, Eastern Mediterranean and the Americas, seven countries had iCCM policies in place. However, in the Eastern Mediterranean and the Americas, only six countries in each region had embarked on some level of implementation. Few countries have nationwide implementation of iCCM, but data on coverage and quality of services are unavailable for most countries at this time.

A number of challenges hinder the full scale-up of iCCM. Effective iCCM relies heavily on community health workers being properly trained, equipped and supervised, which in turn requires government stewardship and investments, but resources are currently insufficient. There is increasing recognition of the need for institutionalization of community health workers into the formal health system to ensure continued provision of their needed health services.

FIG. 4.8.

iCCM policy adoption and implementation by WHO region by 2016 *Source: WHO/UNICEF Global Integrated Management of Childhood Illness (IMCI) survey*



AFR, WHO African Region; AMR, WHO Region of the Americas; EMR, WHO Eastern Mediterranean Region; iCCM, integrated community case management; SEAR, WHO South-East Asia Region; WPR, WHO Western Pacific Region

5 MALARIA SURVEILLANCE SYSTEMS

Pillar 3 of the GTS is to transform malaria surveillance into a core intervention. This involves the establishment of passive case detection systems that perform optimally and are complemented, in elimination settings, with active case detection, to ensure that potentially all malaria cases are detected and treated. The information from surveillance systems is then used to optimize the deployment and impact of interventions to accelerate elimination, and eventually to confirm the interruption of transmission. Effective surveillance of malaria cases and deaths is essential for identifying which areas or population groups are most affected by malaria, and for targeting resources to communities most in need. Such surveillance also alerts ministries of health to epidemics, enabling control measures to be intensified when necessary.

Cases and deaths from the surveillance system reported by countries are often from the public health sector, predominantly through passive case detection. In elimination settings, data on cases may also be recorded during active case detection. Often, data from the private sector remain sparse, and in countries with moderate to high transmission it is possible that a substantial proportion of patients who do not seek care remain undocumented by the surveillance system.

A strong surveillance system therefore requires high levels of access to care and case detection, and complete reporting by all health sectors. This section describes the reporting rates in the public health sector by WHO region, and the proportion of overall malaria cases detected by this sector.

5.1 HEALTH FACILITY REPORTS RECEIVED AT NATIONAL LEVEL

The completeness of health facility reporting is a good indicator of a surveillance system's performance. A high reporting rate is also critical to the accurate estimation of the burden of malaria. Health facility reporting rates become less relevant as countries progress towards elimination and begin to report individual cases. Nonetheless, to ensure that coverage of surveillance systems is complete, the number of health facilities testing for malaria should continue to be tracked.

In the WHO African Region, 37 out of 46 countries had at least 80% of public health facilities reporting in 2016, and it was not possible to compute this indicator for two countries (**Fig. 5.1**). In the WHO Eastern Mediterranean Region, however, only three out of eight countries had 80% or more of public health facilities reporting in 2016. These measures of reporting rates may be uncertain because many countries may not know exactly how many public health facilities they should expect reports from, given that health facility lists may not be updated. Reporting from the private sector was present in only a few countries, accounting for less than 2% of all reported malaria cases.

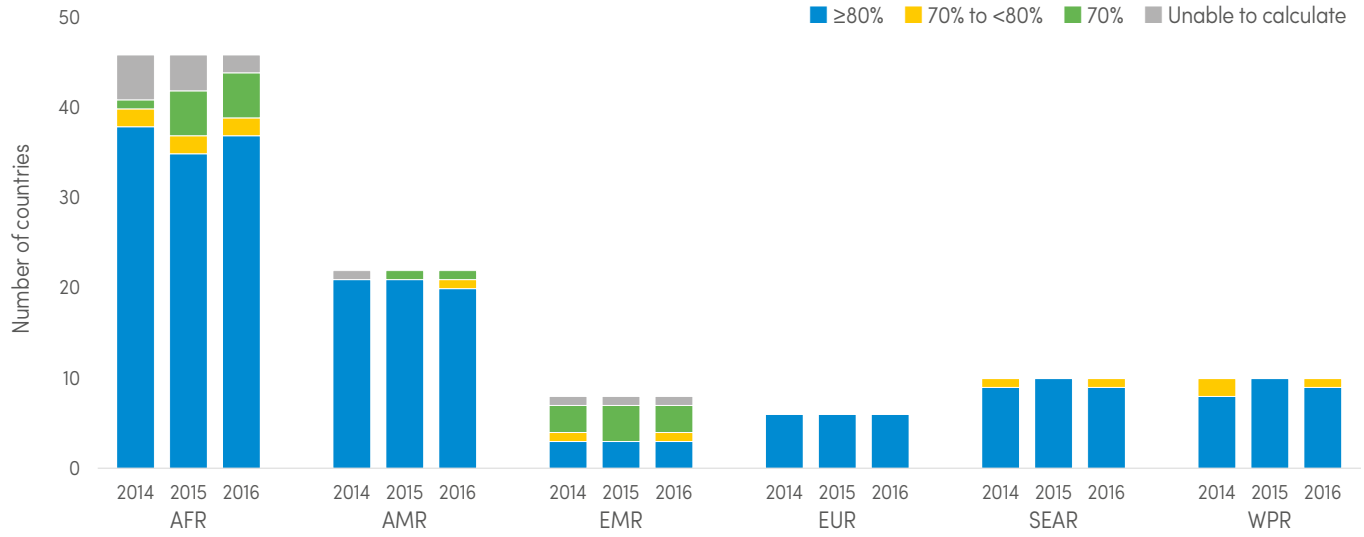
5.2 MALARIA CASES DETECTED BY SURVEILLANCE SYSTEMS

Among 55 countries where the burden of malaria was estimated – from either adjustment of the routine data or the transformation of prevalence to incidence (**Section 6**) – the proportion of estimated cases reported by surveillance systems was lowest in Gabon (8%) and highest in the Bolivarian Republic of Venezuela (84%) (**Fig. 5.2**). Countries with weak malaria surveillance systems include India and Nigeria, two major contributors to the global burden of malaria, with 8% and 16% of cases, respectively, detected by the surveillance system.

Countries shown in **Fig. 5.2** represent over 90% of the global burden of malaria. Prioritizing investments in surveillance in these countries will yield a substantial return in resource optimization and accurate tracking of progress.

FIG. 5.1.

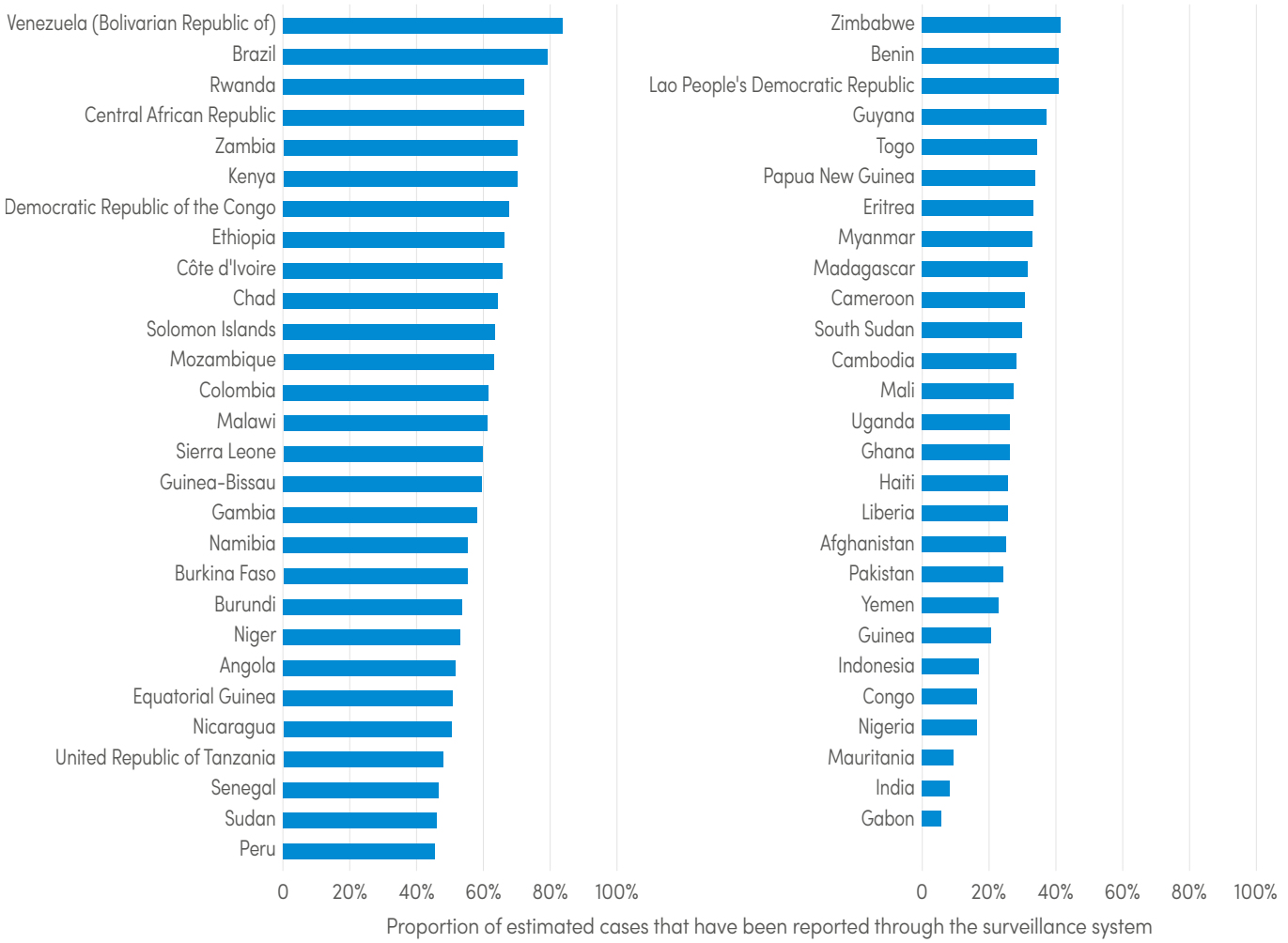
Health facility reporting rates by WHO region, 2014–2016 *Source: National malaria control programme reports*



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

FIG. 5.2.

Proportion of all cases that have been captured by the surveillance system in countries where malaria burden was estimated from either parasite rate-to-incidence model or adjustments of national routine data *Sources: National malaria control programme reports and WHO estimates*



6 REGIONAL AND GLOBAL TRENDS IN MALARIA CASES AND DEATHS

To assess progress towards the targets and milestones of the GTS, this section of the report reviews the total number of cases and deaths estimated to have occurred in 2016.

Due to differences in the coverage and quality of surveillance systems in different countries, three main methods were used to estimate the number of malaria cases and incidence (see **Annex 1** for method use by country).

Category 1 method – adjusted routine data

This method usually applies to countries outside sub-Saharan Africa and to Botswana, Ethiopia, Namibia and Rwanda, where the public health sector surveillance system is good but some clinical diagnosis of cases still occurs and a substantial proportion of patients use the private sector or do not seek treatment. For such countries, case data reported by the NMCPs were adjusted for test positivity rate (where clinical cases were also reported), public health sector reporting rates, fever treatment-seeking rates in the private sector and the rates of not seeking treatment.

Category 2 method – parasite rate-to-incidence

For many countries in sub-Saharan Africa, the surveillance systems do not capture all malaria cases, and data often come from the public health sector only. Not all cases in the public sector are reported consistently and, where cases are reported, a proportion of them may not be parasitologically confirmed. In addition, many patients either use the private sector or do not have adequate access to health care and therefore do not seek treatment. Hence, the routine data remain unreliable for estimating malaria burden, with the reliability becoming poorer going further back in time. For these countries, a method developed by the Malaria Atlas Project is used, which estimates cases by employing an epidemiological model of the relationship between parasite prevalence and case incidence within a geospatial framework.

Category 3 method – unadjusted routine data

This approach involves use of routine data reported by NMCPs without any adjustments. Countries for which this approach was used were Algeria, Argentina, Belize, Bhutan, Cabo Verde, China, Comoros, Costa Rica, Democratic People's Republic of Korea, Ecuador, El Salvador, Iran (Islamic Republic of), Iraq, Malaysia, Mexico, Paraguay, Republic of Korea, Sao Tome and Principe, Saudi Arabia, South Africa, Suriname, Swaziland and Thailand. These are countries that have high-quality surveillance systems and are near elimination, having reported few malaria cases (<10 000 cases) in most of the years since 2010 (**Annex 1**).

6.1 ESTIMATED NUMBER OF MALARIA CASES BY WHO REGION, 2000–2015

In 2016, an estimated 216 million cases of malaria occurred worldwide (95% CI: 196–263 million) compared with 237 million cases in 2010 (95% CI: 218–278 million) (**Table 6.1**). Compared with 2015, 5 million more malaria cases were estimated to have occurred globally in 2016.

TABLE 6.1.

Estimated malaria cases, 2010–2016 Estimated cases are shown with 95% upper and lower confidence intervals. *Source: WHO estimates*

	Number of cases (000)						
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Lower 95% CI	218 000	207 000	199 000	191 000	191 000	192 000	196 000
Estimated total	**237 000**	**225 000**	**217 000**	**210 000**	**210 000**	**211 000**	**216 000**
Upper 95% CI	278 000	267 000	262 000	256 000	256 000	257 000	263 000
Estimated *P. vivax*							
Lower 95% CI	10 490	11 170	9 930	6 800	6 440	6 060	6 430
Estimated total	**15 860**	**14 730**	**13 200**	**10 250**	**8 750**	**8 160**	**8 550**
Upper 95% CI	21 680	19 630	18 000	14 600	11 520	10 640	11 140

Most of the cases in 2016 were in the WHO African Region (90%), followed by the WHO South-East Asia Region (7%) and the WHO Eastern Mediterranean Region (2%) (**Table 6.2**, **Fig. 6.1**). About 4% of estimated cases globally were caused by *P. vivax*, but outside the African continent this proportion was 36% (**Table 6.2**).

P. vivax is the predominant parasite in the Americas (64%) and above 30% in South-East Asia and 40% in the Eastern Mediterranean regions (**Table 6.2**). Most cases of malaria caused by *P. vivax* occur in the WHO South-East Asia Region (58%), followed by the WHO Eastern Mediterranean Region (21%) and the WHO African Region (10%) (**Table 6.2**). Vivax

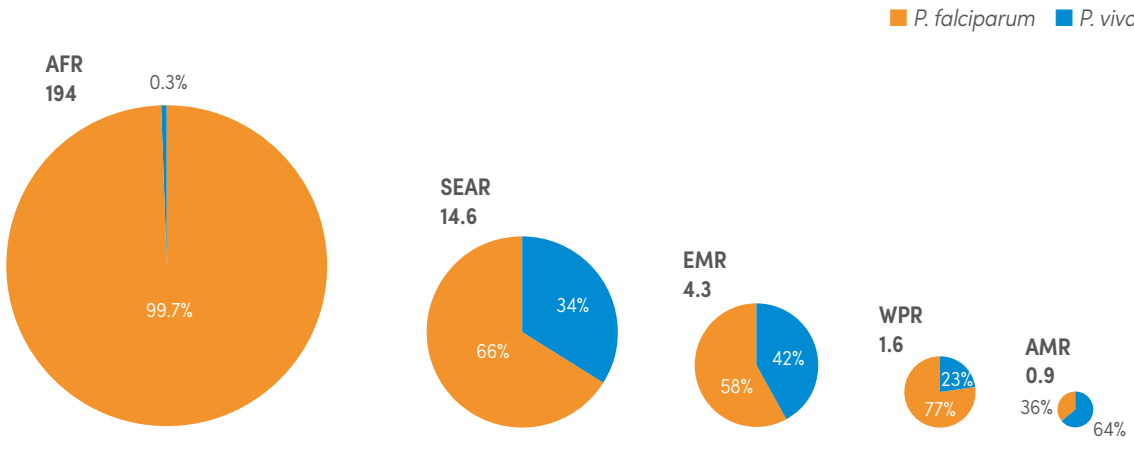
TABLE 6.2.

Estimated malaria cases by WHO region, 2016 Estimated cases are shown with 95% upper and lower confidence intervals (CI). *Source: WHO estimates*

	Number of cases (000)					
	African	**Americas**	**Eastern Mediterranean**	**South-East Asia**	**Western Pacific**	**World**
Lower 95% CI	176 000	665	3 600	10 900	1 200	196 000
Estimated total	**194 000**	**875**	**4 300**	**14 600**	**1 600**	**216 000**
Upper 95% CI	242 000	1 190	5 900	19 800	2 100	263 000
Estimated *P. vivax*						
Lower 95% CI	182	405	1 360	3 280	214	6 430
Estimated total	**859**	**556**	**1 790**	**4 960**	**385**	**8 550**
Upper 95% CI	2 090	786	2 340	7 234	592	11 140
Proportion of *P. vivax* cases	0.4%	64%	42%	34%	24%	4%

FIG. 6.1.

Estimated malaria cases (millions) by WHO region, 2016 The area of the circles is proportional to the estimated number of cases in each region. *Source: WHO estimates*



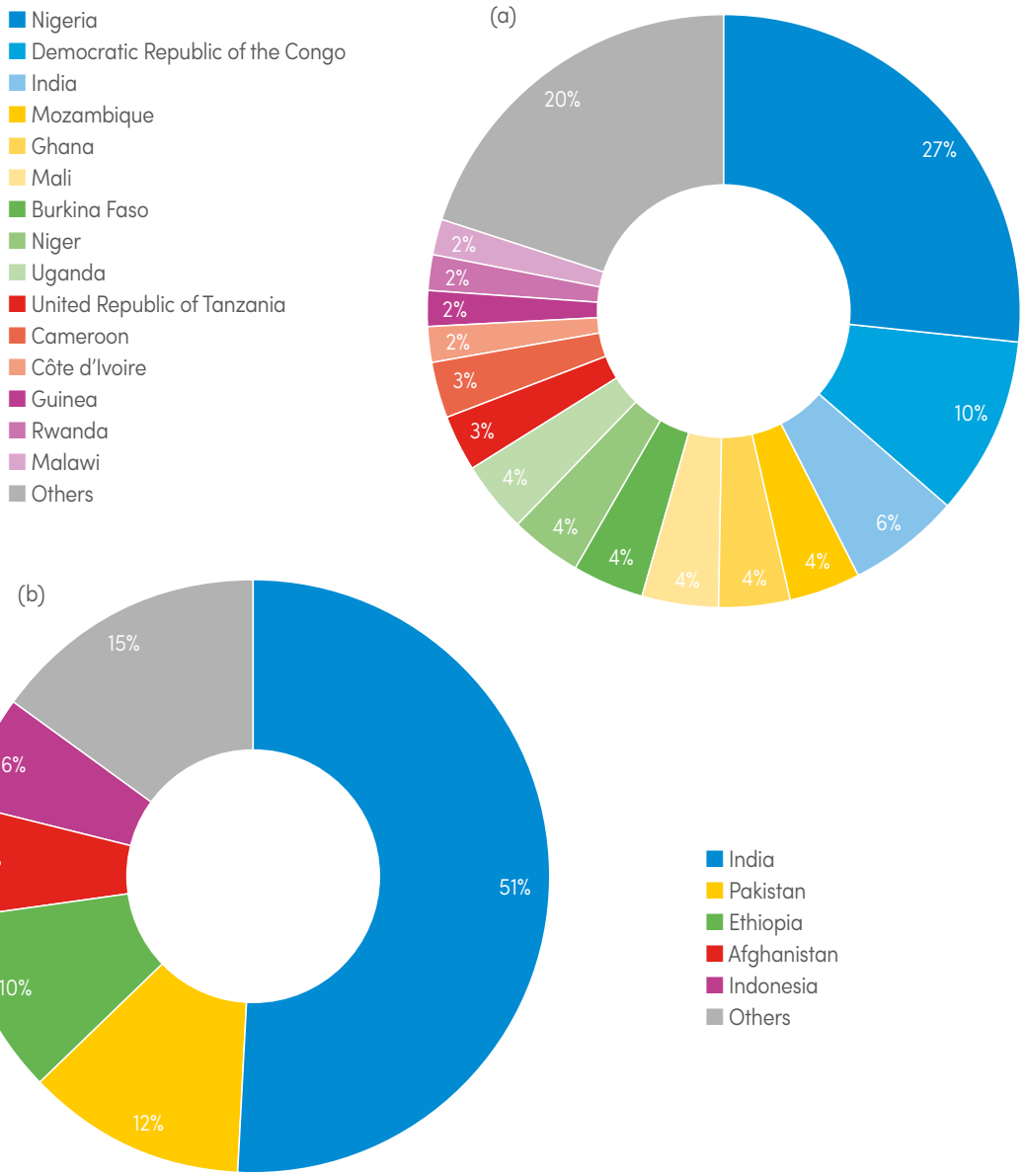
AFR, WHO African Region; AMR, WHO Region of the Americas; EMR, WHO Eastern Mediterranean Region; SEAR, WHO South-East Asia Region; WPR, WHO Western Pacific Region

malaria cases reduced by more than 45% between 2010 and 2016.

Fifteen countries accounted for 80% of all malaria cases globally (**Fig. 6.2a**). Nigeria accounted for the highest proportion of cases globally (27%), followed by the Democratic Republic of the Congo (10%), India (6%) and Mozambique (4%). In 2016, 85% of estimated vivax malaria cases occurred in just five countries (Afghanistan, Ethiopia, India, Indonesia and Pakistan) (**Fig. 6.2b**).

FIG. 6.2.

Estimated country share of (a) total malaria cases and (b) vivax malaria cases, 2016 *Source: WHO estimates*

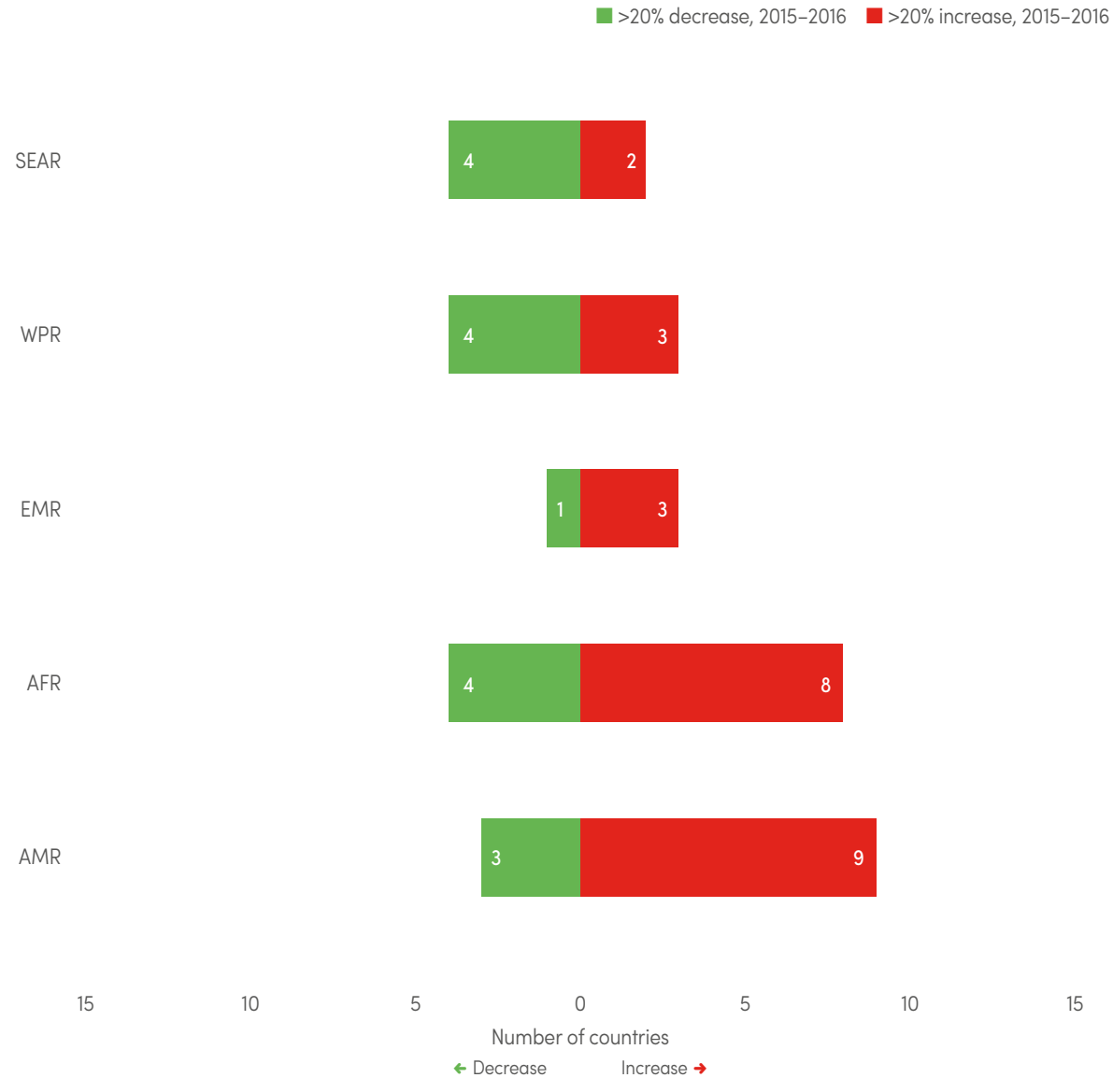


Of the 91 countries that had an indigenous malaria case in 2016, a decrease in malaria cases of more than 20% compared with 2015 was estimated in 16 countries, while an increase of a similar magnitude was estimated in 25 countries (**Fig. 6.3**).

The WHO regions of the Americas and Africa accounted for nearly 70% (n=17) of the countries that had increases of more than 20% in 2016 compared with 2015.

FIG. 6.3.

Number of countries where a reduction (green) or increase (red) of more than 20% in malaria cases has occurred between 2015 and 2016, by WHO region *Source: WHO estimates*

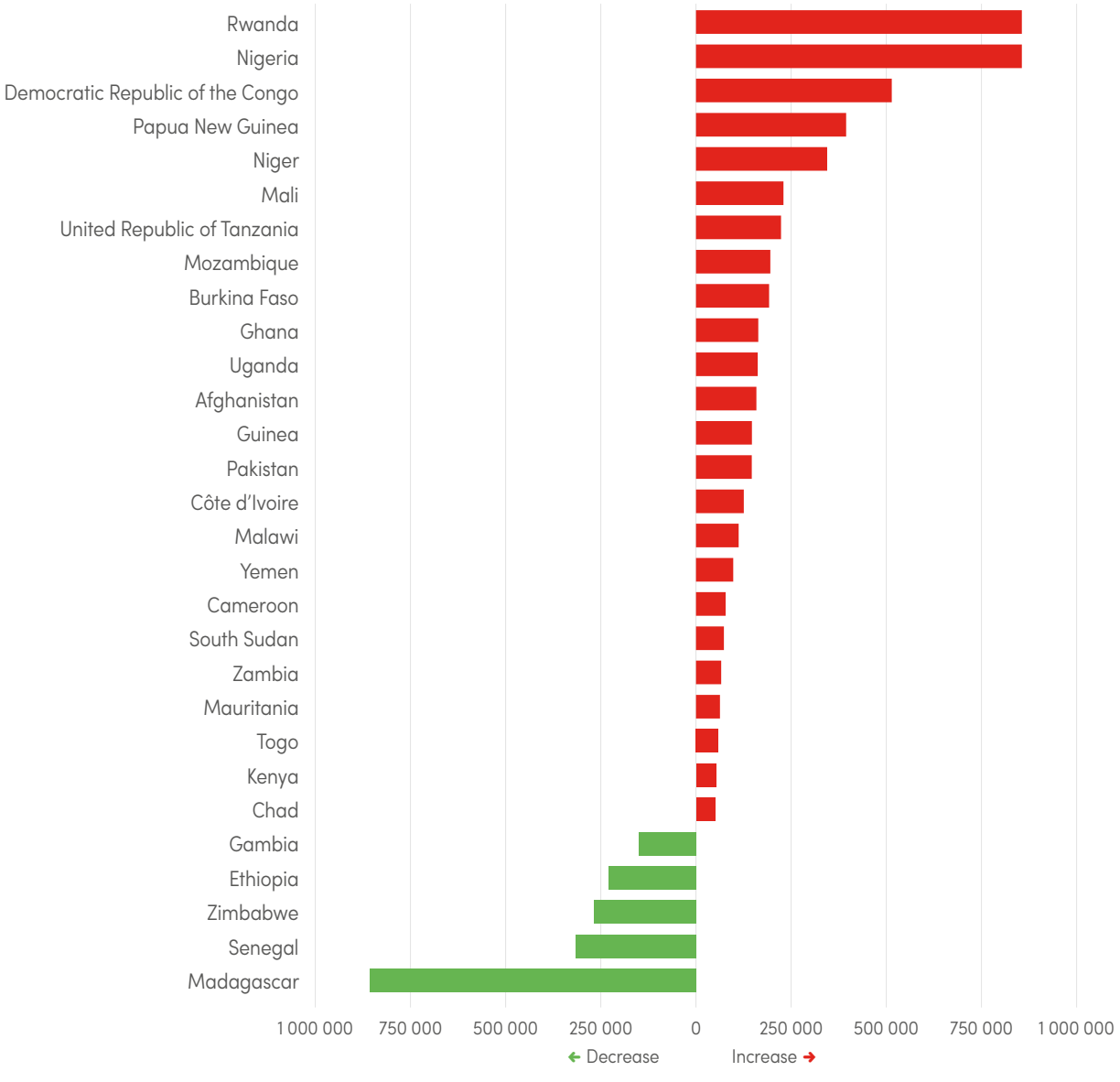


AFR, WHO African Region; AMR, WHO Region of the Americas; EMR, WHO Eastern Mediterranean Region; SEAR, WHO South-East Asia Region; WPR, WHO Western Pacific Region

Twenty-nine high-burden countries that accounted for 85% of malaria cases in 2016 had a change of more than 50 000 cases compared with 2015 (**Fig. 6.4**). Twenty-four had estimated increases of between 50 500 (Chad) and over one million (Nigeria and Rwanda) cases, while five had decreases of between 151 000 (Gambia) and 856 000 (Madagascar).

FIG. 6.4.

Differences in malaria cases of more than 50 000 in 2015 and 2016 in countries with more than 300 000 malaria cases in 2015 Positive values indicate an increase, and negative values indicate a decrease. *Source: WHO estimates*

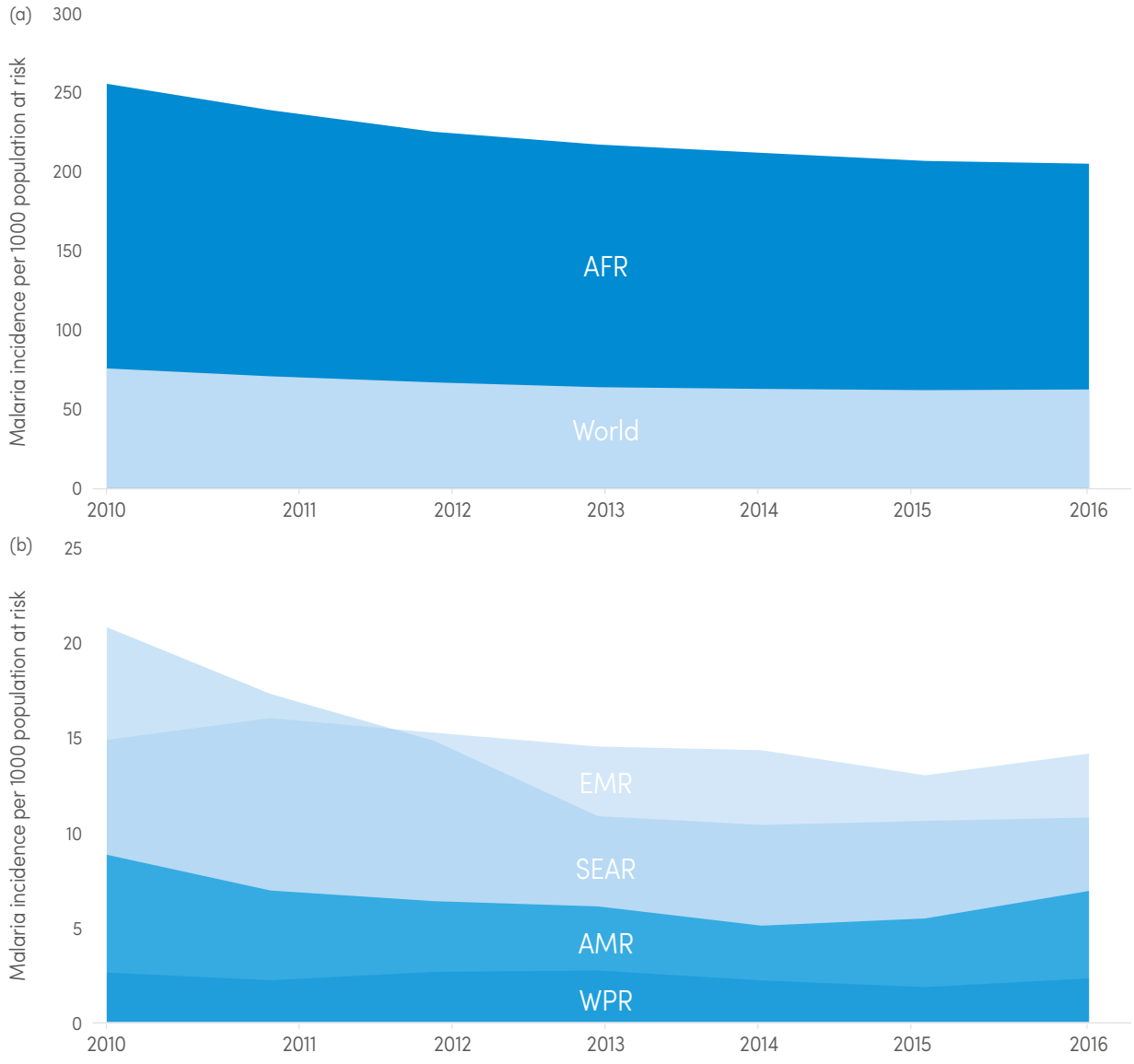


6.2 MALARIA CASE INCIDENCE RATE

For a balanced understanding, changes in numbers of malaria cases should be viewed in parallel with changes in incidence (i.e. the number of cases per 1000 population at risk), to account for population growth over time. The incidence rate of malaria globally declined steadily from 76 to 63 cases per 1000 population at risk from 2010 to 2016 (**Fig. 6.5a**), representing an 18% decline (**Fig. 6.6**). In the WHO African Region, malaria incidence reduced from 256 to 206 cases per 1000 population at risk from 2010 to 2016 (**Fig. 6.5a**), representing a 20% reduction in case incidence (**Fig 6.6**). Among other regions, the WHO South-East Asia Region registered the largest decline (48%), followed by the WHO Region of the

FIG. 6.5.

Trends in malaria case incidence rate globally and by WHO region, 2010–2016 No indigenous cases were recorded in the WHO European Region in 2015. *Source: WHO estimates*



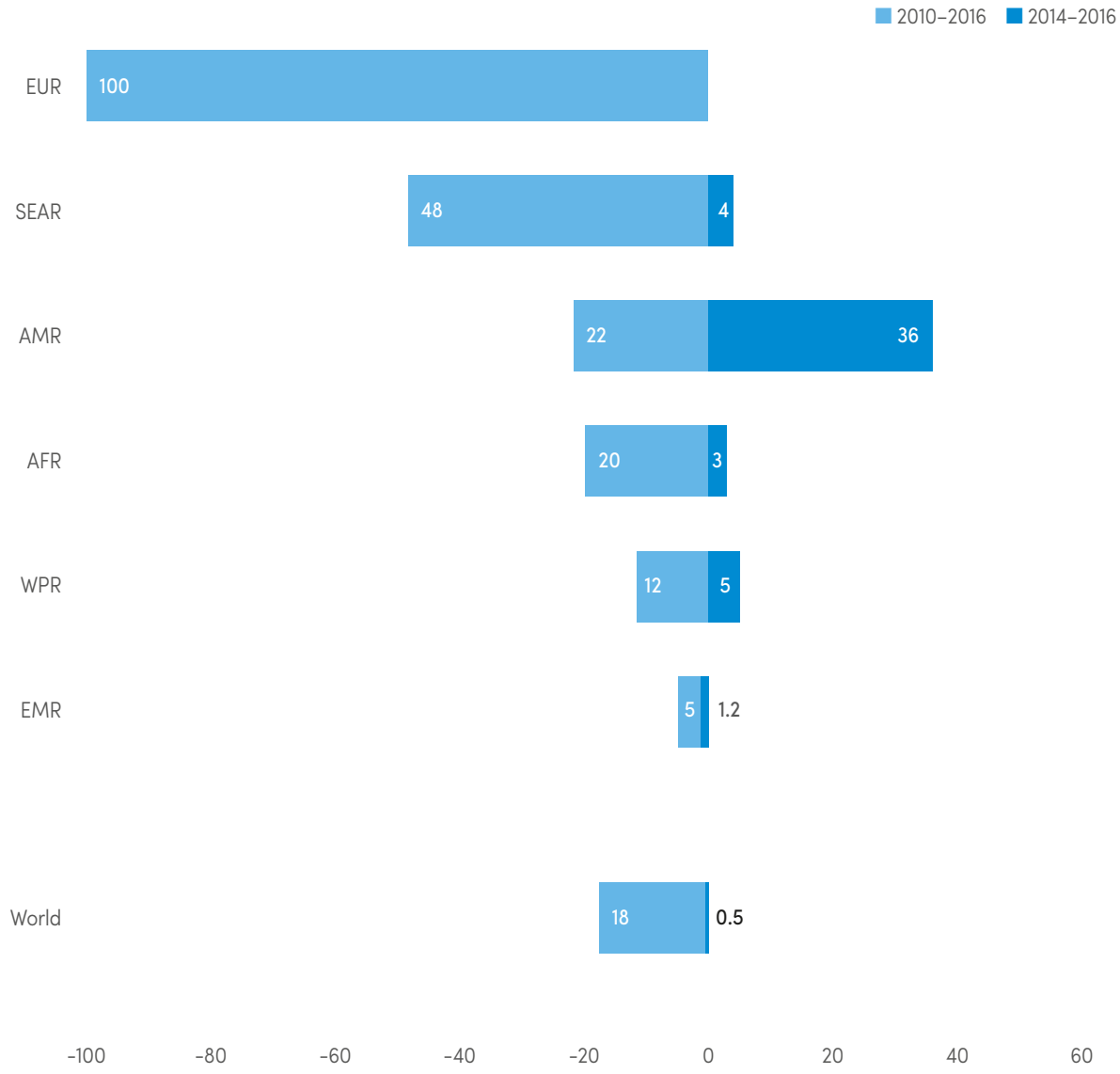
AFR, WHO African Region; AMR, WHO Region of the Americas; EMR, WHO Eastern Mediterranean Region; SEAR, WHO South-East Asia Region; WPR, WHO Western Pacific Region

Americas (22%) and the WHO Western Pacific Region (12%) (**Fig 6.5b** and **Fig. 6.6**).

Between 2014 and 2016, however, the malaria case incidence rate remained unchanged globally and increased in all WHO regions except in the WHO European Region (**Fig. 6.6**). The highest percentage increase was in the WHO Region of the Americas (36%) where malaria incidence began rising in 2013, largely due to increases in Brazil and Venezuela (Bolivarian Republic of).

FIG. 6.6.

Percentage change in malaria case incidence rate globally and by WHO region, 2010–2016 and 2014–2016 No indigenous cases were recorded in the WHO European Region in 2015. *Source: WHO estimates*



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

In a number of countries in the WHO African Region, the reported number of cases confirmed using RDT or microscopy in the public health sector alone is greater than the number of estimated cases in 2016 (**Table 6.3**). In others, confirmed cases are ≥70% higher than the estimated cases from the parasite rate-to-incidence model, suggesting an improbably high use of the public sector, given evidence of treatment seeking from household surveys (**Section 4**). WHO will review the data and methods to identify reasons for these differences and to potentially improve surveillance data and estimates of cases.

TABLE 6.3.

Cases estimated using: parasite rate-to-incidence model (current WHO approach); cases confirmed in the public health sector; and cases confirmed in the public health sector, adjusted for confirmation, reporting and treatment seeking rates *Source: National malaria control programme reports and WHO estimates*

Country	Method i) Parasite-to-incidence model (current WHO approach)	Method ii) Confirmed cases in the public health sector	Method iii) Cases confirmed in the public health sector, adjusted for confirmation, reporting and treatment seeking rates	Ratio of cases (Method i:Method iii)
Angola	3 465 156	3 794 253	7 369 301	0.47
Burkina Faso	7 892 794	9 779 154	17 751 661	0.44
Burundi	1 643 872	8 274 062	15 468 564	0.11
Guinea-Bissau	132 586	150 903	253 423	0.52
Kenya	3 519 272	2 783 846	9 583 406	0.37
Liberia	1 093 659	1 191 137	4 659 583	0.23
Malawi	4 506 310	4 827 373	9 890 653	0.46
Mozambique	8 872 978	8 520 376	14 503 748	0.61
Sierra Leone	2 244 481	1 775 306	2 977 452	0.75
United Republic of Tanzania	6 880 659	5 193 520	10 865 481	0.63
Uganda	7 768 405	9 385 132	31 288 839	0.25
Zambia	3 148 638	4 851 319	8 541 200	0.37
Total	**51 168 810**	**60 526 381**	**133 153 311**	**0.38**

6.3 ESTIMATED NUMBER OF MALARIA DEATHS AND MORTALITY RATE BY WHO REGION, 2010–2016

In 2016, it was estimated that 445 000 deaths due to malaria had occurred globally, of which 407 000 deaths (approximately 91%) were in the WHO African Region (**Table 6.4**). This represents broadly similar levels of deaths to 2015, when 446 000 deaths were estimated to have occurred globally. Approximately 80% of all deaths in 2016 occurred in 15 countries, all of which are in the WHO African Region, except for India. Nigeria, Democratic Republic of the Congo, Burkina Faso and India accounted for 58% of all malaria deaths globally (**Fig. 6.7**).

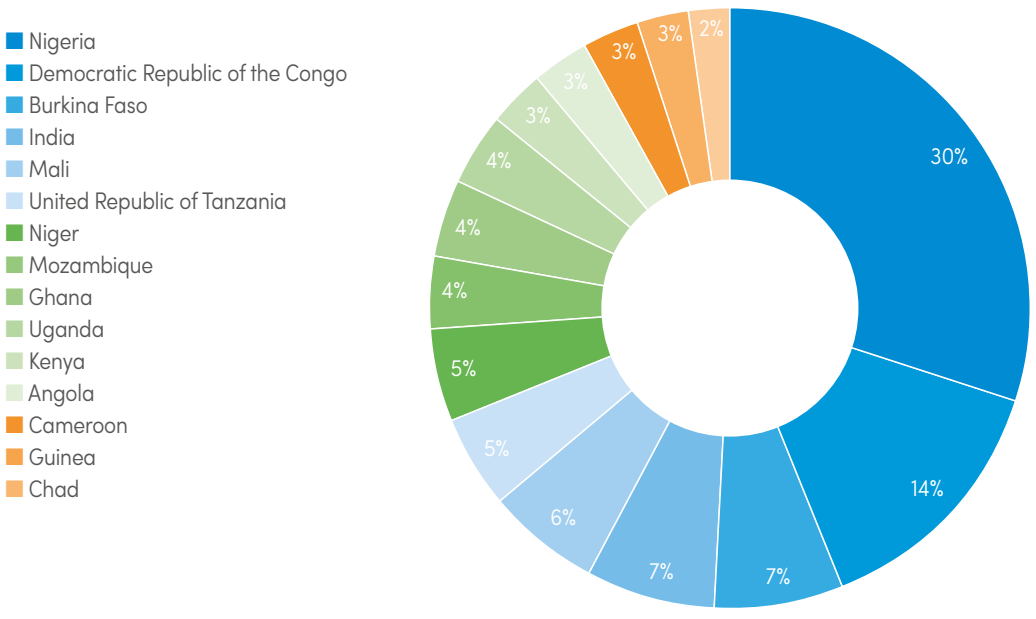
TABLE 6.4.

Estimated number of malaria deaths by WHO region, 2010–2016 *Source: WHO estimates*

	Number of deaths						
	2010	2011	2012	2013	2014	2015	2016
African	538 000	484 000	445 000	430 000	423 000	409 000	407 000
Eastern Mediterranean	7 200	7 100	7 700	7 800	7 800	7 600	8 200
European	0	0	0	0	0	0	0
Americas	830	790	630	620	420	450	650
South-East Asia	41 700	34 000	29 000	22 000	25 000	26 000	27 000
Western Pacific	3 800	3 300	4 000	4 300	2 900	2 600	3 300
World	**591 000**	**529 000**	**487 000**	**465 000**	**459 000**	**446 000**	**445 000**

FIG. 6.7.

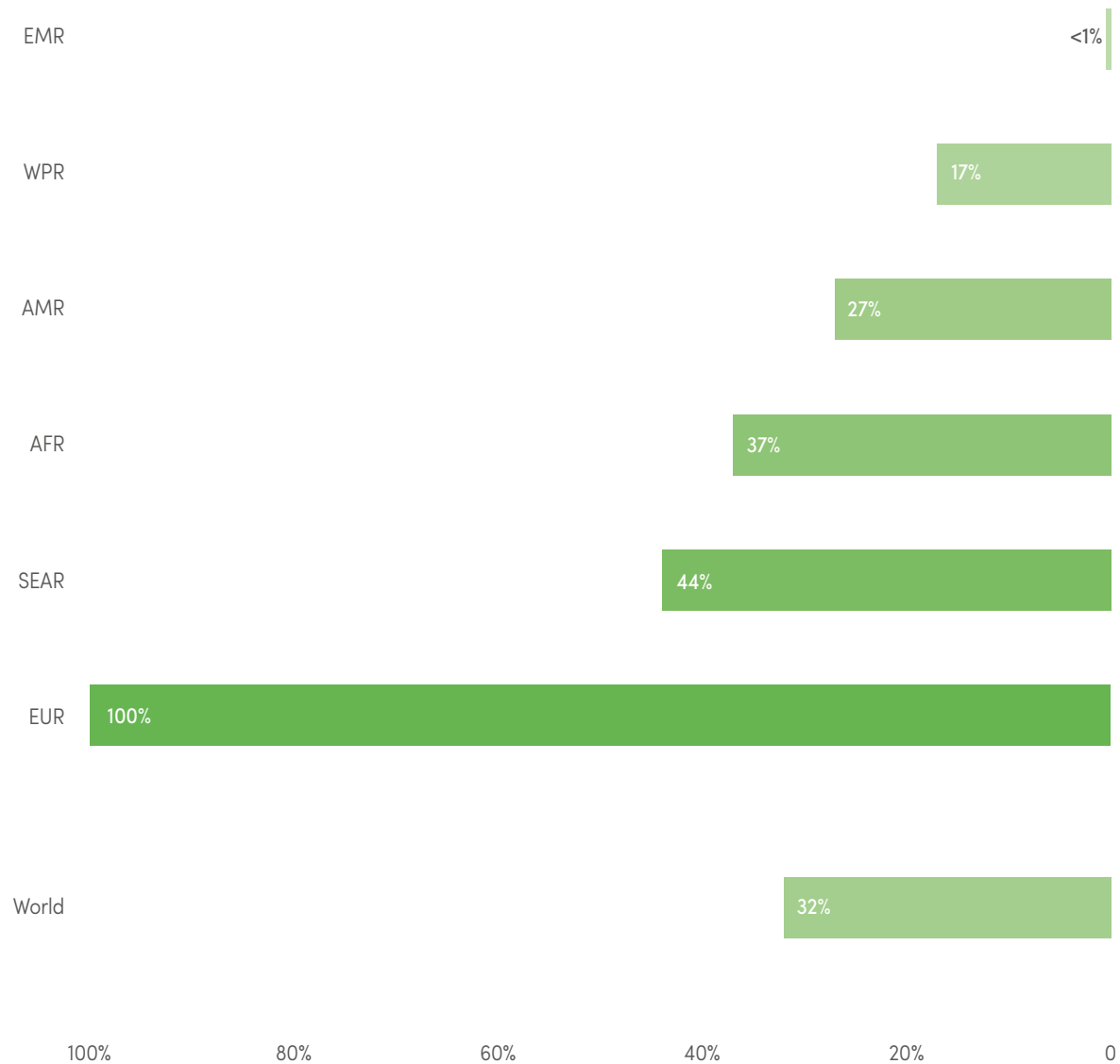
Proportion of estimated malaria deaths attributable to the 15 countries with nearly 80% of malaria deaths globally in 2016 *Source: WHO estimates*



Estimates of malaria mortality rate per 100 000 population at risk show that, compared with 2010, all regions where an indigenous malaria death was reported or estimated had recorded reductions by 2016, except the WHO Eastern Mediterranean Region where there has been a slight increase in mortality rate (**Fig. 6.8**). The largest decline in mortality rate occurred in the WHO regions of South East Asia (44%), Africa (37%) and the Americas (27%). Between 2015 and 2016, however, there was no significant change in mortality rate in the WHO African Region, while a slight increase was reported in all other WHO regions (**Fig. 6.9** and **Fig. 6.10**).

FIG. 6.8.

Percentage decrease in malaria mortality rate (deaths per 100 000 population at risk) by WHO region, 2010–2016 *Source: WHO estimates*

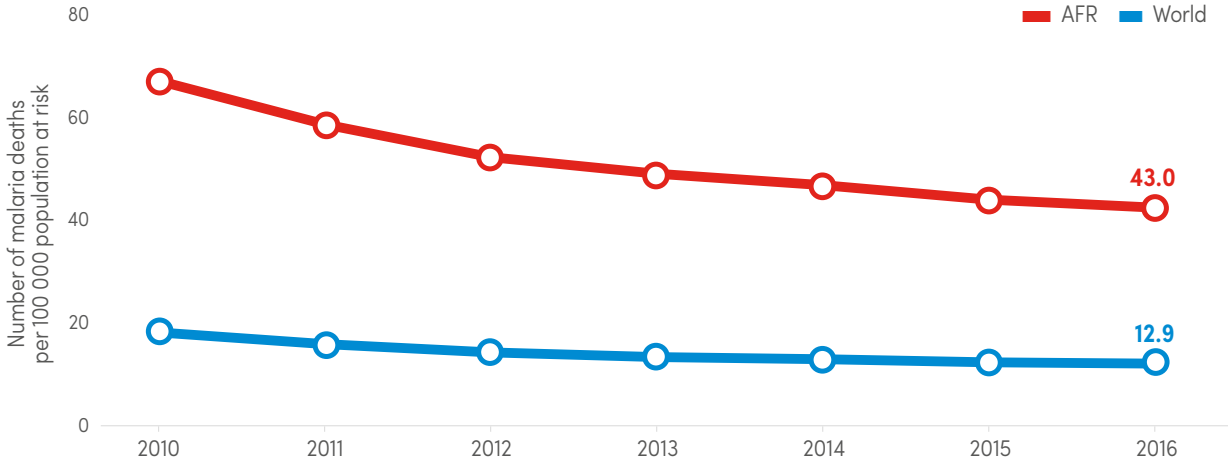


AFR, WHO African Region; AMR, WHO Region of the Americas; EMR, WHO Eastern Mediterranean Region; EUR, WHO European Region; SEAR, WHO South-East Asia Region; WPR, WHO Western Pacific Region

In the analysis of mortality, WHO uses a model that has parasite rate among children as a covariate to quantify malaria deaths among children aged under 5 in high-burden countries in sub-Saharan Africa. Malaria deaths over age five are imputed from malaria deaths under age 5 (see methods notes for **Table 6.4**) to compute total malaria deaths. This estimation approach currently does not use routine case incidence data from sub-Saharan Africa in the mortality analysis, leading to a difference in trends between the routine case data and mortality estimates. The same issue is present as is seen with the parasite-to-incidence model (**Table 6.3**). As part of the broader review of malaria burden estimation methods, in 2018, the WHO will be looking into ways to incorporate case incidence data in the analysis of malaria mortality in sub-Saharan Africa.

FIG. 6.9.

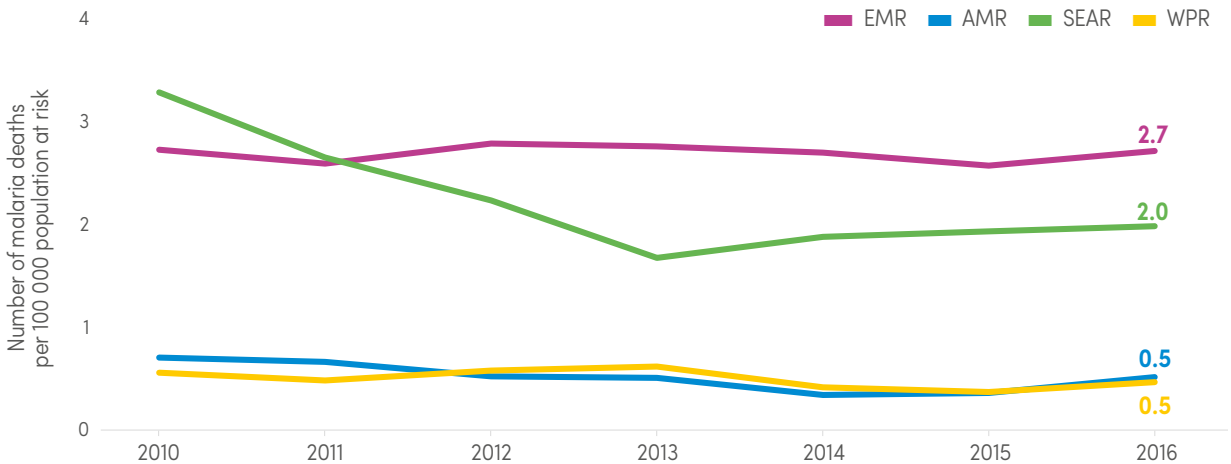
Trends in malaria mortality rate (deaths per 100 000 population at risk) globally and in the WHO African Region, 2010–2016 *Source: WHO estimates*



AFR, WHO African Region

FIG. 6.10.

Trends in malaria mortality rate (deaths per 100 000 population at risk) in WHO regions, 2010–2016 *Source: WHO estimates*



AMR, WHO Region of the Americas; EMR, WHO Eastern Mediterranean Region; SEAR, WHO South-East Asia Region; WPR, WHO Western Pacific Region

7 MALARIA ELIMINATION AND PREVENTION OF RE-ESTABLISHMENT

One of the GTS milestones for 2020 is elimination of malaria in at least 10 countries that were malaria endemic in 2015. A country can be considered for WHO certification of malaria elimination after it has reported zero indigenous cases of malaria for at least the past 3 consecutive years. Between 2000 and 2016, 18 countries attained zero indigenous cases for 3 years or more (**Fig. 7.1**); 10 of these countries attained zero indigenous cases for 3 years within the period 2011–2016. Between 2000 and 2016, six of the 18 countries that attained zero indigenous cases for 3 years or more were certified as free of malaria by WHO (**Fig. 7.1**).

Plans are under way to begin the certification process for Argentina and Paraguay, and Uzbekistan will formally request WHO certification of elimination by the end of 2017. Globally, the number of countries that were malaria endemic in 2000 and reported fewer than 10 000 malaria cases, and are therefore nearing elimination, increased from 37 in 2010 to 44 in 2016 (**Fig. 7.2**). These countries are distributed across the WHO regions as follows: the Americas (14), European (8), African (7), South-East Asia (6), Western Pacific (5) and Eastern Mediterranean (4).

FIG. 7.1.

Countries attaining zero indigenous malaria cases since 2000 Countries are shown by the year that they attained 3 consecutive years of zero indigenous cases; countries that have been certified as free of malaria are shown in green, with the year of certification in brackets. *Source: Country reports*

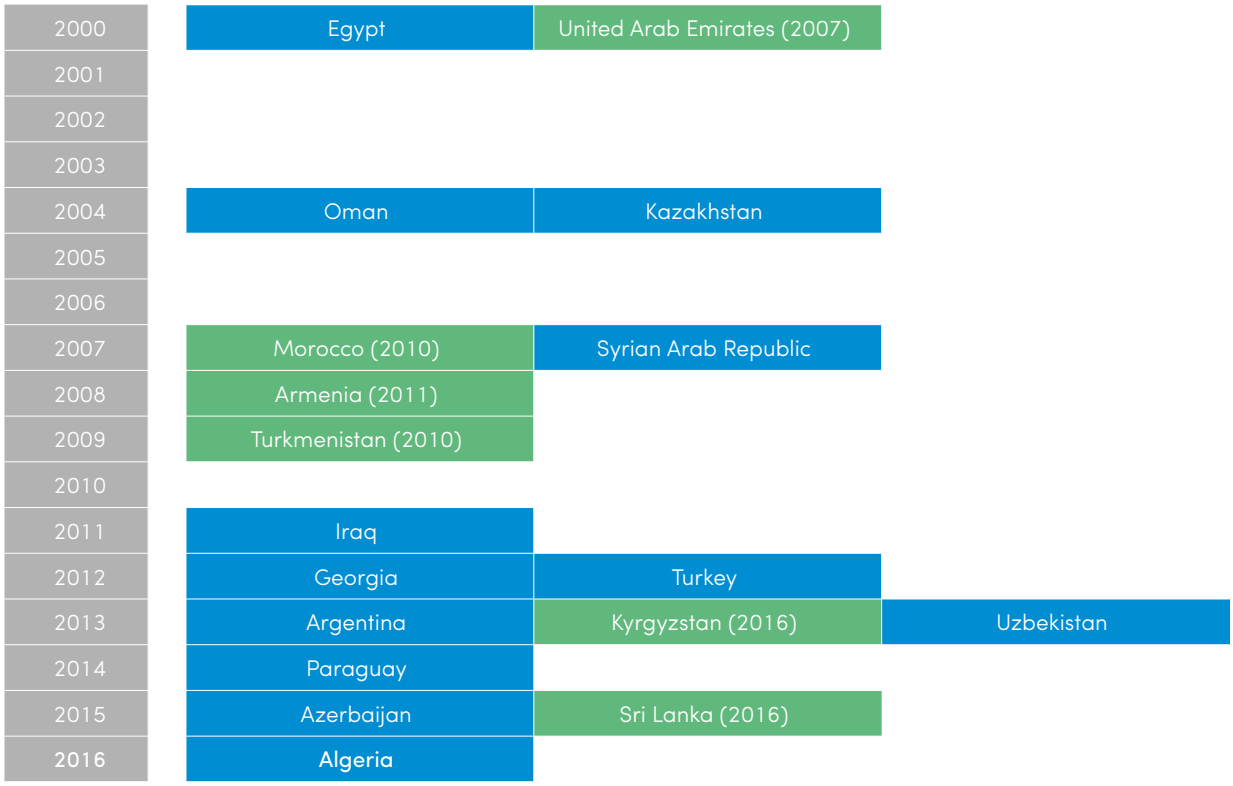
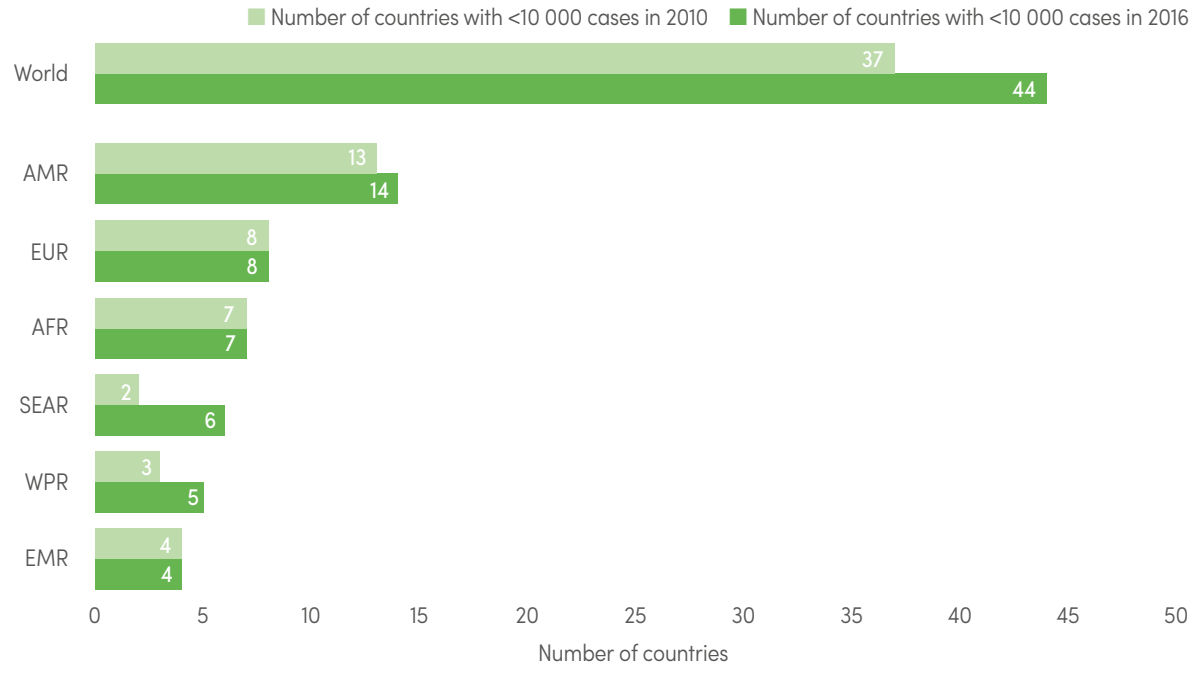


FIG. 7.2.

Number of countries that were malaria endemic in 2000 with fewer than 10 000 indigenous malaria cases in 2010 and 2016, by WHO region *Source: National malaria control programme reports*



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

7.1 E-2020 INITIATIVE

In April 2016, WHO published an assessment of the likelihood of countries achieving malaria elimination by 2020. The assessment was based not only on the number of cases but also on countries' declared malaria objectives and the informed opinions of WHO experts in the field (*28*). A total of 21 countries, spread across five WHO regions, were identified as the most likely to reach zero indigenous cases by 2020 (**Table 7.1**). These countries were termed eliminating countries for 2020 (E-2020) and are the special focus of WHO efforts to accelerate national elimination efforts and monitor progress towards malaria free status. An inaugural meeting of the NMCPs of the E-2020 countries was organized by WHO in March 2017 in Geneva.

Given a target of zero indigenous cases by 2020, the progress indicator for the countries is annual reports of indigenous cases. Overall, 11 E-2020 countries reported an increase of between four (Costa Rica) and 3768 (South Africa) cases between 2015 and 2016 (**Table 7.1**). Among the three E-2020 countries with zero indigenous cases in 2015, two (Algeria and Paraguay) maintained their malaria free status in 2016, and one (Costa Rica) saw an increase to four cases.

Of the three countries that had fewer than 10 cases in 2015, two (Cabo Verde and El Salvador) saw increases in cases in 2016, and one (Belize) saw a reduction in the number of cases from nine in 2015 to four in 2016. Of the four countries with between 10

TABLE 7.1.

Trends in indigenous malaria cases in the E-2020 countries *Source: National malaria control programme reports*

WHO region	Country	2010	2011	2012	2013	2014	2015	2016	Change 2015 to 2016
African	Algeria	1	1	55	0	0	0	0	0
	Botswana	7 592	1 223	537	1221	3 594	878	1 911	+1 033
	Cabo Verde	47	7	1	22	26	7	48	+41
	Comoros	36 538	24 856	49 840	53 156	2 203	1 300	1 066	–234
	South Africa	8 060	9 866	5 629	8 645	11 705	555	4 323	+3 768
	Swaziland	268	549	562	962	711	157	350	+193
Americas	Belize	150	72	33	20	19	9	4	–5
	Costa Rica	110	10	6	0	0	0	4	+4
	Ecuador	1 888	1 219	544	368	242	618	1 191	+573
	El Salvador	19	9	13	6	6	3	13	+10
	Mexico	1 226	1 124	833	495	656	517	551	+34
	Paraguay	18	1	0	0	0	0	0	0
	Suriname	1 712	771	356	729	401	81	76	–5
Eastern Mediterranean	Iran (Islamic Republic of)	1 847	1 632	756	479	358	167	84	–83
	Saudi Arabia	29	69	82	34	30	83	272	+189
South-East Asia	Bhutan	436	194	82	15	19	34	15	–19
	Nepal	43 377	32 650	20 542	16 241	8 033	6 599	4 218	–2 381
	Timor-Leste	113 260	36 185	8 078	1 564	521	122	143	+21
Western Pacific	China	4 990	3 367	244	86	56	39	3	–36
	Malaysia	5 194	3 954	3 662	2 921	3 147	242	266	+24
	Republic of Korea	1 267	505	394	383	557	627	601	–26

E-2020, malaria eliminating countries for 2020

and 100 cases in 2015, three saw decreases in numbers of cases (Bhutan, China and Suriname) and one (Saudi Arabia) experienced an increase. In 2015, nine countries had between 100 and 1000 cases, and two of these (Iran [Islamic Republic of] and Republic of Korea) experienced decreases in 2016. Comoros and Nepal, the only E-2020 countries reporting more than 1000 cases in 2015, both reported fewer cases in 2016.

7.2 WHO SUPPORT STRUCTURES FOR MALARIA ELIMINATING COUNTRIES

In March 2017, WHO launched the *Framework for malaria elimination* to provide guidance to all countries on the tools, activities and dynamic strategies required to achieve interruption of transmission and prevent re-establishment of malaria transmission. To further assist countries to achieve malaria elimination, the WHO Malaria Policy Advisory Committee (MPAC) endorsed the creation of two new committees to support malaria elimination goals: the Malaria Elimination Oversight Committee (MEOC) and the Malaria Elimination Certification Panel (MECP). The MEOC (see **Section 7.2.1**) provides independent operational and programmatic advice as well as oversight monitoring of malaria elimination globally, to help guide WHO and countries' elimination efforts. The MECP (see **Section 7.2.2**) reviews countries' applications for elimination certification, and recommends whether countries should receive WHO certification.

7.2.1 The Malaria Elimination Oversight Committee

The purpose of the MEOC is to monitor and guide malaria elimination activities as part of a transparent, responsive and effective approach to malaria elimination in countries and regions actively pursuing that goal. The MEOC will review progress towards elimination, and the quality and coverage of malaria elimination strategies, in order to provide recommendations on how to accelerate elimination and prevent re-establishment of transmission.

The specific responsibilities of the MEOC are to:

- evaluate national and regional progress towards malaria elimination according to established milestones and timelines;
- determine the need for corrective actions to address programmatic or operational bottlenecks, and evaluate plans developed to address such issues;
- identify any risks to malaria elimination that need to be addressed by WHO, regional initiatives or national programmes;
- provide observations or draft recommendations to the WHO Global Malaria Programme with respect to policies or guidance related to malaria elimination; and
- question the status quo and confront difficult issues.

The MEOC will have up to 10 full and two adjunct members. Full members are experts in the field of malaria or disease elimination, and adjunct members are representatives of NMCPs.

7.2.2 The Malaria Elimination Certification Panel

Countries that have achieved at least 3 consecutive years with zero indigenous malaria cases may request WHO certification of elimination. The MECP is charged with reviewing the evidence submitted by national programmes, conducting evaluation missions to verify reports, and recommending when a country has met the criteria for elimination and should be certified by the WHO Director-General.

The specific duties of the MECP are to:

- review submitted country documentation and national elimination reports;
- conduct field missions to verify findings in the national elimination report; and
- develop a final evaluation report with a recommendation on whether to certify malaria elimination.

The MECP comprises at least eight malaria experts representing different specialties and regions of the world.

8 RESPONDING TO THREATS TO THE FIGHT AGAINST MALARIA

The GTS (*1*) recognizes that the fight against malaria may be prolonged, and in some places slowed down, by several interconnected challenges. These challenges include the lack of robust, predictable and sustained international and domestic financing; the risks posed by conflict and other complex situations; the emergence of parasite resistance to antimalarial medicines and of mosquito resistance to insecticides; and the inadequate performance of health systems.

This section of the report documents some of these challenges and their current status, to focus global attention on the potential issues that may have already slowed progress in some countries or reversed gains in others.

8.1 FUNDING FOR MALARIA

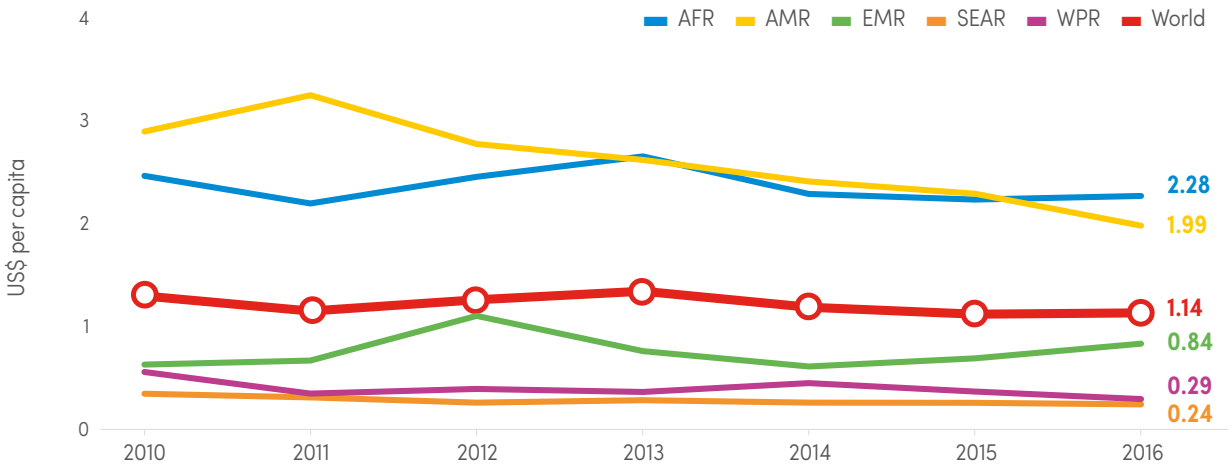
Despite the unprecedented funding for malaria in recent years, the US$ 2.7 billion invested in 2016 accounts for only 41% of the estimated annual investment required to achieve the GTS goals. Funding levels per capita at risk have either plateaued or decreased across most WHO regions relative to the peak years of 2012 or 2013 (**Fig. 8.1**).

The flattening or decreasing trends in funding mean that, for some countries, available resources may only be sufficient to make limited progress; in other countries, progress may be reversed altogether.

An analysis of malaria funding in 41 high-burden countries that rely mainly on external funding for the implementation of malaria interventions shows a mixed picture. Funding (domestic and international) per capita population at risk in the past 3 years (2014–2016) has reduced relative to 2011–2013 estimates in all these countries, except for Democratic Republic of the Congo, Guinea, Mauritania, Mozambique, Niger and Senegal (**Fig. 8.2**). In 10 of these countries, there was a reduction in average per capita population at risk funding of more than 50%. Although further work is required to analyse the effect of funding patterns on disease burden in these countries, the average funding per person at risk remains below US$ 2 over the past 3 years and it is likely that decreasing funds will lead to gradual deterioration of the coverage and quality of interventions, and eventually to loss of previous gains.

FIG. 8.1.

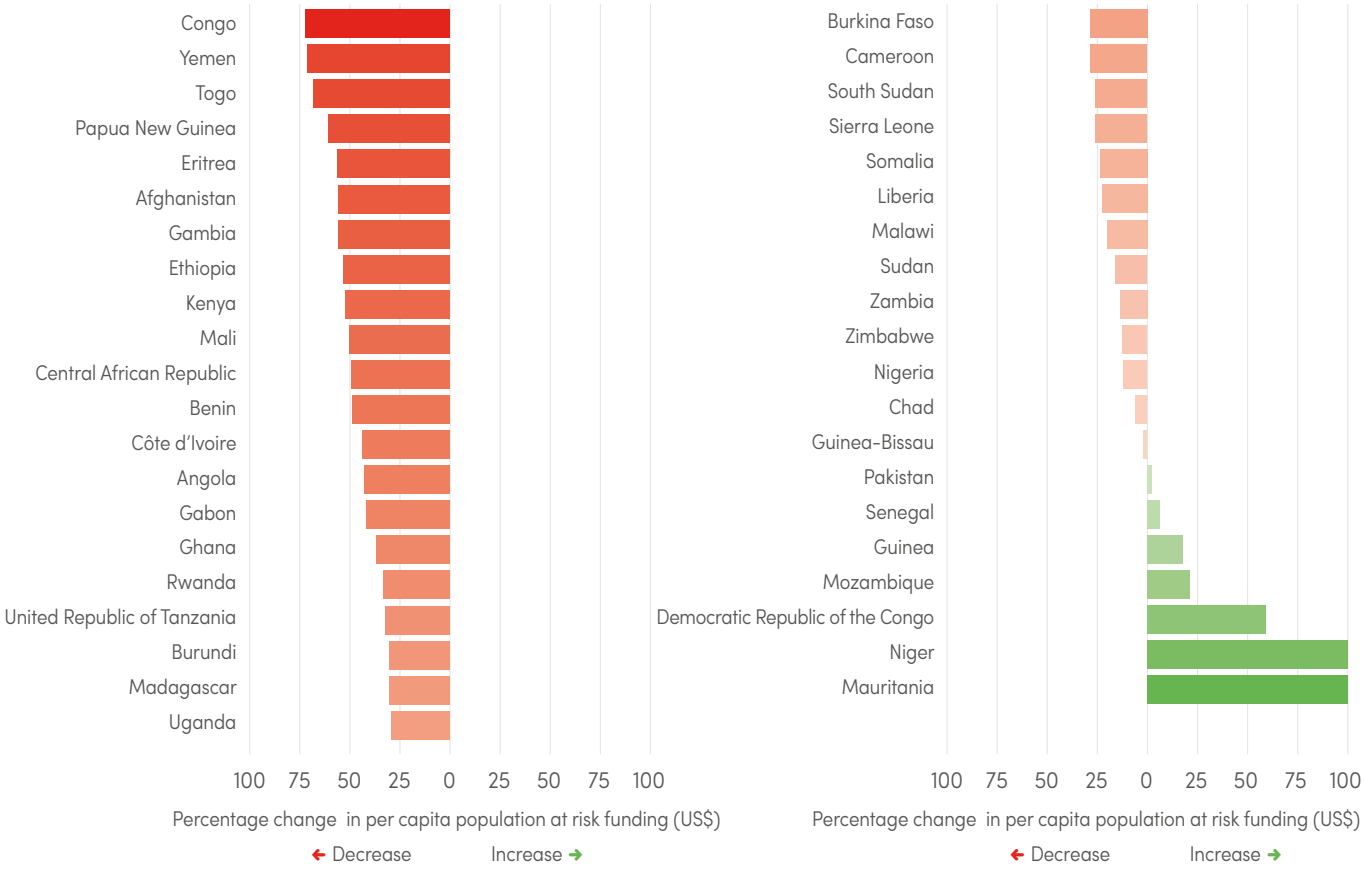
Per capita expenditure for malaria control and elimination by WHO region, 2010–2016 For detailed information on data sources and methodology, refer to **Annex 1.** *Sources: ForeignAssistance.gov; Global Fund to Fight AIDS, Tuberculosis and Malaria; national malaria control programmes; Organisation for Economic Co-operation and Development creditor reporting system; the World Bank Data Bank; Department for International Development*



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

FIG. 8.2.

Percentage change in average of funding (US$) per capita population at risk in 2011–2013 and 2014–2016 in 41 high-burden countries *Sources: ForeignAssistance.gov; Global Fund to Fight AIDS, Tuberculosis and Malaria; national malaria control programmes; Organisation for Economic Co-operation and Development creditor reporting system; the World Bank Data Bank; Department for International Development*



8.2 MALARIA IN COMPLEX SITUATIONS

Complex situations, whether as a result of natural factors such as excessive rains, flooding or earthquakes, or human-made ones such as conflict and political crises, often disrupt service delivery and the implementation of interventions. Where the ecological conditions are suitable for malaria, such situations often result in increased malaria transmission, disease and deaths. The burden of disease can be exceptionally high among the most vulnerable, such as children and pregnant women, especially when worsening nutritional conditions impair their capacity to fight the disease.

The Global Malaria Programme, in collaboration with the WHO Health Emergencies Programme, pays close attention to the malaria situation in complex settings, and facilitates the response. This section highlights recent malaria trends and responses in four countries where complex conditions have led to an increase in malaria cases: Nigeria (Borno State), South Sudan, Yemen and the Bolivarian Republic of Venezuela. WHO is also providing continued support to other countries with complex situations, such as Afghanistan and Somalia.

8.2.1 Nigeria: Borno State

Between 2009 and 2013, Boko Haram has led an insurgency in Borno State that has caused high levels of insecurity, substantial population displacements and near total disruption of public services, including disruption of an already very weak health system. With the violence becoming widespread, the Nigerian Government declared a state of emergency in northern Nigeria in May 2013. In August 2016, the government declared that Boko Haram had been defeated, meaning that humanitarian agencies could now reach 3.7 million people in previously inaccessible parts of Borno State. By this time, nearly 60% of the health facilities in Borno had either been damaged or destroyed. Record child death rates of up to 8.4 deaths per 10 000 children per day were observed among displaced populations. On 26 August 2016, WHO declared the Borno situation an emergency. Given the high levels of *P. falciparum* transmission in the state, malaria was reported as being the single largest contributor to morbidity (60%), and was a major cause of death among children aged under 5 years (40%) as of September 2016.

In response to this emergency, the Global Malaria Programme, in collaboration with the Borno State Ministry of Health, developed a malaria response component as part of the WHO emergencies response toolkit, which includes vector control, case management and mass drug administration (*19*), to dramatically reduce malaria mortality in the region, particularly among young children. To complement improvements in vector control and case management, WHO recommended the use of repeated rounds of mass drug administration for children aged under 5 years, the most vulnerable population groups, whether or not they show symptoms of the disease. Mass drug administration is a WHO-recommended approach for preventing malaria mortality and morbidity in high-risk groups. Through mass drug administration, all individuals in a target population are given antimalarial treatment (often at repeated intervals), regardless of whether or not they show symptoms of the disease. Beginning in July 2017, at the onset of the peak malaria transmission season, all children aged under 5 years in targeted areas received their first monthly round of treatments. Second, third and fourth cycles were implemented in August, October and November 2017. These interventions reached a total of 1.2 million children, and early results suggest a reduction of malaria cases in Borno. These activities were integrated into the WHO polio campaigns.

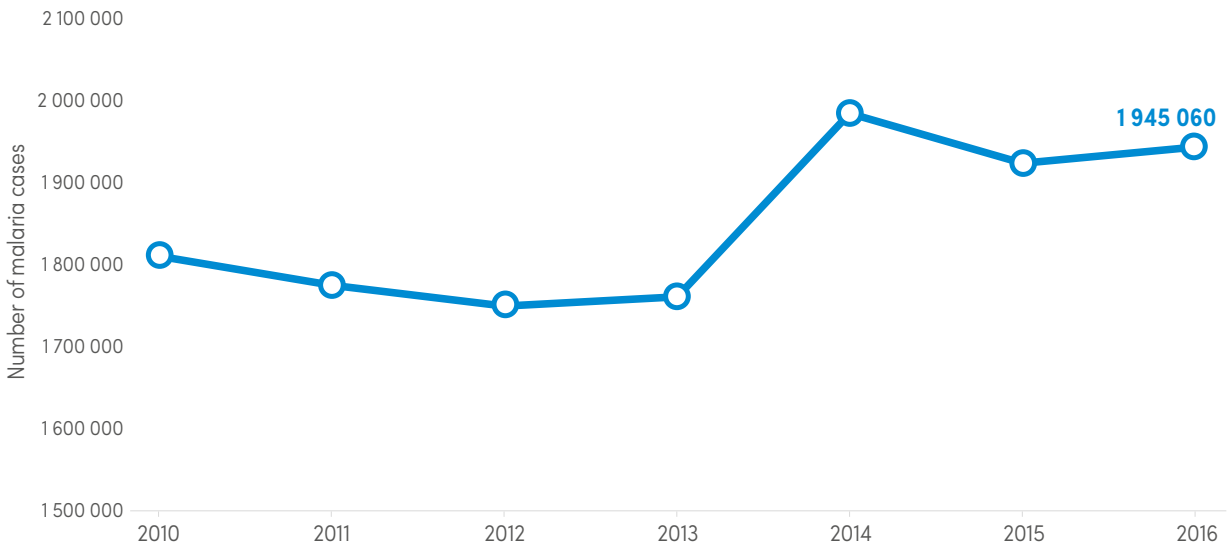
8.2.2 South Sudan

Since 2013, ongoing widespread factional conflicts have put the South Sudan health system under severe strain and have interrupted malaria control in most parts of the country. This situation is compounded by generalized advanced food insecurity, and massive internal and external population movements.

Despite these difficulties, the South Sudanese Ministry of Health, with the support of WHO and several international nongovernmental organizations (NGOs), has been able to deliver a substantial degree of emergency health services as part of an integrated strategic and operational response plan. Achievements include strengthening case management through training and dispatching of community volunteers to attend to inaccessible villages. Substantial efforts have also gone into the distribution of LLINs. However, in large pockets of the country there is neither vector control nor access to functioning health facilities, and the burden of malaria continues to rise relative to the status before the civil conflict (**Fig. 8.3**). Continued external support and expansion of the humanitarian interventions must remain a priority. An additional priority is the millions of refugees that have crossed to neighbouring countries, especially into Uganda, where 1 million refugees from South Sudan have settled in the north-east of the country (*29*).

FIG. 8.3.

Malaria cases in South Sudan, 2010–2016 *Sources: WHO estimates*



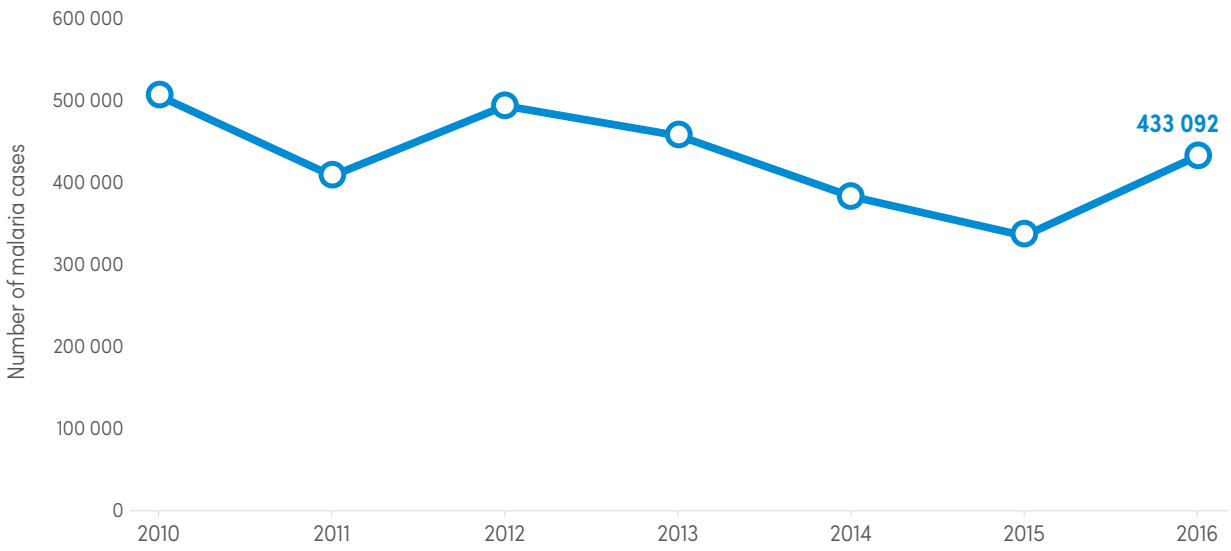
8.2.3 Yemen

The current Yemeni civil war began in March 2015 and has since spread across the whole country. WHO estimates that about 15 million people lack access to basic health care, including 8.8 million living in severely underserved areas. As of October 2016, at least 274 health facilities had been damaged or destroyed, and 13 health workers had been killed and 31 injured (*30*). The main causes of avoidable deaths in Yemen are communicable diseases; maternal, perinatal and nutritional conditions (together accounting for 50% of mortality); and non communicable diseases (39% of mortality). There have been two waves of cholera in Yemen, the first beginning in October 2016 and the second in April 2017. As part of a broader project between UNICEF, the World Bank and WHO, activities have started to support 65 hospitals and more than 1000 primary health centres across Yemen (*31*).

Before the civil war, Yemen had achieved impressive results in reducing the burden of malaria, and was considering launching elimination activities in a number of very low transmission states (*32*). Since the war, direct government support to the NMCP reduced to a point where staff had not received salaries for 1 year, and the national health information system has been badly weakened. Direct donor support to the NMCP has either reduced or stopped, leading to major scale-back of implementation activities. Although there has been some funding support through the Global Fund and the World Bank, funds remain inadequate; also, it has sometimes been difficult to monitor activities where operational support to NMCP staff has not been available. Consequently, the malaria cases are beginning to increase again, with an additional estimated 100 000 malaria cases in 2016 relative to 2015 (**Fig. 8.4**).

FIG. 8.4.

Malaria cases in Yemen, 2010–2016 *Sources: WHO estimates*



8.2.4 Bolivarian Republic of Venezuela

Historically, the Bolivarian Republic of Venezuela has served as a model for malaria eradication in the Americas, with its northern region declared malaria free by the WHO in 1961 (*33*). Following the recent political and economic crises, malaria has been increasing annually since 2008. Between 2015 and 2016, reported cases increased by over 76% (from 136 402 to 240 613), with the country overtaking Brazil as the larger contributor to the malaria burden in the Americas, and the cases reported in 2016 were the highest in the country's history (**Fig. 8.5**).

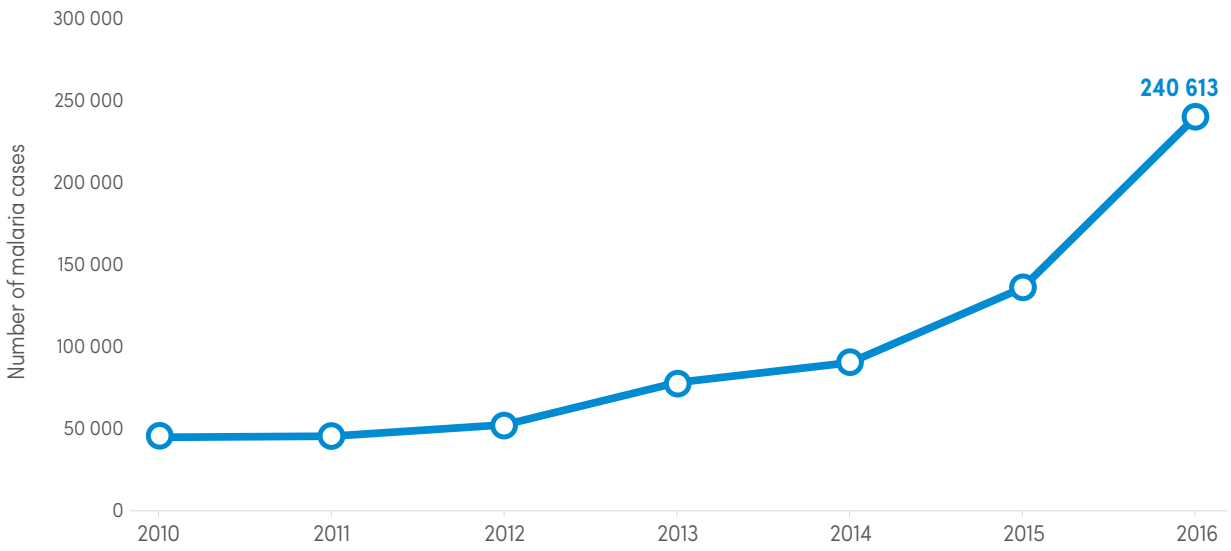
The malaria problem is focal and is concentrated in the state of Bolivar (74% of cases), which borders Guyana. The municipality of Sifontes in Bolivar state reported 43% of all the cases in the Bolivarian Republic of Venezuela in 2016. The areas most affected are those where gold mining occurs; the population of these areas has increased in recent times due to the harsh economic conditions. Miners are not legally registered, and most settlements are informal and hard to reach. About 40% of all cases in the Bolivarian Republic of Venezuela were reported in miners. Most of the malaria cases are due to *P. vivax* with only about 25% due to *P. falciparum*. Recently, malaria has gradually spread into other areas, including some that were previously declared malaria free.

Although malaria treatment is free in the public health sector, availability of antimalarial drugs has reduced. The number of people protected by IRS has declined significantly, from over 2.7 million people in 2015 to around 30 000 people in 2016. Bednet coverage was never high in the country, protecting a maximum of 30 000 people in 2010 and declining since then. ITNs were used by only a small proportion of the population because they were not considered the main vector control intervention, but the coverage of ITNs is also reducing among targeted populations. *Anopheles darlingi*, the predominant vector in the country, is considered to be anthropophilic, and has highly adaptable resting and feeding behaviour. Given the precarious situation in which miners live, vector-control interventions are vital for decreasing malaria in the country.

The Bolivarian Republic of Venezuela is not currently eligible for funding from the Global Fund and does not receive funding from other external sources. Since 2010, government spending on malaria has varied; it reached almost US$ 10 million in 2015, but in 2016 declined to about one fifth of this amount (US$ 2.2 million), even though malaria almost doubled during that time.

FIG. 8.5.

Malaria cases in the Bolivarian Republic of Venezuela, 2010–2016 *Sources: National malaria control programme reports and WHO estimates*



8.3 FALSE-NEGATIVE DIAGNOSIS DUE TO PARASITE DELETION OF HISTIDINE-RICH PROTEINS

Distributions of malaria RDTs have increased, which has helped to improve the accurate diagnosis of malaria and thus increase the likelihood of appropriate treatment. Ensuring the safety and quality of the RDTs used in malaria control and case management has been a major focus of WHO and its partners. The tests that are most sensitive for detecting falciparum malaria contain antibodies to detect histidine-rich protein 2 (HRP2) or the related HRP3 protein. These protein targets, which are specific to *P. falciparum*, are strongly expressed by asexual parasites. About 10 years ago, researchers working in the Amazon region of Peru identified patients infected with *P. falciparum* strains in which the genes that encode these proteins (*pfhrp2* and *pfhrp3*) were deleted (*34*), which meant the strains were not detected with HRP2-based RDTs. Since then, such strains have been found in other countries and regions. The frequency and global distribution of this phenomenon is not yet fully understood; however, in a few countries, the relative incidence of these deletions has been found to be high enough to threaten the usefulness of HRP2-only RDTs.

In 2016, WHO started a rigorous process of collating all information on *pfhrp2* deletions studies and of providing direct support to Member States to investigate patients who were suspected of being infected with *P. falciparum* but returned a negative RDT result (*35*). In May 2016, WHO released information notes targeted at NMCPs and partners, and it released revised notes in September 2017. These notes provided updated information on the implications of reports of *pfhrp2* and *pfhrp3* gene deletions in the case of management of patients infected with *P. falciparum* parasites, and advised on procedures for investigating suspected false-negative RDT results. WHO is currently finalizing a protocol for determining whether the number of *pfhrp2* deletions that cause negative results in HRP2 RDTs among symptomatic patients with confirmed falciparum malaria has reached a threshold that requires a change in diagnostic strategy. This protocol includes a sampling tool, a report form and data entry templates.

WHO continues to recognize the urgency of this issue and, during the November meeting of the MPAC, discussed a Global Action Plan (GAP) for a response to *pfhrp2* and *pfhrp3* deletions. The aim is to support NMCPs and their implementing partners to address this problem pragmatically. Thus, it is expected that the GAP will focus on:

- defining the frequency and distribution of these diagnostically relevant mutations in circulating *P. falciparum* strains;
- providing concrete guidance to countries on malaria diagnosis and treatment in settings where such mutations are found to be frequent;
- identifying gaps in knowledge about the genesis and spread of strains with *pfhrp2* or *pfhrp3* deletions (or both), and the actions required to develop new, accurate tests for malaria based on alternative target antigens; and
- coordinating advocacy and communication with donors, policy-makers, test developers, research agencies, technical partners and disease control programmes to assist in planning.

8.4 PARASITE RESISTANCE – ANTIMALARIAL DRUG EFFICACY AND RESPONSE

ACTs have been integral to the recent success of global malaria control, and protecting their efficacy for the treatment of malaria is a global health priority. The main advantage of ACTs is that the artemisinin quickly reduces most of the malaria parasites and the partner drug clears the remaining ones. However, the efficacy of ACTs is threatened by the emergence of both artemisinin and partner drug resistance. Partial resistance to artemisinin causes delayed parasite clearance following treatment with an ACT. Such resistance does not usually lead to treatment failure; however, if the artemisinin component is less effective, the partner drug has to clear a greater parasite mass, jeopardizing the future efficacy of the partner drug. In addition, partner drug resistance can arise independently of artemisinin resistance. Given that an effective partner drug is essential for clearing all remaining parasites, partner drug resistance carries a high risk of treatment failure. Because of their different roles, the efficacy of the artemisinin and the partner drug must be monitored concomitantly but separately.

For *P. vivax*, chloroquine (CQ) remains an effective first-line treatment in many countries. Countries endemic for vivax malaria recommend either CQ or an ACT for treating uncomplicated *P. vivax*. Most also

include primaquine (PQ) to eliminate latent liver stage infections and prevent relapse. In addition, PQ improves the activity of CQ against CQ-resistant blood stage parasites. Where there is a high treatment failure rate with CQ (>10%), countries are encouraged to change their first-line treatment to an ACT.

8.4.1 Status of antimalarial drug efficacy (2010–2016)

The WHO global database on antimalarial drug efficacy and resistance contains data on therapeutic efficacy studies (TESs) for *P. falciparum* and *P. vivax* and, more recently, data from studies of molecular markers. Up-to-date summary reports of the global database are available on the Global Malaria Programme website at www.who.int/malaria/areas/drug_resistance/drug_efficacy_database/en/. This section outlines the status of antimalarial drug efficacy in the WHO regions for 2010–2016.

WHO AFRICAN REGION

Artemether-lumefantrine (AL) and artesunate-amodiaquine (ASAQ) are the first-line treatment policies used in most African countries, with some countries adding dihydroartemisinin-piperaquine (DP). Between 2010 and 2016, the overall average efficacy of DP, ASAQ and AL were 98.7%, 98.3% and 97.9%, respectively. When the failure rates of all three treatments were analysed separately by year, it was found that their high efficacy has remained constant over time. In studies of AL, treatment failure rates above 10% occurred in three countries (Angola, Gambia and Malawi), although lumefantrine resistance could not be confirmed by molecular marker, in vitro test or blood dosage levels. In Africa, artemisinin resistance was not confirmed.

Studies of *P. vivax* were conducted in Ethiopia, Madagascar (both of which had previously reported CQ resistance) and Mauritania. In Ethiopia, treatment failure rates ranged from 3% to 22% (median: 5.1%). Treatment failure rates of 0% for ASAQ were reported in Madagascar and for CQ in Mauritania.

WHO REGION OF THE AMERICAS

The first-line treatment policy is AL in Bolivia (Plurinational State of), Brazil, Colombia, Ecuador, French Guiana, Guyana, Panama and Suriname; artesunate-mefloquine (ASMQ) in Brazil, Peru and Venezuela (Bolivarian Republic of); and CQ+PQ in Costa Rica, Dominican Republic, Guatemala, Haiti, Honduras and Nicaragua. Apart from one small study conducted in Suriname in 2011 (which detected a 9% treatment failure rate with AL), studies in the period 2010–2016 showed effective first-line treatment for *P. falciparum* (treatment failure rates 0%). Artemisinin resistance was suspected in French Guiana, Guyana and Suriname, but molecular markers of artemisinin resistance (*PfK13* C580Y) were only detected in a retrospective study of Guyanese samples from 2010, and a larger survey in 2016 confirmed the emergence of artemisinin resistance with a genetic profile compatible with a South American origin. In Guatemala, Haiti, Honduras and Nicaragua, molecular marker studies of *Pfcrt* are conducted in lieu of TESs. Between 2010 and 2015, more than 1000 samples were analysed and the mutation was rarely observed. Two TESs conducted in Haiti reported treatment failures, but reinfections were not excluded and no *Pfcrt* mutants were detected in the failing cases.

For *P. vivax*, treatment failures or confirmed resistance (or both) were reported previously in Bolivia (Plurinational State of), Brazil, Colombia, Guyana and Peru. Between 2010 and 2016, studies of *P. vivax* were conducted in Bolivia (Plurinational State of), Brazil, Colombia and Peru. All countries conducted studies for *P. vivax* with CQ alone or with CQ and PQ. In Bolivia (Plurinational State of), a study conducted in 2011 found a CQ treatment failure rate of 10.4%, with 6.3% confirmed resistance. Treatment failure rates in the other three countries were all below 10%.

WHO SOUTH-EAST ASIA REGION

AL is the first-line treatment policy in Bangladesh, Bhutan, Nepal and Timor-Leste; AL and artesunate+sulfadoxine-pyrimethamine (AS+SP) are the first-line treatments in India, and DP is the first-line treatment in Indonesia and Thailand. Myanmar has several first-line treatments for *P. falciparum*, including AL, ASMQ and DP. With the exception of four studies, first-line treatment for *P. falciparum* was effective, with treatment failures of less than 10% during this period. The exceptions were in India,

where three studies conducted in 2012 detected treatment failure rates of 12.1%, 17.3% and 21.4% with AS+SP, which led the country to change its treatment policy to AL in the north-eastern part of the country; and one study from Bangladesh, where there was a 11.1% treatment failure rate with AL in a small sample size. Studies of molecular markers of artemisinin resistance have been conducted in Bangladesh, India, Indonesia, Myanmar, Nepal and Thailand, and the presence of molecular markers of artemisinin resistance has been reported in Myanmar and Thailand. Currently, there is no evidence of artemisinin (partial) resistance in Bangladesh or India, in contrast to Myanmar and Thailand.

For *P. vivax*, treatment failures or confirmed resistance to CQ were reported previously in India, Indonesia, Myanmar and Thailand. Although most studies demonstrated high efficacy of CQ, very high treatment failure rates with CQ were reported from Myanmar in 2012, but this finding was not confirmed later. Similarly, one study from Timor-Leste found high treatment failure rates.

WHO EASTERN MEDITERRANEAN REGION

Until recently, the first-line treatment for all countries in the WHO Eastern Mediterranean Region was AS+SP, with the exception of Djibouti, where AL is the current first-line treatment. High treatment failure rates with AS+SP were observed in Somalia and Sudan. These results were further supported by investigations of the presence of *Pfdhps* and *Pfdhfr* quadruple and quintuple mutations. The evidence prompted a treatment policy change in both Somalia and Sudan to AL (first-line) and DP (second-line). Recent studies of both treatments indicate high efficacy. In Afghanistan, Iran (Islamic Republic of), Pakistan and Yemen, treatment failure rates with AS+SP were all less than 10%.

Studies of *P. vivax* were conducted in Afghanistan, Iran (Islamic Republic of), Pakistan and Sudan. TESs conducted on CQ and several ACTs all indicated high treatment efficacy, with failure rates of 0%.

WHO WESTERN PACIFIC REGION

AL is the first-line treatment policy for most countries in the region, with the exception of Cambodia, China and Viet Nam, where the first-line treatment is ASMQ or DP. In Cambodia, high treatment failure rates were identified in Cambodia (2010–2017 DP; 2014 artesunate-pyronaridine [2 studies]; 2016 ASAQ [2 studies]), but the efficacy of the current first-line treatment, ASMQ, is now high (0% failure 2014–2016), contrary to a study conducted in 2010 detecting a treatment failure rate of 11.1%. Further in vitro analyses reported absence of cross-resistance between piperaquine and pyronaridine, and molecular studies indicated that artesunate-pyronaridine treatment failures were unrelated to the presence of molecular markers of piperaquine and mefloquine resistance. ASMQ has continued to have high efficacy over the past 3 years, despite a high prevalence of *PfK13* C580Y mutants in the area. In Lao People's Democratic Republic, two among eight studies of AL observed high treatment failure rates (10% and 14.3%) in 2013 and 2014, respectively. In Viet Nam, four of the 35 studies conducted during this period demonstrated high treatment failure rates with DP in 2014 and 2015 (range: 25.9–46.3%). Subsequent investigations confirmed the presence of piperaquine resistance. The evidence prompted a treatment policy change in Viet Nam from DP to other ACTs in September 2016 in areas where DP is failing. All TESs conducted in China, Papua New Guinea, Philippines and Solomon Islands in 2010–2016 confirmed that the national treatment policy is still effective.

For *P. vivax*, the first-line treatment in most countries in the region is CQ with primaquine, except for Cambodia (DP) and Papua New Guinea, Solomon Islands and Vanuatu (AL). Treatment failures or confirmed resistance to CQ were reported previously in Cambodia, Malaysia, Papua New Guinea, Republic of Korea, Solomon Islands, Vanuatu and Viet Nam. All countries conducted studies on their first-line treatment. In Malaysia, a TES of CQ in 2012 found a high treatment failure rate (61.9%), and one study of CQ in Viet Nam found a failure rate of 11.1% (2015). High treatment failure rates were also observed with AL in Papua New Guinea (35% in 2011), Solomon Islands (31.6% in 2011) and Vanuatu (12.1% in 2013), possibly explained by the short half-life of lumefantrine in areas where early relapses occur.

8.4.2 Preventing and responding to antimalarial drug resistance

In areas where the recommended antimalarial treatments remain fully efficacious, the correct use of medicine is essential; this requires expansion of diagnostic testing, quality-assured treatment and good patient adherence to the prescribed treatment. Further extending basic malaria interventions, including vector control, will reduce the number of parasites exposed to a drug and the risk of resistance.

Use of oral artemisinin-based monotherapy is considered a contributing factor in the development and spread of resistance to artemisinins. WHO has urged regulatory authorities in malaria endemic countries to take measures to halt the production and marketing of oral artemisinin-based monotherapy, and to promote access to quality-assured ACTs for the treatment of falciparum malaria.

In countries where resistance is reported either to artemisinins or to ACT partner drugs, it is necessary to intensify malaria control to reduce the burden of disease, and delay or prevent the spread of resistance. In areas of low transmission where antimalarial drug resistance is present, countries should target rapid elimination of falciparum malaria, to limit the risk of spread and minimize the impact of resistance in the region.

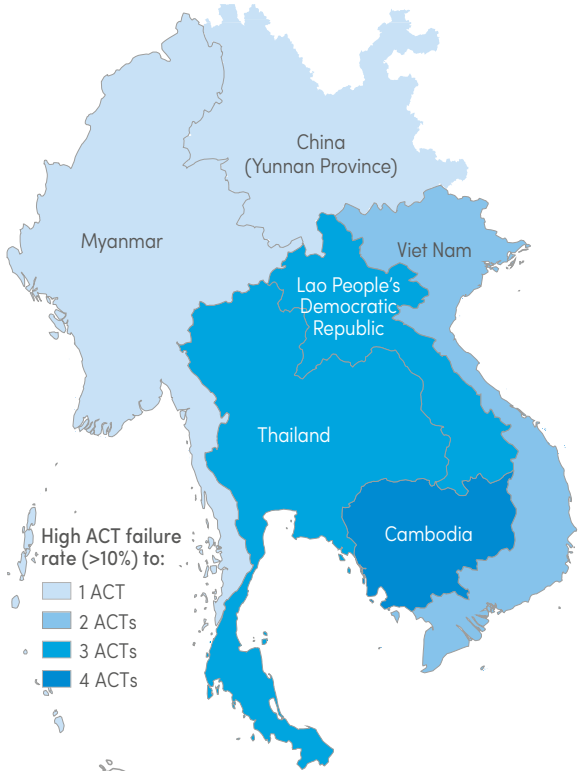
8.4.3 Global public health implications of antimalarial drug resistance

Antimalarial drug resistance is a threat to malaria control and has important implications for global public health. In particular, when CQ resistance emerged in Africa in the 1980s, there were documented increases in hospital admissions and mortality, mainly due to severe malaria and increased transmission. Resistance to antimalarial drugs has had a significant impact on the cost of global malaria control (due to the need for new drugs, and the social and health costs of treatment failure).

The consequences of the development of resistance to antimalarial medicines today are likely to be less severe than those observed when CQ resistance developed in the 1980s, owing to the implementation of combination therapies, improvements to health systems, increased surveillance systems to monitor first- and second-line treatment, and the availability of guidelines on policy change.

FIG. 8.6.

Number of ACTs failing in the Greater Mekong subregion



Currently, five ACTs are recommended by WHO in the Greater Mekong subregion: AL, AS+AM, ASMQ, AS+SP and DP. A sixth ACT, artesunate-pyronaridine, was given a positive scientific opinion by the European Medicines Agency (EMA) under article 58 and is being considered for recommendation by WHO. By default, AS+SP is considered to have a high failure rate in the region because of high treatment failure rates with SP, or because quadruple and quintuple *Pfdhfr* and *Pfdhps* mutations (which are usually fixed) have been reported in the region. The countries are classified by numbers of ACTs failing (>10% treatment failure) after 2010.

ACT, artemisinin-based combination therapy

8.5 INSECTICIDE RESISTANCE

Resistance of malaria vectors to the four insecticide classes commonly used in ITNs or IRS threatens malaria prevention and control efforts. Of the 76 malaria endemic countries that reported standard monitoring data for 2010 to 2016, resistance was detected in 61 countries to at least one insecticide in one malaria vector from one collection site. In 50 countries there was resistance to two or more insecticide classes. Resistance to the four insecticide classes was detected in vectors present in all WHO regions except Europe, although the extent of monitoring varied between regions. The majority of data were reported by countries of the WHO African Region (70%) (**Fig. 8.7**).

Resistance to pyrethroids – the insecticide class used in all ITNs – is widespread (**Fig. 8.8**). The proportion of malaria endemic countries that reported pyrethroid resistance (of those that monitored for it) increased from 71% in 2010 to 81% in 2016; 16 of the 72 countries that monitored throughout this period did not detect pyrethroid resistance. The prevalence of confirmed pyrethroid resistance differed between regions, and was highest in the WHO African and Eastern Mediterranean regions, where it was detected in malaria vectors in over two thirds of all sites monitored (**Fig. 8.7**).

Resistance to the three other insecticide classes used in adult malaria vector control is also present across all WHO regions except Europe. In countries that conducted monitoring between 2010 and 2016, resistance was confirmed to at least one organochlorine, carbamate and organophosphate insecticide in 80%, 65% and 51% of countries, respectively. Organochlorine (mainly DDT) resistance was detected in at least one malaria vector species at almost two thirds of the sites tested in four regions, with low prevalence in the WHO Region of the Americas and no testing in the WHO European Region (**Fig. 8.7**). Carbamate resistance was detected in malaria vectors at a third of all locations monitored worldwide. Organophosphate resistance was detected in malaria vectors at over half of sites monitored in the WHO Eastern Mediterranean, South-East Asia and Western Pacific regions, but was less prevalent in vectors in Africa and the Americas.

Further data as reported to WHO – such as on the mechanisms underpinning vector resistance and results from intensity concentration and synergist-insecticide assays – are available via the new WHO Malaria Threats Map. This map tracks biological challenges to malaria control and elimination, and is accessible at www.who.int/malaria/maps/threats.

8.5.1 Addressing the challenge of insecticide resistance

Up-to-date and representative data on insecticide resistance are needed for planning and implementation of vector control. Monitoring should be conducted in all malaria endemic countries at least once per year, and should include all major vector species from the different eco-epidemiological zones. Tests should be conducted with insecticide classes that are either in use or planned for use in vector control.

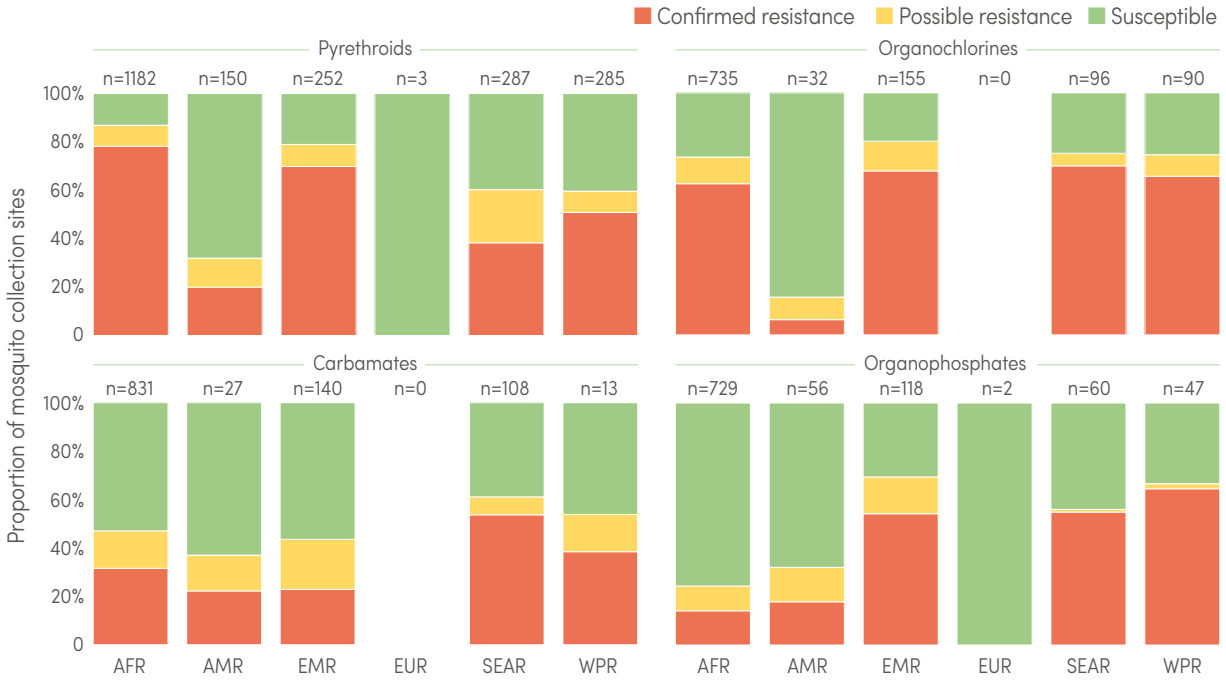
Monitoring of insecticide resistance in major malaria vector species is critical to track changes over time and between areas, to guide locally appropriate vector control. However, resistance monitoring is usually not conducted on a routine basis because of limited human and financial resources. Management, sharing and reporting of available data are also weak in many countries. As a result of these limitations, information continues to be inadequate, particularly on resistance intensity. In 2017, only 23 countries reported having completed plans for resistance monitoring and management.

The impact of pyrethroid resistance on ITN effectiveness is not yet well known. A WHO-coordinated five-country evaluation conducted in areas with pyrethroid-resistant malaria vectors did not find an association between malaria disease burden and levels of resistance, and showed that ITNs still provided personal protection. Nevertheless, evidence of geographical spread of resistance and intensification in some areas underscores the urgent need to better understand the implication of insecticide resistance on the effectiveness of malaria vector control tools, as well as to reduce reliance on pyrethroids through the development, evaluation and implementation of new tools.

Priority actions to address malaria vector resistance include establishing and applying national insecticide resistance monitoring and management plans, in line with WHO's 2012 *Global plan for insecticide resistance management in malaria vectors* (*36*). Guidance on such plans is provided in the 2017 *Framework for a national plan for monitoring and management of insecticide resistance in malaria vectors* (*37*). New vector monitoring and control tools and approaches are also urgently required. The WHO process for the evaluation of vector-control products has been revised to accelerate product evaluation, in order to enable continued scale-up and strengthening of vector control, and to address key challenges such as vector insecticide resistance. Further information is available at www.who.int/vector-control/.

FIG. 8.7.

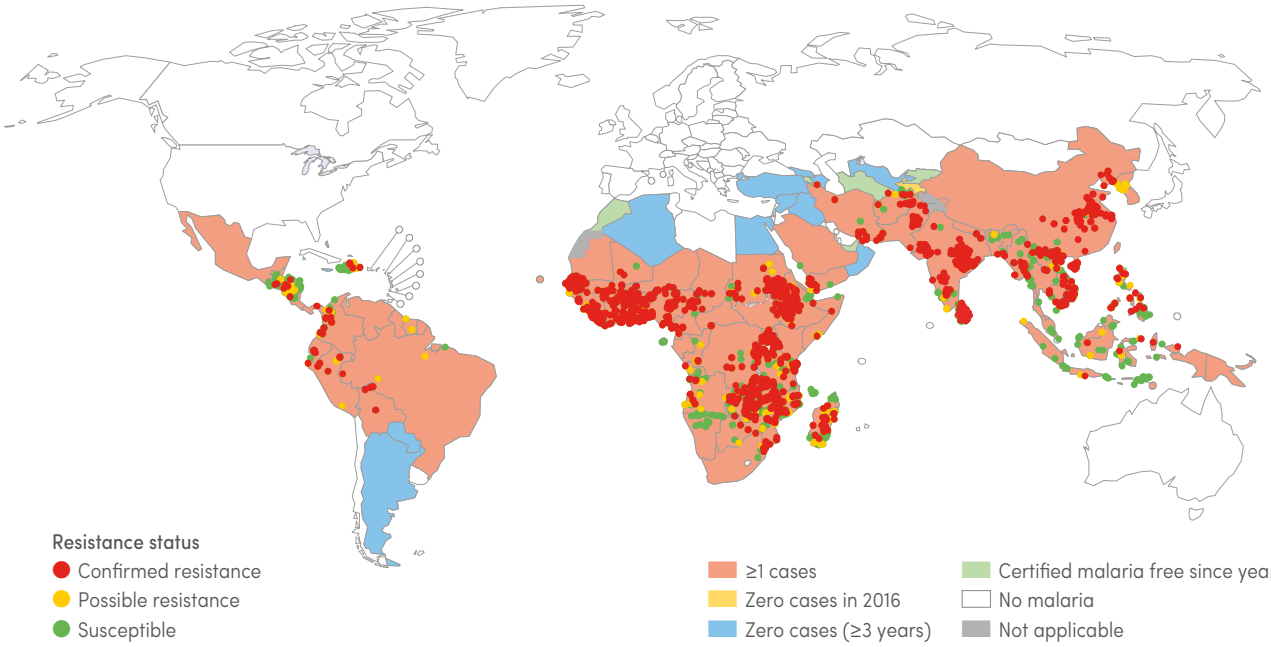
Reported insecticide resistance status as a proportion of sites for which monitoring was conducted by WHO region, 2010–2016 Highest resistance status is shown, with confirmed resistance considered if this was reported in at least one major malaria vector species to at least one insecticide of the class indicated. *Sources: National malaria control programme reports, African Network for Vector Resistance, Liverpool School of Tropical Medicine, Malaria Atlas Project, US President's Malaria Initiative and scientific publications*



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

FIG. 8.8.

Reported pyrethroid resistance status of malaria vectors measured with insecticide bioassays, 2010–2016 Data are from standard WHO insecticide susceptibility or Centers for Disease Control and Prevention (CDC) bottle bioassays. Where multiple insecticide classes or types, mosquito species or time points were tested, the most recent resistance status is shown. *Sources: National malaria control programme reports, African Network for Vector Resistance, Liverpool School of Tropical Medicine, Malaria Atlas Project, US President's Malaria Initiative and scientific publications*



9 CONCLUSION

The *World malaria report 2017* summarizes global achievements in the fight against malaria up to the end of 2016, a year after the launch of the GTS (*1*), AIM (*2*) and the SDGs (*3*). The information provided shows countries and the global malaria community whether we are on a trajectory towards achieving the global strategic vision and goals for 2020 and beyond. A baseline year of 2010 provides sufficient trend data to relate the current status to past trends.

Substantial funding continues to be invested in the fight against malaria, with over US$ 19 billion invested by governments of malaria endemic countries and international partners since 2010. In 2016 alone, the total investment in malaria control and elimination was estimated to be US$ 2.7 billion. However, the trends have remained flat, and in some high-burden countries funding support has reduced considerably. Overall, malaria funding in 2016 was only 41% of the 2020 milestone of US$ 6.5 billion (*4*), putting the 2020 milestones at great risk.

Pillar 1 of the GTS calls for universal access to malaria interventions (*1*). The distribution of ITNs has increased considerably since 2010 but the rate of increase has slowed since 2014. In 2015 and 2016, a total 360 million ITNs were distributed by NMCPs globally; of these, over 90% were distributed in sub-Saharan Africa, where the proportion of the population with access to ITNs was 61% in 2016. Access to ITNs, however, remained variable, with many high-burden countries having a large gap in household ITN ownership. About 100 million people were protected by IRS in 2016, but the proportion of the population at risk who benefited from this intervention fell substantially, to nearly a half of those protected in 2010.

Preventive treatment of pregnant women in malaria endemic countries has risen since 2010; however, it is still low (only 19%) when the three recommended doses of SP for IPTp are considered. In the 12 countries currently implementing SMC, impressive gains have been made since 2014, with over 15 million children reached with treatments by 2016. However, there are still important gaps in coverage, with about 13 million children who could have benefited from this intervention not covered, mainly due to lack of funding.

The increasing distribution of RDTs by NMCPs since 2010 has led to considerable improvements in the accurate diagnosis of patients who seek care in public health facilities. In the WHO African Region, where confirmation was historically the lowest, 87% of all patients suspected of having malaria at public health facilities were tested, mainly with RDTs. This represented a more than two-fold increase in the diagnosis rate compared with 2010. Similarly, considerably more patients now receive effective antimalarial drugs, with 70% of all malaria patients in the public health sector in sub-Saharan Africa receiving ACTs for malaria in 2016. Despite this progress, overall coverage with ACTs is compromised by the low access to clinical services, as indicated by the very low proportion of people with fevers who seek treatment. In several countries, iCCM policies were adopted to improve access to care but coverage remains low, with most countries reporting only subnational scale-up. Inadequate resources and low levels of integration with national health plans have been some of the main bottlenecks to increasing the proportion of the population reached through iCCM.

Pillar 2 of the GTS calls for countries to accelerate efforts towards malaria elimination (*1*). Globally, the number of countries that were malaria endemic in 2000 and reported fewer than 10 000 malaria cases increased from 37 in 2010 to 44 in 2016. In 2016, Kyrgyzstan and Sri Lanka were certified by WHO as malaria free. Plans are under way to begin the certification process for Argentina and Paraguay, and Uzbekistan will formally request WHO certification of elimination by the end of 2017.

In March 2017, WHO held the inaugural meeting of the 21 countries of the E-2020 initiative (which comprises countries with the potential to reach zero indigenous cases in 2020) in Geneva. Although several of these countries remain on track to achieve the E-2020 goal, 11 have reported increases in indigenous malaria cases since 2015. Also, five of these 11 countries (Botswana, Ecuador, Saudi Arabia, South Africa and Swaziland) have reported an increase of more than 100 cases in 2016 compared with 2015.

Pillar 3 of the GTS is to transform malaria surveillance into a core intervention (*1*). Public health sector malaria surveillance systems continue to detect a higher proportion of cases and, with increasing rates of diagnosis, the reported data are becoming increasingly reliable for estimating trends. However, surveillance systems in 31 countries with high malaria burden captured less than 50% of malaria cases, and improved data from these countries will have a substantial impact on future estimates of malaria burden and trends. The relatively high usage of private health service providers and the lack of data from this sector continue to be a major surveillance bottleneck.

Target 3.3 of the SDGs aligns with the GTS malaria burden reduction goals (*1,3*). The analysis of global progress summarized in this report suggests that the world is not on a trajectory to achieve the GTS targets. Although substantial reductions in malaria burden have occurred since 2010, the trend indicates an increasing burden between 2014 and 2016. Globally, conservative estimates suggest that malaria cases have increased by 5 million in 2016 compared with 2015. In the same period, the number of deaths remained largely the same. Many of these increases in malaria cases have occurred in the WHO African Region, but all other regions have also reported increases in this period. New data from national surveillance systems suggests that we may be underestimating the burden of malaria and WHO will embark on a detailed review of national data and estimation methods in 2018. Even with the current conservative estimates, however, globally, the fight against malaria is at a crossroads.

Factors that may have contributed to the reversal in recent progress in many countries include inadequate funding, inefficient implementation of interventions, conflict and other crises, and anomalous climate patterns. Many high-burden but low-income countries have reported reducing the funding per capita for the population at risk of malaria. The complex situations in northern Nigeria, South Sudan, Venezuela (Bolivarian Republic of) and Yemen have all resulted in interruption of services and increasing malaria burden. Biologically, increasing levels of *pfhrp2* deletions threaten the ability to diagnose and appropriately treat malaria patients infected with *P. falciparum* parasites. Prevalence of *pfhrp2* deletions in most high-burden countries remains low, and further monitoring is required. Although the threat of drug resistance remains serious and global vigilance must remain high, the immediate threat is low and ACTs remain efficacious in most malaria endemic settings. Also, recent evidence indicates that although ITNs remain effective in protecting populations from mosquito bites, vector resistance to most of the commonly used insecticides is widespread and further research is needed into the overall public health impact of insecticide resistance. Investments in new diagnostic tools, drugs and insecticides must remain a priority. Most importantly, insufficient resources remain the greatest threat to the gains the world has made so far in the fight against malaria.

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Annex 1 – Data sources and methods

Fig. 1.1. Countries and territories with indigenous cases in 2000 and their status by 2016

Data on the number of indigenous cases (an indicator of whether countries are endemic for malaria) were as reported to WHO by national malaria control programmes (NMCPs). Countries with 3 consecutive years of zero indigenous cases are considered to have eliminated malaria.

Table 1.1. GTS: Global targets for 2030 and milestones for 2020 and 2025

Targets and milestones are as described in the *Global technical strategy for malaria 2016–2030* (GTS) (*1*) and *Action and investment to defeat malaria 2016–2030* (AIM) (*2*).

Fig. 2.1. Investments in malaria control and elimination by source of funds (constant 2016 US$), 2010–2016

Contributions from governments of endemic countries are estimated as the sum of NMCP expenditures reported by NMCPs for the world malaria report of the relevant year plus the estimated costs of delivery of patient-care services at government health facilities. If NMCP contributions were missing for 2016, data from previous years were used after conversion to the equivalent 2016 US$ value. The number of malaria cases attending outpatient services at government facilities was derived from WHO estimates of malaria cases (see methods notes for **Table 6.1**) multiplied by the proportion of estimated cases seeking care at government facilities (data from NMCP reports). Between 1% and 3% of uncomplicated cases were assumed to have moved to the severe stage of disease, and 50–80% of these severe cases were assumed to have been hospitalized. Costs of outpatient visits and inpatient bed-stays were estimated from the perspective of the public health-care provider, using WHO-CHOICE unit cost estimates in current international dollars for 2010–2016.[1] Years with missing gross domestic product (GDP) data were imputed by inflating the GDP per capita by 3% per year over the period of the missing years before running the CHOICE model. Years with missing country-level unit cost data were imputed using the regional average when no data were available in previous years. CHOICE estimates were then converted to local currency in each year using purchasing power parity (PPP) conversion factors and to US$ using official exchange rate of local currency per US$, sourced from the World Bank.[2] Uncertainty around unit cost estimates was estimated through probabilistic uncertainty analysis. **Fig. 2.1** shows the mean total costs of service delivery to malaria patients from 1000 estimations.

International bilateral funding data were obtained from several sources. Data on funding from the Government of the United States of America (USA) were sourced from the US Foreign Aid Dashboard, with the technical assistance of the Kaiser Family Foundation. Funding data were available for the United States Agency for International Development (USAID), the US Centers for Disease Control and Prevention (CDC) and the US Department of Defense. Contributions from the Department for International Development (DFID) of the Government of the United Kingdom on funding for malaria control were extracted from the DFID management information systems and converted to 2016 US$ (note this data excludes funding from other departments of the Government of the United Kingdom of Great Britain and Northern Ireland). In this report, contributions from the United Kingdom do not capture all spending that may affect malaria outcomes such as support to overall health-system strengthening in malaria endemic countries. Bilateral funding from other countries included annual disbursement flows for 2010–2015 obtained from the Organisation for Economic Co-operation and Development (OECD) creditor reporting system (CRS) database on aid activity.[3] For each year and each funder, the country-level and regional-level project-type interventions and other technical assistance were extracted. The 2015 value converted to constant 2016 US$ was used as the 2016 estimated disbursement. Estimates of total spent by bilateral donors on malaria control and elimination exclude health-system strengthening contributions that may benefit malaria control. **Fig. 2.1** also excludes household spending on malaria prevention and treatment, and malaria-related research and development investments.

Multilateral funding amounts in terms of core contributions from donors to multilateral agencies were sourced from data on core pledges and contributions published by the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund)[4] (i) and annual disbursements for malaria grants to malaria endemic countries between 2010 and 2016 as reported by the Global Fund, and (ii) the CRS and the Development Assistance Committee (DAC) members' total use of the multilateral system.[5] All funding flows were converted to the equivalent 2016 US$ value.

For (i), the amount of funding contributed by each donor was estimated as the proportion of funding contributed by each donor out of the total amount of funding pledged

[1] http://www.who.int/choice/en/
[2] https://data.worldbank.org/indicator
[3] https://stats.oecd.org/Index.aspx?DataSetCode=CRS1, accessed 03 October 2017
[4] https://www.theglobalfund.org/en/government/, accessed 25 September 2017
[5] https://stats.oecd.org/Index.aspx?DataSetCode=CRS1, accessed 30 September 2017

by all donors in a given period, multiplied by the total amount disbursed by the Global Fund in that given year, assuming equal contributions every year by each donor over the 3-year periods for which data were available. The proportion of funding contributed by each donor was adjusted by the "amount pledged to amount paid" ratio.

For (ii), contributions from donors to multilateral channels were estimated by calculating the proportion of the total contributions received by a multilateral agency each year by each donor, then multiplying that amount by the multilateral agency's estimated investment in malaria in the same year. Contributions by malaria endemic countries to multilateral agencies were allocated to governments of endemic countries under the "funding source" category. Contributions from non-DAC countries and other sources were not available and were therefore not included in the "Other funders" category.

Fig. 2.2. Investments in malaria control and elimination by channel delivered (constant 2016 US$), 2010–2016

See methods notes for **Fig. 2.1** for sources of information on funding from governments of malaria endemic countries and on international funding flows.

Fig. 2.3. Investments in malaria control and elimination by WHO region (constant 2016 US$), 2010–2016

See methods notes for **Fig. 2.1** for sources of information on funding from governments of malaria endemic countries and on international funding flows. The "Unspecified" category includes all funding for which there was no geographical information on the recipient.

Fig. 2.4. Investments in malaria research and development by recipient and by research area, 2010–2015 (in US$ million)

Data on funding for malaria-related research and development for 2010–2015 were collected directly from the G-FINDER Public Search Tool.[1] All data were converted to constant 2016 US$.

Fig. 2.5. Number of ITNs delivered by manufacturers and delivered by NMCPs, 2010–2016

Data on the number of insecticide-treated mosquito nets (ITNs) delivered by manufacturers to countries were provided to WHO by Milliner Global Associates. Data from NMCP reports were used for the number of ITNs distributed within countries.

Fig. 2.6. Proportion of ITNs distributed through different delivery channels in sub-Saharan Africa, 2014–2016

Data were derived from NMCP reports.

Fig. 2.7. Number of RDTs sold by manufacturers and distributed by NMCPs, 2010–2016

The numbers of rapid diagnostic tests (RDTs) distributed by WHO region are the annual totals reported as having been distributed by NMCPs. Numbers of RDT sales were reported by 41 manufacturers that participated in RDT product testing by WHO, the Foundation for Innovative New Diagnostics (FIND), the CDC, and the Special Programme for Research and Training in Tropical Diseases. The number of RDTs reported by manufacturers represents total sales to the public and private sectors worldwide.

Fig. 2.8. Number of ACT treatment courses delivered by manufacturers and distributed by NMCPs, 2010–2016

Data on artemisinin-based combination therapy (ACT) sales were provided by eight manufacturers eligible for procurement by WHO or the United Nations Children's Fund (UNICEF). ACT sales were categorized as being to either the public sector or the private sector. Data on ACTs distributed within countries through the public sector were taken from NMCP reports to WHO.

Fig. 2.9. Ratio of ACT treatment courses distributed to diagnostic tests performed (RDTs or microscopy) and test positivity rate, WHO African Region, 2010–2016

The ratio was calculated using the number of ACTs distributed, the number of microscopic examinations of blood slides, and the number of RDTs performed in the WHO African Region, as reported by NMCPs to WHO. The test positivity rate was calculated as the total number of positive tests (i.e. slide examinations or RDTs) divided by the total number of tests undertaken, as reported by countries in the WHO African Region.

Fig. 3.1. Proportion of population at risk with access to an ITN and sleeping under an ITN and proportion of households with at least one ITN and enough ITNs for all occupants, sub-Saharan Africa, 2010–2016

Estimates of ITN coverage were derived from a model developed by the Malaria Atlas Project,[2] using a two-stage process. First, we defined a mechanism for estimating net crop (i.e. the total number of ITNs in

[1] https://gfinder.policycuresresearch.org/PublicSearchTool
[2] http://www.map.ox.ac.uk/

households in a country at a given point in time), taking into account inputs to the system (e.g. deliveries of ITNs to a country) and outputs (e.g. loss of ITNs from households). We then used empirical modelling to translate estimated net crops into resulting levels of coverage (e.g. access within households, use in all ages and use among children aged under 5 years).

The model incorporates data from three sources:

- the number of ITNs delivered by manufacturers to countries, as provided to WHO by Milliner Global Associates;
- the number of ITNs distributed within countries, as reported to WHO by NMCPs; and
- data from nationally representative household surveys from 39 countries in sub-Saharan Africa, from 2001 to 2016.

Countries for analysis

The main analysis covered 40 of the 47 malaria endemic countries or areas of sub-Saharan Africa. The islands of Mayotte (for which no ITN delivery or distribution data were available) and Cabo Verde (which does not distribute ITNs) were excluded, as were the low-transmission countries of Namibia, Sao Tome and Principe, South Africa and Swaziland, for which ITNs comprise a small proportion of vector control. Analyses were limited to populations categorized by NMCPs as being at risk.

Estimating national net crops through time

As described by Flaxman et al. (*3*) , national ITN systems were represented using a discrete-time stock-and-flow model. Nets delivered to a country by manufacturers were modelled as first entering a "country stock" compartment (i.e. stored in-country but not yet distributed to households). Nets were then available from this stock for distribution to households by the NMCP or other distribution channels. To accommodate uncertainty in net distribution, the number of nets distributed in a given year was specified as a range, with all available country stock (i.e. the maximum number of nets that could be delivered) as the upper end of the range and the NMCP-reported value (i.e. the assumed minimum distribution) as the lower end. New nets reaching households joined older nets remaining from earlier time steps to constitute the total household net crop, with the duration of net retention by households governed by a loss function. Rather than fitting the loss function to a small external dataset, as was done by Flaxman et al. (*3*), the loss function was fitted directly to the distribution and net crop data within the stock-and-flow model itself. Loss functions were fitted on a country-by-country basis, were allowed to vary through time, and were defined separately for conventional ITNs (cITNs) and long-lasting insecticidal nets (LLINs). The fitted loss functions were compared to existing assumptions about rates of net loss from households. The stock-and-flow model was fitted using Bayesian inference and Markov chain Monte Carlo methods, which provided time-series estimates of national household net crop for cITNs and LLINs in each country, and an evaluation of under distribution, all with posterior credible intervals.

Estimating indicators of national ITN access and use from the net crop

Rates of ITN access within households depend not only on the total number of ITNs in a country (i.e. the net crop), but also on how those nets are distributed among households. One factor that is known to strongly influence the relationship between net crop and net distribution patterns among households is the size of households, which varies among countries, particularly across sub-Saharan Africa.

Many recent national surveys report the number of ITNs observed in each household surveyed. Hence, it is possible to not only estimate net crop, but also to generate a histogram that summarizes the household net ownership pattern (i.e. the proportion of households with zero nets, one net, two nets and so on). In this way, the size of the net crop was linked to distribution patterns among households while accounting for household size in order to generate ownership distributions for each stratum of household size. The bivariate histogram of net crop to distribution of nets among households by household size made it possible to calculate the proportion of households with at least one ITN. Also, because the number of both ITNs and people in each household was available, it was possible to directly calculate two additional indicators: the proportion of households with at least one ITN for every two people, and the proportion of the population with access to an ITN within their household. For the final ITN indicator – the proportion of the population who slept under an ITN the previous night – the relationship between ITN use and access was defined using 62 surveys in which both these indicators were available ($\text{ITN use}_{\text{all ages}} = 0.8133 \times \text{ITN access}_{\text{all ages}} + 0.0026$, $R^2 = 0.773$). This relationship was applied to the Malaria Atlas Project's country–year estimates of household access in order to obtain ITN use among all ages. The same method was used to obtain the country–year estimates of ITN use in children aged under 5 years ($\text{ITN use}_{\text{children under 5}} = 0.9327 \times \text{ITN access}_{\text{children under 5}} + 0.0282$, $R^2 = 0.754$).

Fig. 3.2. Proportion of population at risk with access to an ITN, sub-Saharan Africa, 2010–2016

Data on the number of ITNs distributed within countries were as reported to WHO by 39 countries where ITNs are the primary method of vector control.

Fig. 3.3. Household ITN ownership gap, 2016

See methods notes for **Fig. 3.1**.

Fig. 3.4. Proportion of the population at risk protected by IRS by WHO region, 2010–2016

The number of persons protected by indoor residual spraying (IRS) was reported to WHO by NMCPs. The total population of each country was taken from the 2016 revision of the *World population prospects* (*4*) and the proportion at risk of malaria was derived from NMCP reports.

Table 3.1. Countries and territories of sub-Saharan Africa that have reported reduced IRS coverage in any year between 2010 and 2016

Data were derived from NMCP reports.

Fig. 3.5. Chemical class used for IRS, 2010–2016

Data on the type of insecticide used for IRS were reported to WHO by NMCPs. Insecticides were classified into pyrethroids or other classes (carbamates, organochlorines or organophosphates). If data were not reported for a particular year, data from the most recent year were used. For the period 2010–2016 this method of imputation was used for an average of 19 countries each year.

Fig. 3.6. Proportion of the population protected by IRS or sleeping under an ITN in sub-Saharan Africa, 2010–2016

The proportion of the population at risk sleeping under an ITN was derived as described for **Fig. 3.1**, and the proportion benefiting from IRS was derived as for **Fig. 3.4**. In combining these proportions, the extent to which populations benefit from one or both of these interventions must be estimated. Analysis of household survey data indicates that about half of the people in IRS-sprayed households are also protected by ITNs, but the extent of overlap between intervention coverage can vary from 0% to 100% (if the proportions sum to <1). To reflect this uncertainty, we assumed the combined coverage to have a rectangular distribution with the range of maximum (0%, ITN coverage + IRS coverage – 100%) to minimum (ITN coverage, IRS coverage). Palisade's @RISK software (version 6.0)[1] was used to sample from the distributions for each country, and a continental estimate of vector-control coverage was obtained by summing the combined ITN and IRS coverage of all countries.

Fig. 3.7. Proportion of pregnant women attending ANC at least once and receiving IPTp, by dose, sub-Saharan Africa, 2010–2016

The total number of pregnant women eligible for intermittent preventive treatment in pregnancy (IPTp) was calculated by adding total live births calculated from the United Nations (UN) population data and spontaneous pregnancy loss (specifically, miscarriages and stillbirths) after the first trimester. Spontaneous pregnancy loss has previously been calculated by Dellicour et al. (*5*). Country-specific estimates of IPTp coverage were calculated as the ratio of pregnant women receiving IPTp at antenatal care (ANC) clinics to the estimated number of IPTp-eligible pregnant women in a given year. ANC attendance rates were derived in the same way, using the number of initial ANC visits reported through routine information systems. Local linear interpolation was used to compute missing values. Annual aggregate estimates exclude countries for which a report or interpolation was not available for the specific year. Among 34 countries with IPTp policy, IPTp1 dose coverage could be calculated for 34 countries, IPTp2 for 33 countries and IPTp3 for 20 countries. Aggregate estimates of IPTp1 and IPTp2 coverage for 20 countries with IPTp3 estimates were similar to estimates of IPTp1 and IPTp2 coverage using data from all countries.

Fig. 3.8. Maps of countries and subnational areas where SMC has been scaled up, 2014–2016

Data were provided by the Seasonal Malaria Chemoprevention (SMC) Working Group.

Fig. 3.9. Number of SMC treatments administered in scale-up countries, 2012–2016 (in million)

Data were provided by the SMC Working Group.

Fig. 4.1. Proportion of febrile children for whom care was sought, by health sector, sub-Saharan Africa, 2014–2016

Estimates were derived from 18 nationally representative household surveys (demographic health surveys and malaria indicator surveys) conducted between 2014 and 2016. The surveys asked caregivers whether their child had had a fever in the 2 weeks preceding the survey, whether care was sought for the fever and, if so, where care was sought.

[1] https://www.palisade.com/risk/

Fig. 4.2. Proportion of febrile children seeking care that received a blood test, by health sector, sub-Saharan Africa, 2014–2016

Estimates were derived from 17 nationally representative household surveys (demographic health surveys and malaria indicator surveys) conducted between 2014 and 2016. The surveys asked caregivers whether their child had had a fever in the 2 weeks preceding the survey, whether care was sought for the fever and, if so, where care was sought; they also asked whether the child had received a finger or heel stick as part of the care (indicating that a malaria diagnostic test was performed).

Fig. 4.3. Proportion of febrile children attending public health facilities that received a blood test, sub-Saharan Africa, 2010–2016

Estimates were derived from 44 nationally representative household surveys (demographic health surveys and malaria indicator surveys) conducted between 2010 and 2016. The surveys asked caregivers whether their child had had a fever in the 2 weeks preceding the survey, whether care was sought for the fever and, if so, where care was sought; they also asked whether the child had received a finger or heel stick as part of the care (indicating that a malaria diagnostic test was performed). Median values and interquartile ranges were calculated from available surveys in 3-year moving averages.

Fig. 4.4. Proportion of suspected malaria cases attending public health facilities who received a diagnostic test by WHO region, 2010–2016

The proportion of suspected malaria cases receiving a malaria diagnostic test in public facilities was calculated from NMCP reports to WHO. The number of malaria diagnostic tests performed comprised the number of RDTs and the number of microscopic slide examinations. Few countries reported the number of suspected malaria cases as an independent value. For countries reporting the total number of malaria cases as the sum of presumed malaria cases (i.e. cases classified as malaria without undergoing malaria parasitological testing) and confirmed malaria cases, the number of suspected cases was calculated by adding the number of negative diagnostic tests to the number of presumed and confirmed cases. Using this method, for countries that reported only confirmed malaria cases as the total number of malaria cases, the number of suspected cases is equal to the number of cases tested. This value is not informative in determining the proportion of suspected cases tested; therefore, countries were excluded from the regional calculation for the years in which they reported only confirmed cases as total malaria cases.

Fig. 4.5. Proportion of febrile children seeking care that received antimalarial medicines, sub-Saharan Africa, 2010–2016

Estimates were derived from 49 nationally representative household surveys (demographic health surveys and malaria indicator surveys) conducted between 2010 and 2016. The surveys asked caregivers whether their child had had a fever in the 2 weeks preceding the survey, and what treatment was received for the fever, particularly whether the child had received an ACT or other antimalarial medicine. Median values and interquartile ranges were calculated from available surveys in 3-year moving averages.

Fig. 4.6. Proportion of febrile children seeking care and treated with antimalarial medicines that received an ACT, sub-Saharan Africa, 2010–2016

See methods notes for **Fig. 4.5**.

Fig. 4.7. Proportion of febrile children with a positive RDT at time of survey and treated with antimalarial medicines who received an ACT, by health sector, sub-Saharan Africa, 2014–2016

Data from nationally representative household surveys were used to examine the treatment received by children who had had a fever in the previous 2 weeks and a positive RDT at the time of the survey, and received antimalarial medicines. Estimates were derived from 12 nationally representative household surveys (demographic health surveys and malaria indicator surveys) conducted between 2014 and 2016. Surveys included those that undertook diagnostic testing with a histidine rich protein 2 (HRP2) RDT, and that asked caregivers whether their child had had a fever in the 2 weeks preceding the survey, where care was sought, and what treatment was received for the fever, particularly whether the child received an ACT or other antimalarial medicine.

Fig. 4.8. iCCM policy adoption and implementation by WHO region by 2016

Data were derived from the WHO/UNICEF Global Integrated Management of Childhood Illness (IMCI) survey.

Fig. 5.1. Health facility reporting rates by WHO region, 2014–2016

Using data provided by NMCPs, reporting rates of health facilities were calculated by NMCPs as follows: (number of health facility reports received in 2016) divided by (number of health facilities providing treatment for uncomplicated malaria × reporting frequency).

Fig. 5.2. Proportion of all cases that have been captured by the surveillance system in countries where malaria burden was estimated from either parasite rate-to-incidence model or adjustments of national routine data

This indicator was computed using the following formulae: number of cases reported by the surveillance system divided by the number of estimated cases. The numerator consists of the reported confirmed cases plus the presumed cases adjusted for test positivity rate. For computation of estimated cases, see methods for **Table 6.1**.

Table 6.1. Estimated malaria cases, 2010–2016

The number of malaria cases was estimated by one of two methods. Method 1 was used for countries outside Africa and for low-transmission countries in Africa. Estimates were made by adjusting the number of reported malaria cases for completeness of reporting, the likelihood that cases were parasite positive, and the extent of health-service use. The procedure, which is described in the *World malaria report 2008* (*6*), combines data reported by NMCPs (reported cases, reporting completeness and likelihood that cases are parasite positive) with data obtained from nationally representative household surveys on health-service use. Briefly,

$$Case_{public\ sector} = (Cases_{confirmed} + Cases_{presumed} \times Test\ positivity\ rate)/Reporting\ completeness$$

$$Cases_{private\ sector} = Cases_{public\ sector} \times Prop.seeking\ care_{private\ sector}/Prop.seeking\ care_{public\ sector}$$

$$Cases_{Not\ seeking\ treatment} = Cases_{public\ sector} \times Prop.not\ seeking\ care/Prop.seeking\ care_{public\ sector}.$$

To estimate the uncertainty around the number of cases, the test positivity rate (**Fig. 2.9**) was assumed to have a normal distribution centred on the *Test positivity rate* value and standard deviation defined as 0.244 × Test positivity rate$^{0.5547}$ and truncated to be in the range 0, 1. Reporting completeness was assumed to have one of three distributions, depending on the value reported by the NMCP. If the value was greater than 80% the distribution was assumed to be triangular, with limits of 0.8 and 1 and the peak at 0.8. If the value was greater than 50% then the distribution was assumed to be rectangular, with limits of 0.5 and 0.8. Finally, if the value was lower than 50% the distribution was assumed to be triangular, with limits of 0 and 0.5 and the peak at 0.5 (*7*). The proportions of children for whom care was sought in the private sector and in the public sector (Fig. 4.1) were assumed to have a beta distribution, with the mean value being the estimated value in the survey and the standard deviation calculated from the range of the estimated 95% confidence intervals (CI) divided by 4. The proportion of children for whom care was not sought was assumed to have a rectangular distribution, with the lower limit 0 and upper limit calculated as:

$$1-Prop.seeking\ care_{public\ sector} - Prop.seeking\ care_{private\ sector}.$$

Values for the proportion seeking care were linearly interpolated between the years that have a survey, and were extrapolated for the years before the first or after the last survey. Missing values for the distributions were imputed using a mixture of the distribution of the country, with equal probability for the years where values were present or, if there was no value at all for any year in the country, a mixture of the distribution of the region for that year. The data were analysed using the R statistical software (*8*). Convolution of the distributions was made using the package "distr" (*9*,*10*). Method 1 was used for Afghanistan, Armenia, Azerbaijan, Bangladesh, Bolivia (Plurinational State of), Botswana, Brazil, Cambodia, Colombia, Dominican Republic, Eritrea, Ethiopia, French Guiana, Gambia, Georgia, Guatemala, Guyana, Haiti, Honduras, India, Indonesia, Kyrgyzstan, Lao People's Democratic Republic, Madagascar, Mauritania, Mayotte, Myanmar, Namibia, Nepal, Nicaragua, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Rwanda, Senegal, Solomon Islands, Sri Lanka, Tajikistan, Timor-Leste, Turkey, Turkmenistan, Uzbekistan, Vanuatu, Venezuela (Bolivarian Republic of), Viet Nam, Yemen and Zimbabwe. For India, the values were obtained at subnational level using the same methodology, but adjusting the private sector for an additional factor due to the active case detection. This factor was estimated to have a normal distribution with mean value and standard deviation calculated from the values reported in 2010.

Method 2 was used for high-transmission countries in Africa and for some countries in the WHO Eastern Mediterranean Region in which the quality of surveillance data did not permit a robust estimate from the number of reported cases. In this method, estimates of the number of malaria cases were derived from information on parasite prevalence obtained from household surveys. First, data on parasite prevalence from nearly 60 000 survey records were assembled within a spatiotemporal Bayesian geostatistical model, along with environmental and sociodemographic covariates, and data distribution on interventions such as ITNs, antimalarial drugs and IRS. The geospatial model enabled predictions of *Plasmodium falciparum* prevalence in children aged 2–10 years, at a resolution of 5 × 5 km^2, throughout all malaria endemic African countries for each year from 2000 to 2016.[1] Second, an ensemble model was developed to predict malaria

[1] For methods on the development of maps by the Malaria Atlas Project, see www.map.ox.ac.uk/making-maps/.

incidence as a function of parasite prevalence. The model was then applied to the estimated parasite prevalence in order to obtain estimates of the malaria case incidence at 5 × 5 km^2 resolution for each year from 2000 to 2016. Data for each 5 × 5 km^2 area were then aggregated within country and regional boundaries to obtain both national and regional estimates of malaria cases (*11*). Method 2 was used for Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Gabon, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Malawi, Mali, Mozambique, Niger, Nigeria, Sierra Leone, Somalia, South Sudan, Sudan, Togo, Uganda, United Republic of Tanzania and Zambia.

For some years, information was not always available or not of sufficient quality to be used with Method 1. For those countries, the number of cases was imputed from other years where the quality of the data was better, adjusting for population growth, as follows: for Gambia 2010, values were imputed from 2011 to 2013; for Namibia 2012, values were imputed from 2010 and 2013; for Haiti 2010, values where imputed from 2006 to 2008; for Papua New Guinea, 2012 values were imputed from 2009 to 2011; and for Ethiopia, the values were taken from a mixed distribution between values from Method 1 and Method 2 (50% from each method).

For most of the elimination countries, the number of indigenous cases registered by the NMCPs are reported without further adjustments. The countries in this category were Algeria, Argentina, Belize, Bhutan, Cabo Verde, China, Comoros, Costa Rica, Democratic People's Republic of Korea, Ecuador, El Salvador, Iran (Islamic Republic of), Iraq, Malaysia, Mexico, Paraguay, Republic of Korea, Sao Tome and Principe, Saudi Arabia, South Africa, Suriname, Swaziland and Thailand.

The number of malaria cases caused by *P. vivax* in each country was estimated by multiplying the country's reported proportion of (1– *P. falciparum*) cases by the total number of estimated cases for the country. For countries where the estimated proportion was not 0 or 1, the proportion of *P. falciparum* was assumed to have a triangular distribution with limits ±20% of the value of the estimated proportion, and limited to the range 0, 1.

To transform malaria cases to incidence, a population at risk estimate was used. The proportion of population at high, low or no risk of malaria was provided by NMCPs. This was applied to UN population estimates to compute the number of people at risk of malaria.

Table 6.2. Estimated malaria cases by WHO region, 2016

See methods notes for **Table 6.1**.

Fig. 6.1. Estimated malaria cases (millions) by WHO region, 2016

See methods notes for **Table 6.1**.

Fig. 6.2. Estimated country share of (a) total malaria cases and (b) vivax malaria cases, 2016

See methods notes for **Table 6.1**.

Fig. 6.3. Number of countries where a reduction (green) or increase (red) of more than 20% in malaria cases has occurred between 2015 and 2016, by WHO region

See methods notes for **Table 6.1**.

Fig. 6.4. Differences in malaria cases of more than 50 000 in 2015 and 2016 in countries with more than 300 000 malaria cases in 2015

See methods notes for **Table 6.1**.

Fig. 6.5. Trends in malaria case incidence rate globally and by WHO region, 2010–2016

See methods notes for **Table 6.1**.

Fig. 6.6. Percentage change in malaria case incidence rate globally and by WHO region, 2010–2016 and 2014–2016

See methods notes for **Table 6.1**.

Table 6.3. Cases estimated using: parasite rate-to-incidence model (current WHO approach); cases confirmed in the public health sector; and cases confirmed in the public health sector, adjusted for confirmation, reporting and treatment seeking rates

Data were derived from NMCP reports; also, see methods notes for **Table 6.1**.

Table 6.4. Estimated number of malaria deaths by WHO region, 2010–2016

Numbers of malaria deaths were estimated using methods from Category 1, 2 or 3, as outlined below.

Category 1 method

A Category 1 method was used for countries outside Africa and for low-transmission countries in Africa. A case fatality rate of 0.256% was applied to the estimated number of *P. falciparum* cases, which represents the average of case fatality rates reported in the literature (*12–14*) and rates from unpublished data from Indonesia, 2004–2009 (Dr Ric Price, Menzies School of Health Research, Australia,

personal communication). The proportion of deaths follows then a categorical distribution of 0.01%, 0.19%, 0.30%, 0.38% and 0.40%, each one with equal probability. A case fatality rate of 0.0375% was applied to the estimated number of *P. vivax* cases, representing the midpoint of the range of case fatality rates reported in a study by Douglas et al. (*15*), following a rectangular distribution between 0.012% and 0.063%. Following the nonlinear association explained for the Category 2 method below, the proportion of deaths in children under 5 was estimated as: $Proportion\ of\ deaths_{under\ 5} = -0.288 \times Mortality_{overall}^{2} + 0.823 \times Mortality_{overall} + 0.2239$, where the $Mortality_{overall}$ is the number of estimated deaths over the population at risk per 1000 (see **Annex 3. F.b.** for national estimates of population at risk). Countries where this method was used were: Afghanistan, Armenia, Azerbaijan, Bangladesh, Bolivia (Plurinational State of), Botswana, Cambodia, Comoros, Djibouti, Dominican Republic, Eritrea, Ethiopia, French Guiana, Georgia, Guatemala, Guyana, Haiti, Honduras, India, Indonesia, Kyrgyzstan, Lao People's Democratic Republic, Madagascar, Mayotte, Myanmar, Namibia, Nepal, Nicaragua, Pakistan, Papua New Guinea, Philippines, Solomon Islands, Somalia, Sri Lanka, Sudan, Swaziland, Tajikistan, Timor-Leste, Turkey, Turkmenistan, Uzbekistan, Vanuatu, Venezuela (Bolivarian Republic of), Viet Nam, Yemen and Zimbabwe.

Category 2 method

A Category 2 method was used for countries in Africa with a high proportion of deaths due to malaria. In this method, child malaria deaths were estimated using a verbal autopsy multicause model that was developed by the Maternal and Child Health Epidemiology Estimation Group (MCEE) to estimate causes of death in children aged 1–59 months (*16*). Mortality estimates (and 95% CI) were derived for seven causes of post-neonatal death (pneumonia, diarrhoea, malaria, meningitis, injuries, pertussis and other disorders), four causes arising in the neonatal period (prematurity, birth asphyxia and trauma, sepsis, and other conditions of the neonate), and other causes (e.g. malnutrition). Deaths due to measles, unknown causes and HIV/AIDS were estimated separately. The resulting cause-specific estimates were adjusted, country by country, to fit the estimated mortality envelope of 1–59 months (excluding HIV/AIDS and measles deaths) for corresponding years. Estimated prevalence of malaria parasites (see methods notes for **Table 6.1**) was used as a covariate within the model. It was assumed that the number of deaths follows a rectangular distribution with limits being the estimated 95% CI. The malaria mortality rate in children aged under 5 years estimated with this method was then used to infer malaria-specific mortality in those aged over 5 years, using the relationship between levels of malaria mortality in a series of age groups and the intensity of malaria transmission (*17*), and assuming a nonlinear association between under-5-years mortality and over-5-years mortality, as follows: $Proportion\ of\ deaths_{over\ 5} = -0.293 \times Mortality_{under\ 5}^{2} + 0.8918 \times Mortality_{under\ 5} + 0.2896$, where the $Mortality_{under\ 5}$ is estimated from the number of deaths from MCEE model over the population at risk per 1000. Countries where this method was used were: Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Malawi, Mali, Mauritania, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Sudan, Togo, Uganda, United Republic of Tanzania and Zambia.

Category 3 method

For the Category 3 method, the registered number of indigenous malaria deaths by the NMCPs is reported without further adjustments. This category includes the following countries: Algeria, Argentina, Belize, Bhutan, Brazil, Cabo Verde, China, Colombia, Costa Rica, Democratic People's Republic of Korea, Ecuador, El Salvador, Iran (Islamic Republic of), Iraq, Malaysia, Mexico, Panama, Paraguay, Peru, Republic of Korea, Sao Tome and Principe, Saudi Arabia, South Africa, Suriname and Thailand.

Fig. 6.7. Proportion of estimated malaria deaths attributable to the 15 countries with nearly 80% of malaria deaths globally in 2016

See methods notes for **Table 6.4**.

Fig. 6.8. Percentage decrease in malaria mortality rate (deaths per 100 000 population at risk) by WHO region, 2010–2016

See methods notes for **Table 6.4**.

Fig. 6.9. Trends in malaria mortality rate (deaths per 100 000 population at risk) globally and in the WHO African Region, 2010–2016

See methods notes for **Table 6.4**.

Fig. 6.10. Trends in malaria mortality rate (deaths per 100 000 population at risk) in WHO regions, 2010–2016

See methods notes for **Table 6.4**.

Fig. 7.1. Countries attaining zero indigenous malaria cases since 2000

Countries are shown by the year in which they attained zero indigenous cases for 3 consecutive years, according to reports submitted by NMCPs.

Annex 1 – Data sources and methods

Fig. 7.2. Number of countries that were malaria endemic in 2000 with fewer than 10 000 indigenous malaria cases in 2010 and 2016, by WHO region

For the 17 countries that attained zero indigenous cases for 3 consecutive years between 2000 and 2016, the number of NMCP-reported indigenous cases was tabulated according to the number of years preceding the attainment of zero cases. Data from years before the peak number of cases were excluded. Thus, if a country had experienced zero cases and malaria returned, cases were only included from the year in which they peaked. This inclusion criterion generates a slope that is steeper than if cases from all years were included (because some increases are excluded). In some earlier years where data on indigenous cases were not available, the total number of reported cases was used (i.e. for country–years with larger numbers of cases, in which the proportion of imported cases is expected to be low).

Table 7.1. Trends in indigenous malaria cases in the E-2020 countries

Data were derived from NMCP reports.

Fig. 8.1. Per capita expenditure for malaria control and elimination by WHO region, 2010–2016

See methods notes for **Fig. 2.1** for sources of information on funding from governments of malaria endemic countries and on international bilateral funding flows, and methods notes for **Table 6.1**. for data on population at risk of malaria.

Fig. 8.2. Percentage change in average of funding (US$) per capita population at risk in 2011–2013 and 2014–2016 in 41 high burden countries

Data were derived from the ForeignAssistance.gov; Global Fund to Fight AIDS, Tuberculosis and Malaria; NMCP reports; Organisation for Economic Co-operation and Development creditor reporting system; the World Bank Data Bank; and the Department for International Development.

Fig. 8.3. Malaria cases in South Sudan, 2010–2016

See methods notes for **Table 6.1**.

Fig. 8.4. Malaria cases in Yemen, 2010–2016

See methods notes for **Table 6.1**.

Fig. 8.5. Malaria cases in the Bolivarian Republic of Venezuela, 2010–2016

Data were derived from NMCP reports; also, see methods notes for **Table 6.1**.

Fig. 8.6. Number of ACTs failing in the Greater Mekong subregion

Data were derived from the Global database on antimalarial drug efficacy and resistance.[1]

Fig. 8.7. Reported insecticide resistance status as a proportion of sites for which monitoring was conducted by WHO region, 2010–2016

Insecticide resistance monitoring results were collated from data submissions to WHO by NMCPs, the African Network for Vector Resistance, Liverpool School of Tropical Medicine, Malaria Atlas Project and the US President's Malaria Initiative, and were extracted from other scientific publications. Data from standard WHO tube tests or CDC bottle bioassays with discriminating concentrations of insecticides were considered. Status was based on mosquito mortality, wherein <90% was confirmed resistance, 90–97% was possible resistance and ≥98% was susceptibility. Where multiple insecticide classes or types, mosquito species or time points were tested at an individual site, the highest resistance status was considered.

Fig. 8.8. Reported pyrethroid resistance status of malaria vectors measured with insecticide bioassays, 2010–2016

The map displays a subset of the data from **Fig. 8.7** for bioassays conducted with insecticides of the pyrethroid class only. The most recent resistance status is shown; where multiple insecticides or mosquito species were tested at an individual site, the highest resistance status is shown.

[1] http://www.who.int/malaria/areas/drug_resistance/drug_efficacy_database/en/, accessed 10 November 2017

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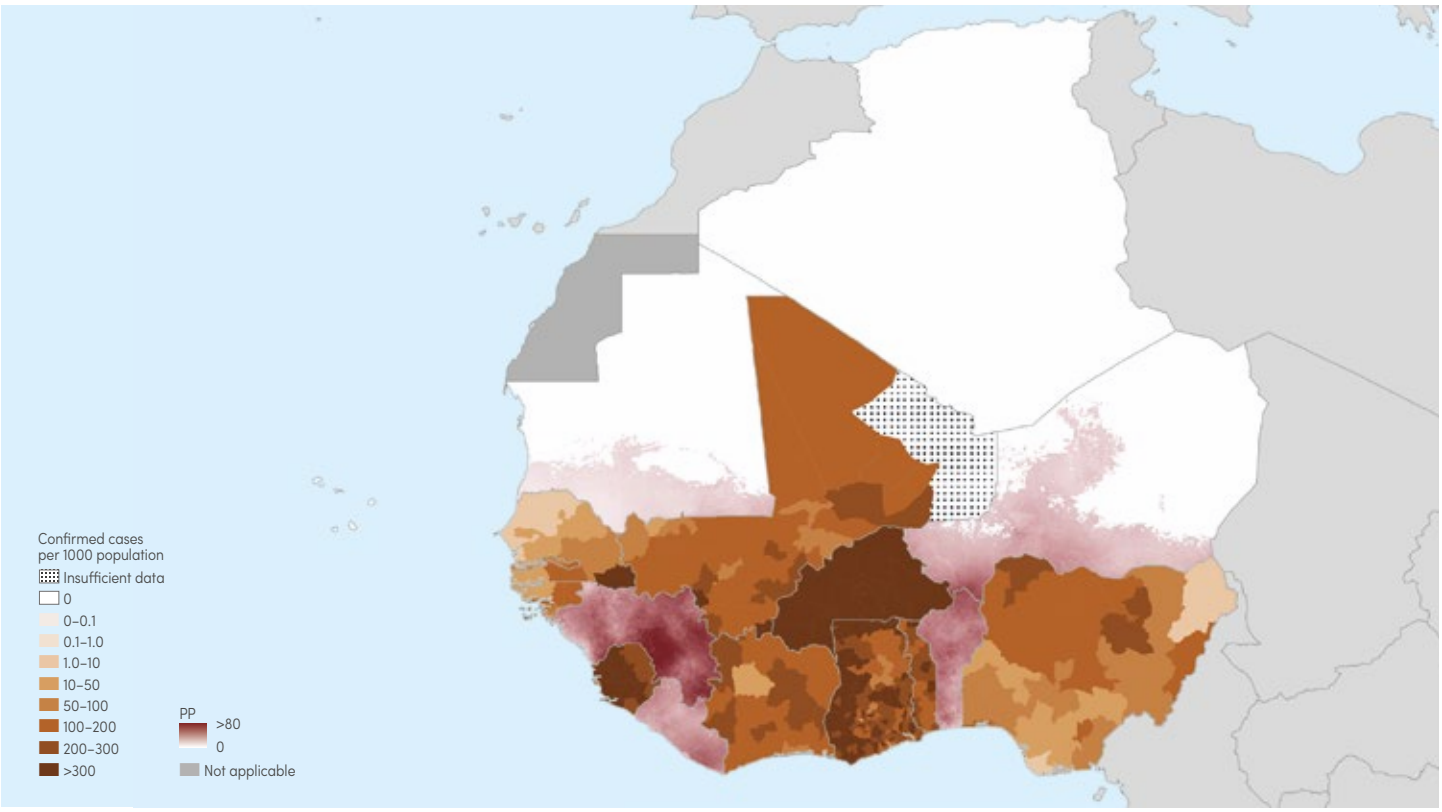
Annex 2 - A. Regional profile: West Africa

A. Confirmed malaria cases per 1000 population/parasite prevalence (PP), 2016



EPIDEMIOLOGY

Population at risk: 367 million
Parasites: *P. falciparum* (100%)
Vectors: *An. arabiensis, An. funestus, An. gambiae, An. hispaniola, An. labranchiae, An. melas, An. moucheti, An. multicolor, An. nili, An. pharoensis* and *An. sergentii*

FUNDING, 2010–2016

Decreased from US$ 1.75 billion in 2010 to US$ 637.7 million in 2016 (64% decrease)
Proportion of domestic source in 2016: 8%
Regional funding mechanisms: none

REPORTED CASES AND DEATHS, 2010–2016

Cases: Increased from 6.9 million in 2010 to 40.6 million in 2016 (488% increase)
Deaths: Decreased from 39 100 in 2010 to 18 700 in 2016 (52% decrease)

ESTIMATED CASES AND DEATHS, 2010–2016

Cases: Decreased from 110.7 million in 2010 to 109.9 million in 2016 (0.01% decrease)
Deaths: Decreased from 287 000 in 2010 to 224 000 in 2016 (22% decrease)

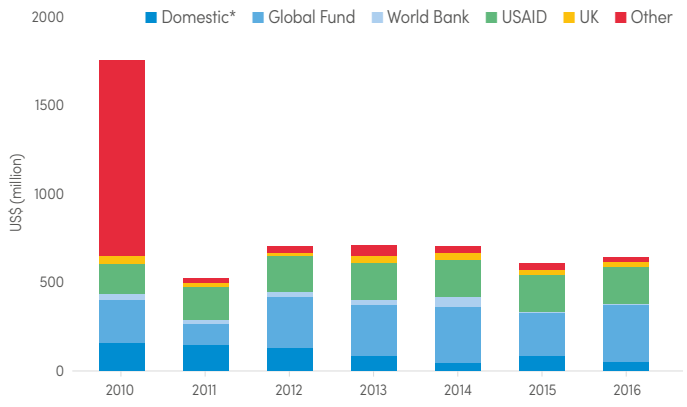
INTERVENTIONS, 2010–2016

Countries with ≥50% access to either LLINs or IRS in 2016: All countries except Cabo Verde and Mauritania
Number of RDTs distributed in 2016: 52.6 million
Number of ACT courses distributed in 2016: 44.2 million

ACCELERATION TO ELIMINATION, 2010–2016

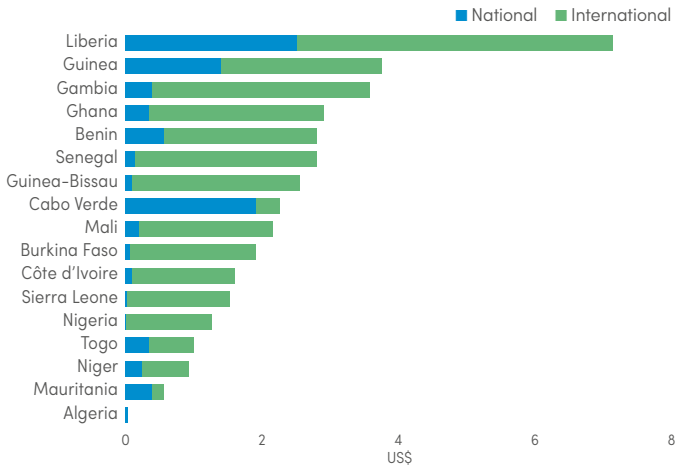
Countries with elimination programmes: Algeria and Cabo Verde
Zero indigenous cases for 3 consecutive years: Algeria
Zero indigenous cases in current year: Algeria
Certification in progress: no country

B. Malaria funding by source, 2010–2016



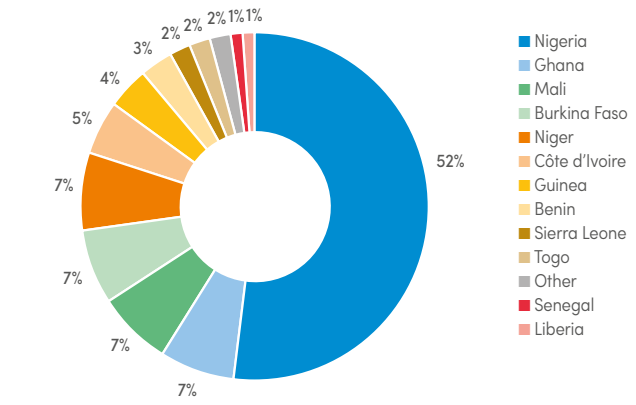
Global Fund, Global Fund to Fight AIDS, Tuberculosis and Malaria; UK, United Kingdom of Great Britain and Northern Ireland; USAID, United States Agency for International Development
* Excludes patient service delivery costs and out-of-pocket expenditure

C. Malaria funding* per person at risk, average 2014–2016

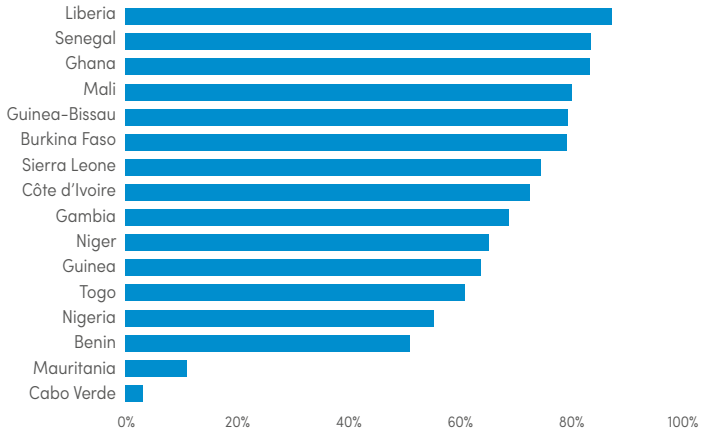


* Excludes cost related to health staff and out-of-pocket expenditure

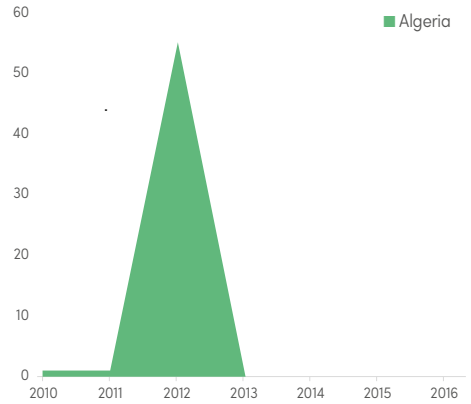
D. Share of estimated malaria cases, 2016



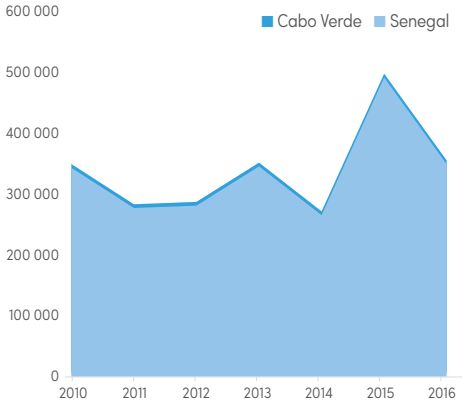
E. Proportion of population with access to either LLINs or IRS, 2016



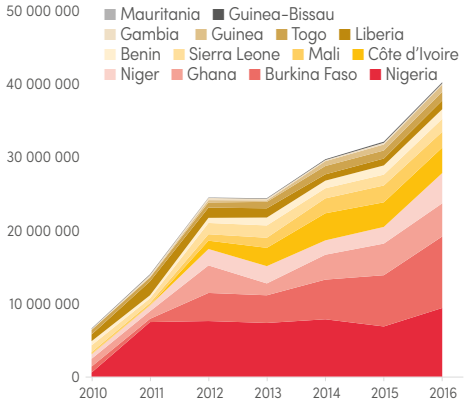
F. Countries projected to reduce case incidence by ≥40% by 2020



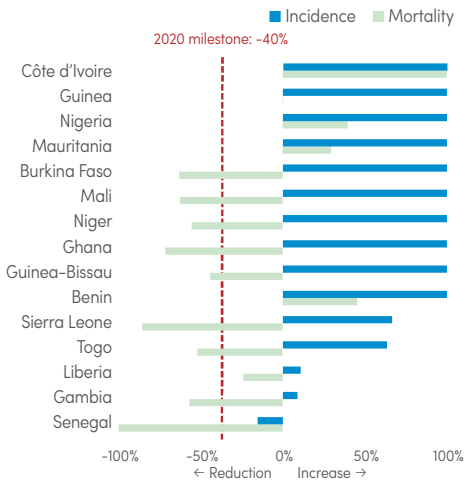
G. Countries projected to reduce case incidence by <40% by 2020



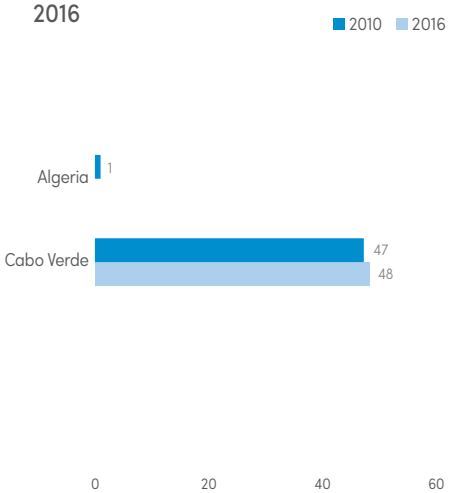
H. Countries with increase in case incidence, 2010–2016



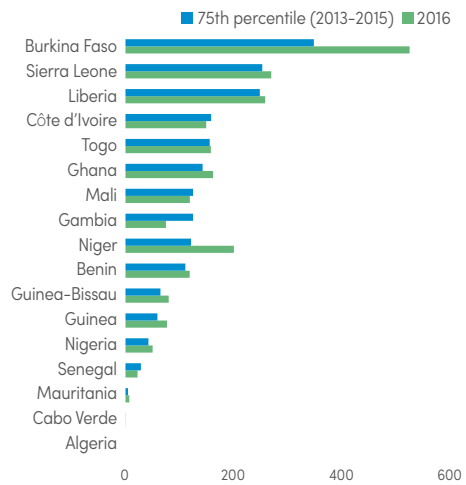
Ia. Change in reported malaria incidence and mortality rates, 2010–2016



Ib. Reported indigenous cases in countries with elimination activities, 2010 versus 2016



J. Incidence in 2016 compared to 75th percentile of 2013–2015



KEY MESSAGES

- About 367 million people living in the 17 countries are at high risk. With the exception of Algeria, malaria transmission is year-round and almost exclusively due to *P. falciparum* in most of the countries, with strong seasonality in the Sahelian countries.
- The subregion had about 111 million estimated cases and 41 million reported confirmed cases. Some 19 000 malaria deaths were reported in 2016 but reporting rates were low, and the estimated number of deaths was about 224 000. Six countries accounted for 85% of the estimated cases: Nigeria (52%), Burkina Faso, Ghana, Mali and Niger (each contributing 7%) and Côte d'Ivoire (5%).
- Algeria, with zero indigenous cases since 2013, is now eligible for certification of elimination by WHO. Cabo Verde is on target for malaria free status by 2020; however, cases increased from one indigenous case in 2012 to 48 cases in 2016. Senegal is on target for a 20–40% reduction by 2020. Overall, 14 countries had increased cases.
- In line with the Nouakchott Declaration against malaria in the Sahelian countries, a meeting of malaria programme managers of seven countries (Cabo Verde, Chad, Gambia, Mali, Mauritania, Niger and Senegal), held in Monaco in June 2017, agreed to accelerate malaria elimination in these countries. Gambia, Mauritania and Senegal are reorienting their programmes towards malaria elimination.
- Challenges include prioritization and sustainability of interventions, inappropriate application of larviciding, inadequate domestic financing and weak surveillance systems.

Annex 2 – B. Regional profile: Central Africa

EPIDEMIOLOGY

Population at risk: 168 million

Parasites: *P. falciparum* (100%)

Vectors: *An. arabiensis, An. funestus, An. gambiae, An. hancocki, An. melas, An. moucheti, An. Nili* and *An. pharoensis*

FUNDING, 2010–2016

Increased from US$ 251.7 million in 2010 to US$ 303.6 million in 2016 (21% increase)

Proportion of domestic source in 2016: 5%

Regional funding mechanisms: none

INTERVENTIONS, 2010–2016

Countries with ≥50% access to either LLINs or IRS in 2016: All countries except Angola, Congo, Equatorial Guinea and Gabon

Number of RDTs distributed in 2016: 33.8 million

Number of ACT courses distributed in 2016: 32.1 million

REPORTED CASES AND DEATHS, 2010–2016

Cases: Increased from 6.3 million in 2010 to 31.7 million in 2016 (404% increase)

Deaths: Increased from 40 000 in 2010 to 64 000 in 2016 (58% increase)

ESTIMATED CASES AND DEATHS, 2010–2016

Cases: Decreased from 43.7 million in 2010 to 38.3 million in 2016 (12% decrease)

Deaths: Decreased from 137 000 in 2010 to 88 000 in 2016 (36% decrease)

ACCELERATION TO ELIMINATION, 2010–2016

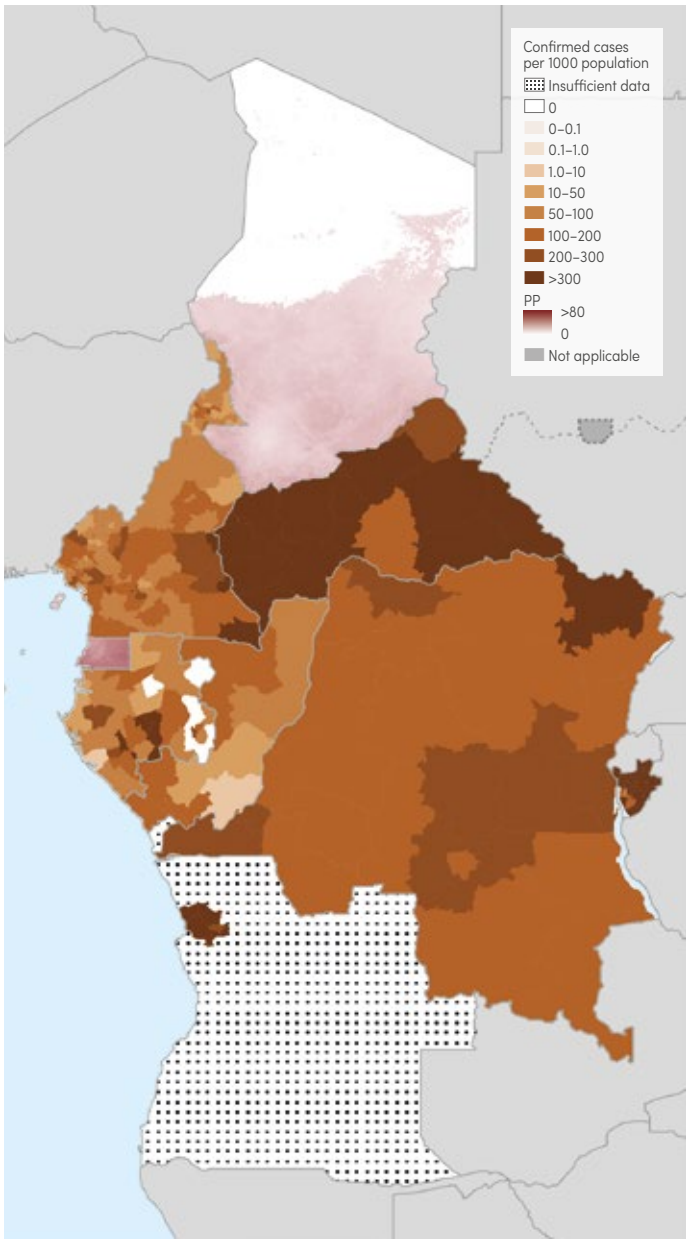
Countries with elimination programmes: no country

Zero indigenous cases for 3 consecutive years: no country

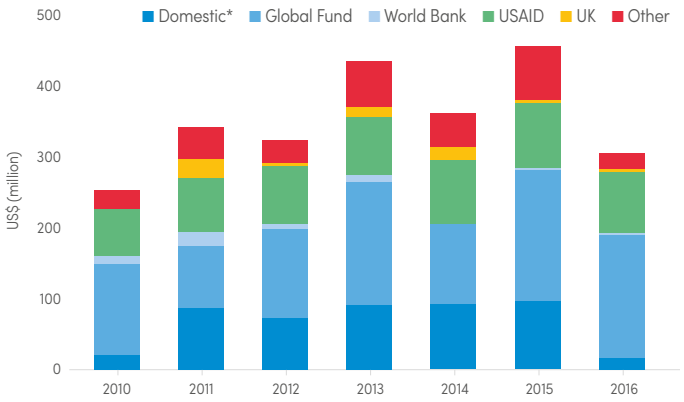
Zero indigenous cases in current year: no country

Certification in progress: no country

A. Confirmed malaria cases per 1000 population/parasite prevalence (PP), 2016



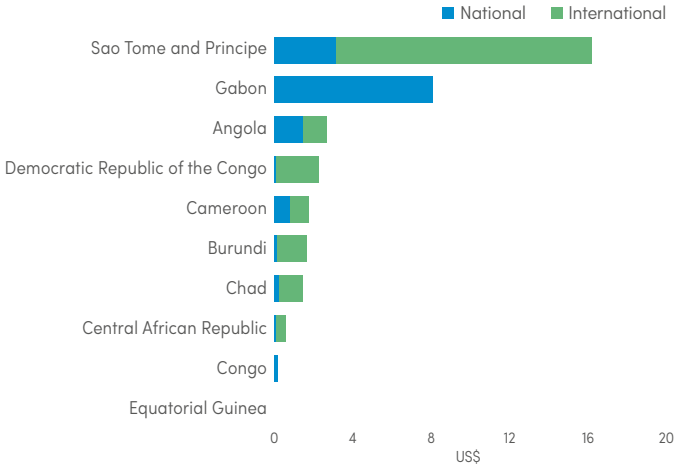
B. Malaria funding by source, 2010–2016



Global Fund, Global Fund to Fight AIDS, Tuberculosis and Malaria; UK, United Kingdom of Great Britain and Northern Ireland; USAID, United States Agency for International Development

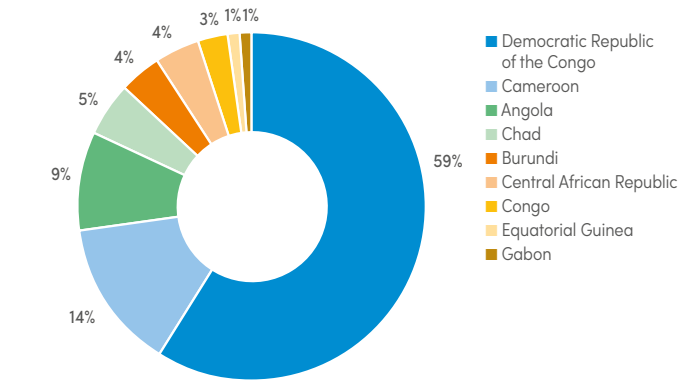
* Excludes patient service delivery costs and out-of-pocket expenditure

C. Malaria funding* per person at risk, average 2014–2016

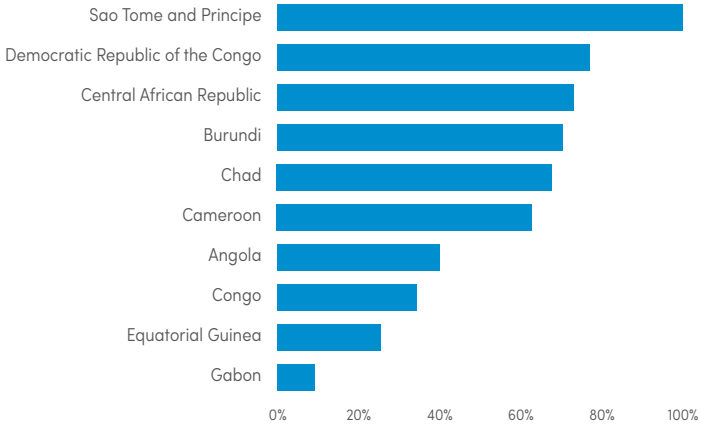


* Excludes cost related to health staff and out-of-pocket expenditure

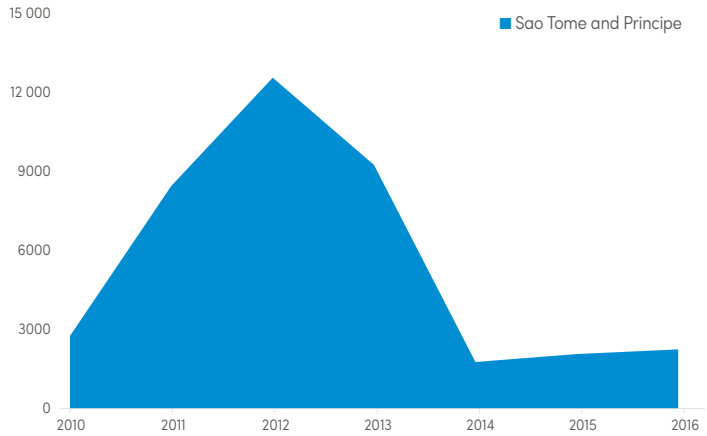
D. Share of estimated malaria cases, 2016



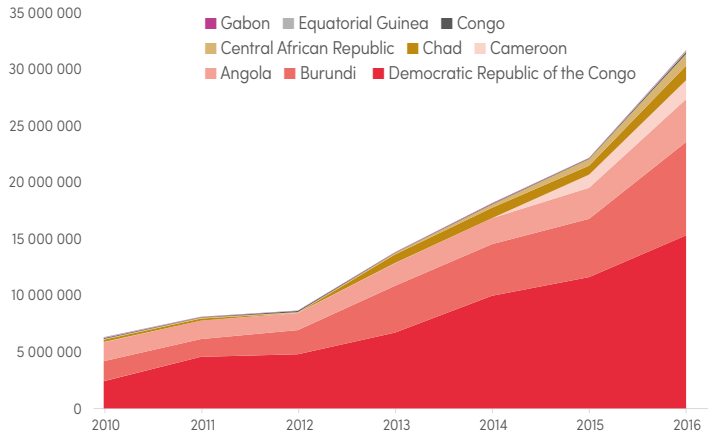
E. Proportion of population with access to either LLINs or IRS, 2016



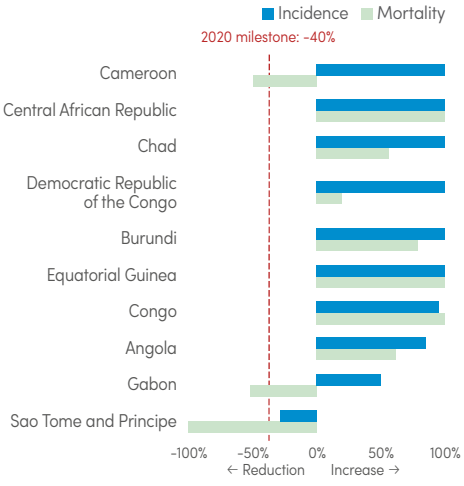
F. Countries projected to reduce case incidence by <40% by 2020



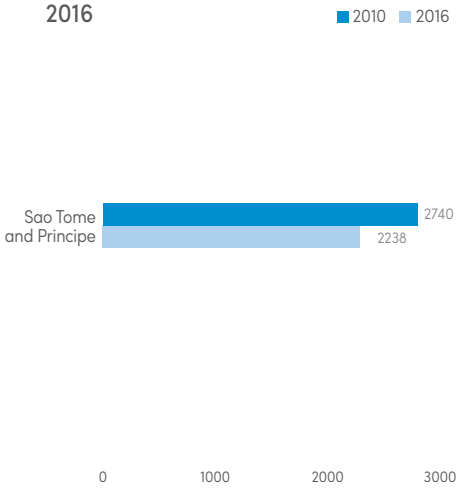
G. Countries with increase in case incidence, 2010–2016



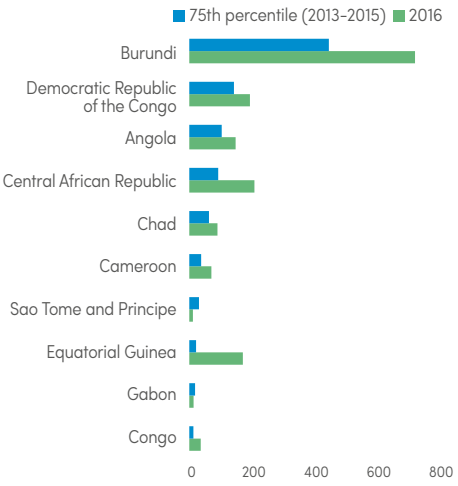
Ha. Change in reported malaria incidence and mortality rates, 2010–2016



Hb. Reported indigenous cases in countries with elimination activities, 2010 versus 2016



I. Incidence in 2016 compared to 75th percentile of 2013–2015



KEY MESSAGES

- About 168 million people living in the 10 countries are at high risk. Malaria transmission, almost exclusively due to *P. falciparum*, occurs throughout the year except in Burundi, Cameroon, northern Chad and the highlands of eastern Congo.
- The subregion had about 38 million estimated cases, with 32 million reported confirmed cases and 64 000 malaria deaths in 2016. The Democratic Republic of the Congo accounted for 48% of reported cases, followed by Burundi (26%) and Angola (12%). Nine countries saw increased cases during 2015–2016. Angola and Burundi alone reported 3.8 and 8.3 million confirmed cases in 2016, a 60% and 37% increase since 2015, respectively. The increases may be due to multiple factors, including inadequate intervention, climatic factors (El Niño) in 2015–2016 and improved reporting.
- Sao Tome and Principe has reported zero malaria deaths since 2014 but is on track for only 20–40% reduction in incidence by 2020. The testing rate in the subregion reached >81% except in Congo and Gabon (<60%). Cameroon and the Democratic Republic of the Congo conducted LLIN mass campaigns in 2016, but Congo, Equatorial Guinea and Gabon have failed to do so for the past 5 years owing to a shortage of funding.
- Challenges include weak health systems, insufficient domestic and international funding, and malaria outbreaks in Angola and Burundi. Congo, Equatorial Guinea and Gabon are no longer eligible for Global Fund support, but domestic investment remains inadequate.

Annex 2 - C. Regional profile: East and Southern Africa

EPIDEMIOLOGY

Population at risk: 394.7 million

Parasites: *P. falciparum* (98%) and *P. vivax* (2%)

Vectors: *An. arabiensis, An. funestus, An. gambiae, An. merus, An. nili* and *An. pharoensis*

FUNDING, 2010–2016

Increased from US$ 820.3 million in 2010 to US$ 866 million in 2016 (5% increase)

Proportion of domestic source in 2016: 6%

Regional funding mechanisms: none

INTERVENTIONS, 2010–2016

Countries with ≥50% access to either LLINs or IRS in 2016: All countries except South Sudan, United Republic of Tanzania (mainland) and Zimbabwe

Number of RDTs distributed in 2016: 87.9 million

Number of ACT courses distributed in 2016: 115 million

REPORTED CASES AND DEATHS, 2010–2016

Cases: Increased from 13.5 million in 2010 to 41.5 million in 2016 (208% increase)

Deaths: Decreased from 70 700 in 2010 to 20 800 in 2016 (71% decrease)

ESTIMATED CASES AND DEATHS, 2010–2016

Cases: Decreased from 49.9 million in 2010 to 46 million in 2016 (8% decrease)

Deaths: Decreased from 109 000 in 2010 to 89 000 in 2016 (18% decrease)

ACCELERATION TO ELIMINATION, 2010–2016

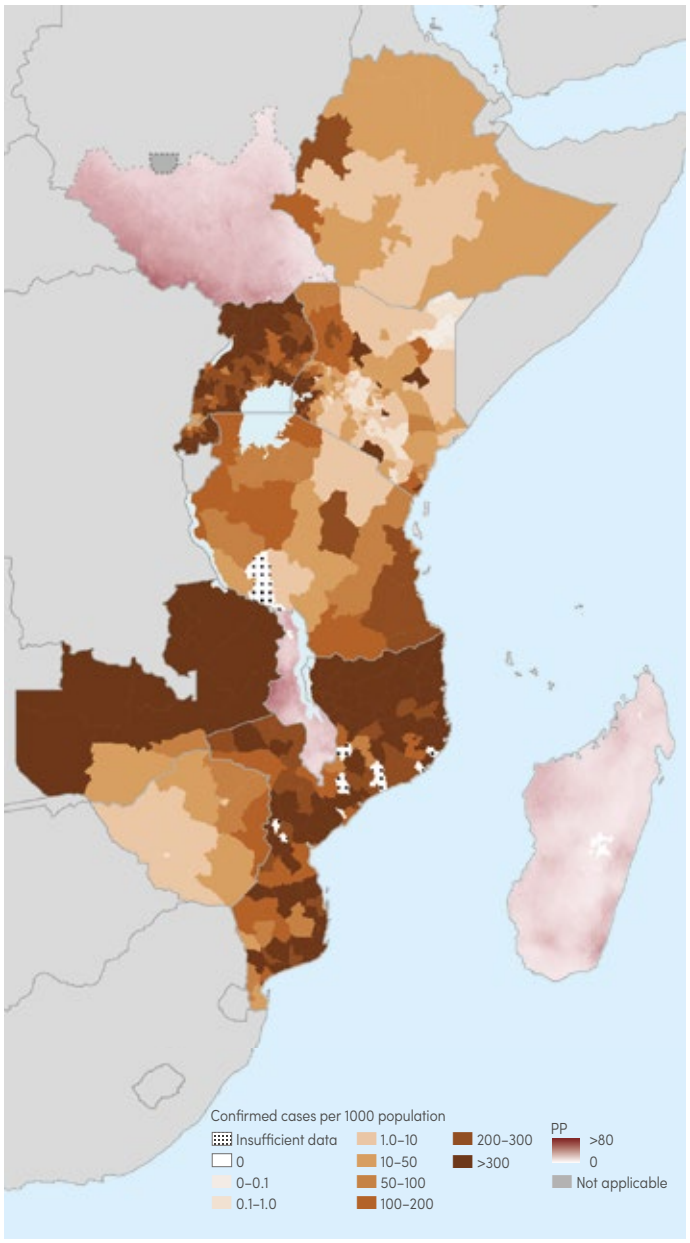
Countries with elimination programmes: no country

Zero indigenous cases for 3 consecutive years: no country

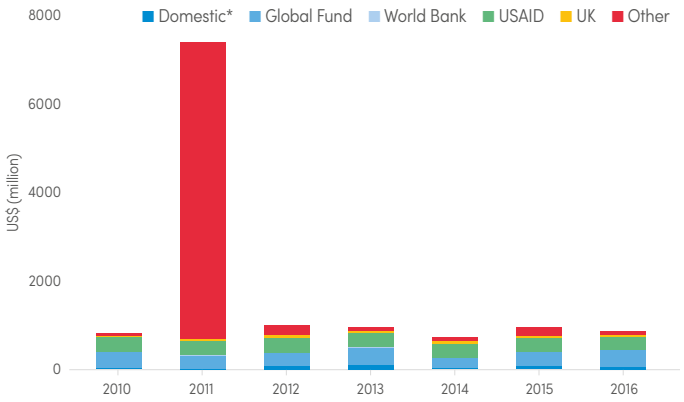
Zero indigenous cases in current year: no country

Certification in progress: no country

A. Confirmed malaria cases per 1000 population/parasite prevalence (PP), 2016



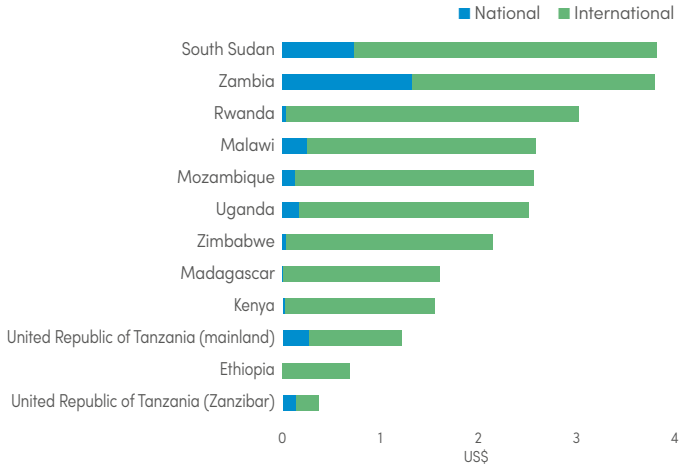
B. Malaria funding by source, 2010–2016



Global Fund, Global Fund to Fight AIDS, Tuberculosis and Malaria; UK, United Kingdom of Great Britain and Northern Ireland; USAID, United States Agency for International Development

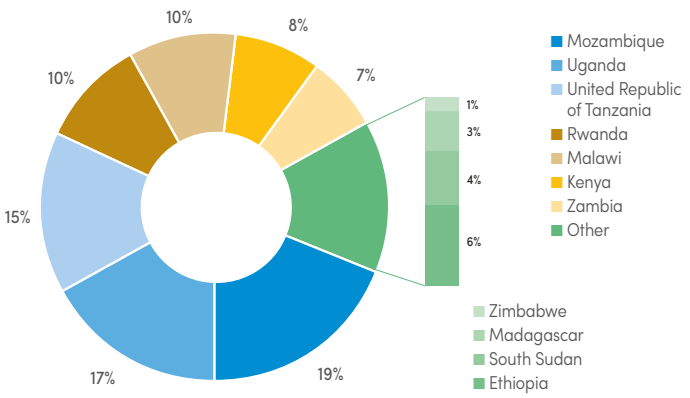
* Excludes patient service delivery costs and out-of-pocket expenditure

C. Malaria funding* per person at risk, average 2014–2016

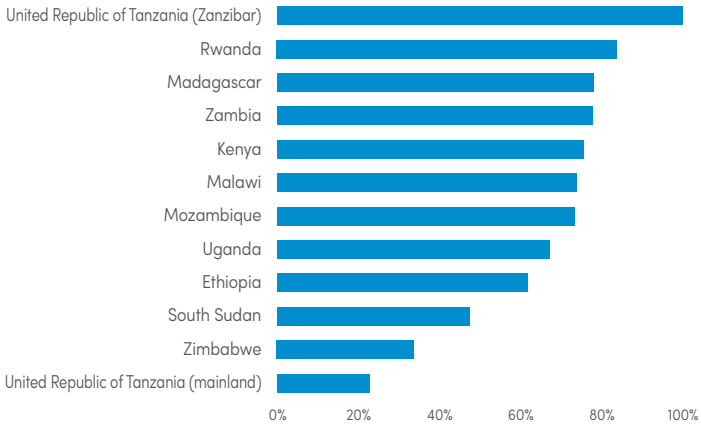


* Excludes cost related to health staff and out-of-pocket expenditure

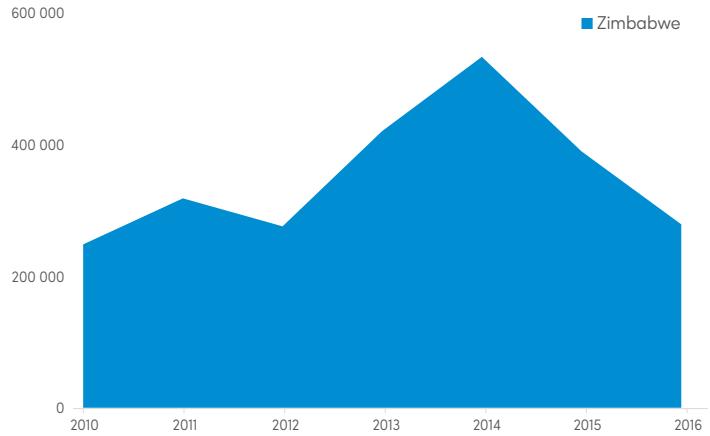
D. Share of estimated malaria cases, 2016



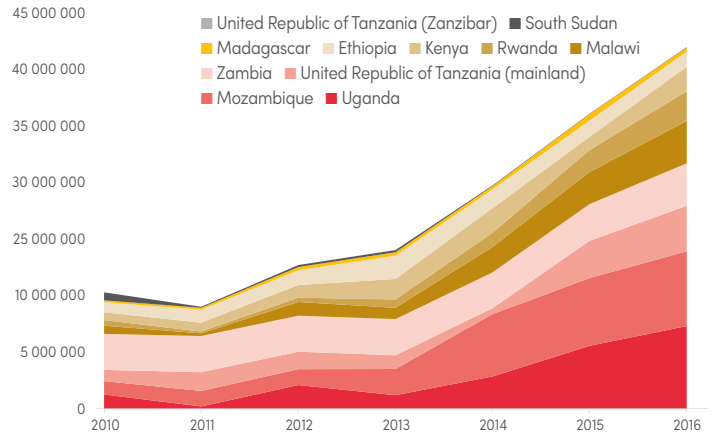
E. Proportion of population with access to either LLINs or IRS, 2016



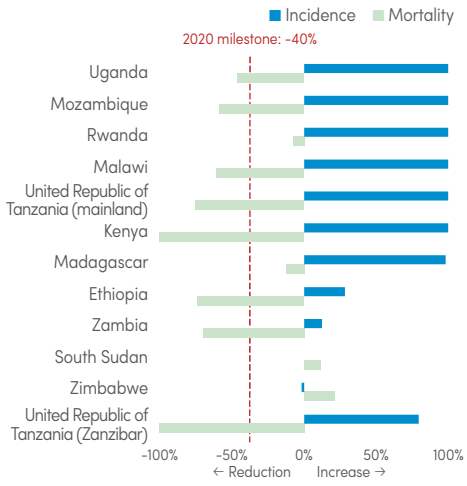
F. Countries projected to reduce case incidence by <40% by 2020



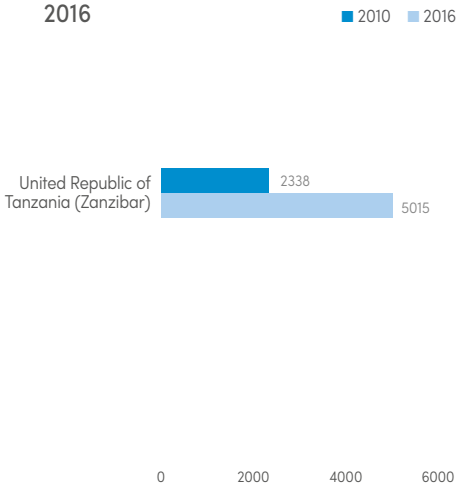
G. Countries with increase in case incidence, 2010–2016



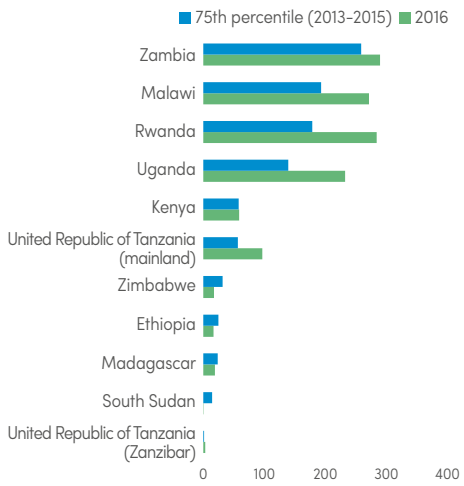
Ha. Change in reported malaria incidence and mortality rates, 2010–2016



Hb. Reported indigenous cases in countries with elimination activities, 2010 versus 2016



I. Incidence in 2016 compared to 75th percentile of 2013-2015



KEY MESSAGES

- About 395 million people in the 11 countries are at high risk. Malaria transmission is almost exclusively due to *P. falciparum* (except in Ethiopia). It is highly seasonal in Ethiopia, Madagascar, Zimbabwe and coastal and highland areas of Kenya, and is stable in most of Malawi, Mozambique, South Sudan, Uganda, United Republic of Tanzania and Zambia.
- The subregion had 46 million estimated malaria cases, with about 42 million reported confirmed cases and 21 000 reported deaths in 2016. Mozambique, Uganda and United Republic of Tanzania accounted for more than 50% of the estimated cases. Estimated deaths decreased from 109 000 to 89 000 during 2010–2016.
- None of the countries in the subregion are on track for a 40% reduction by 2020. All countries except Ethiopia, Madagascar and Zimbabwe reported a substantial increase in cases during 2015–2016. Cases in Rwanda increased from 640 000 in 2010 to 3.4 million in 2016, and in Zanzibar (United Republic of Tanzania) from 2300 to 5000 during the same period. Uganda reported a twofold increase in confirmed cases during 2015–2016 compared to 2013. The increases may be due to inadequate vector control, climatic factors (El Niño) in 2015–2016 affecting south-eastern Africa and improved reporting. In all the countries except South Sudan, United Republic of Tanzania and Zimbabwe, >60% of the population had access to LLINs in 2016.
- Challenges include epidemics during the past 2 years, emergencies and inadequate response, inadequate funding, and weak surveillance systems in a number of the countries.

Annex 2 - D. Regional profile: Countries with low transmission in East and Southern Africa

EPIDEMIOLOGY

Population at risk: 15.7 million
Parasites: *P. falciparum* (98%) and *P. vivax* (2%)
Vectors: *An. funestus, An.gambiae s.s.* and *An. gambiae*

FUNDING, 2010–2016

Decreased from US$ 61.3 million in 2010 to US$ 37 million in 2016 (40% decrease)
Proportion of domestic source in 2016: 63%
Regional funding mechanisms: Southern Africa Malaria Elimination 8 Initiative

INTERVENTIONS, 2010–2016

Countries with ≥50% access to either LLINs or IRS in 2016: Comoros, Eritrea and Namibia
Number of RDTs distributed in 2016: 363 000
Number of ACT courses distributed in 2016: 215 000

REPORTED CASES AND DEATHS, 2010–2016

Cases: Decreased from 82 000 in 2010 to 56 000 in 2016 (32% decrease)
Deaths: Decreased from 242 in 2010 to 126 in 2016 (48% decrease)

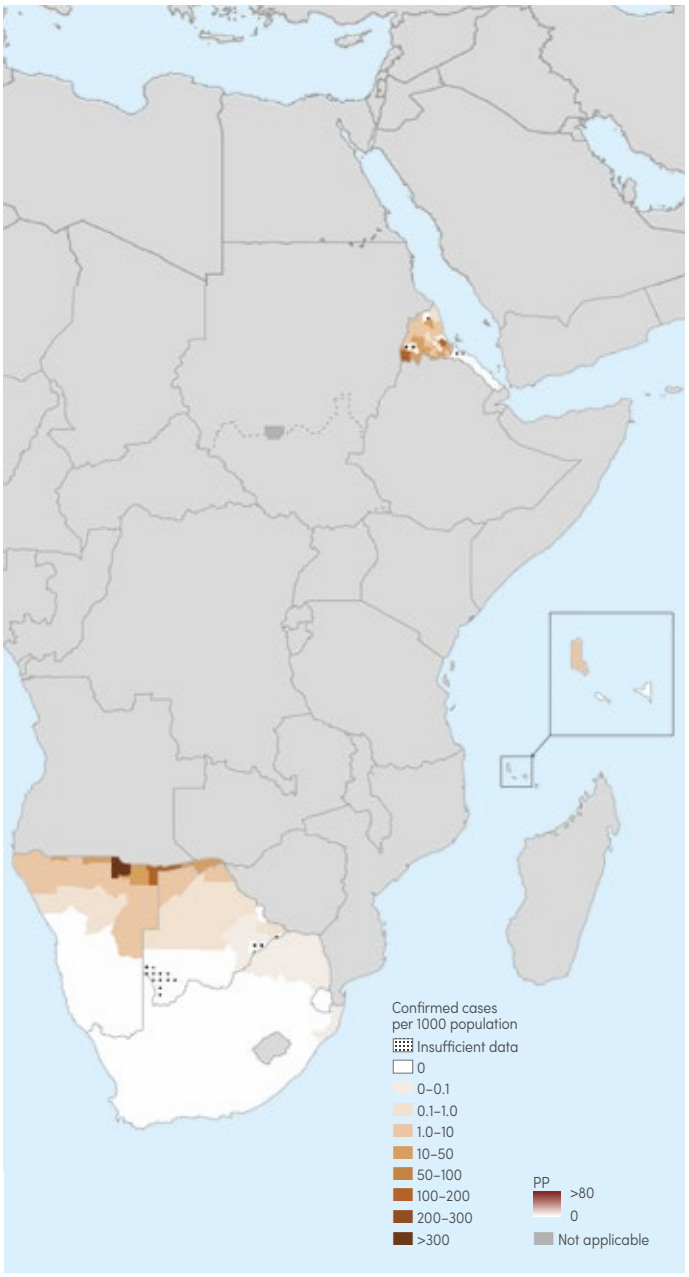
ESTIMATED CASES AND DEATHS, 2010–2016

Cases: Decreased from 146 000 in 2010 to 126 000 in 2016 (14% decrease)
Deaths: Decreased from 370 in 2010 to 320 in 2016 (13% decrease)

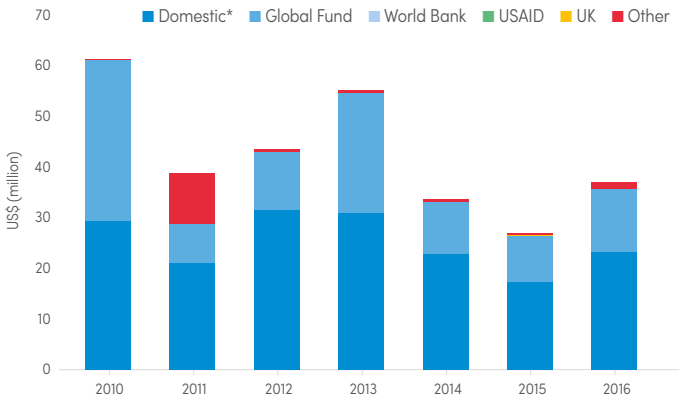
ACCELERATION TO ELIMINATION, 2010–2016

Countries with elimination programmes: Botswana, Comoros, Namibia, South Africa and Swaziland
Zero indigenous cases for 3 consecutive years: no country
Zero indigenous cases in current year: no country
Certification in progress: no country

A. Confirmed malaria cases per 1000 population, 2016

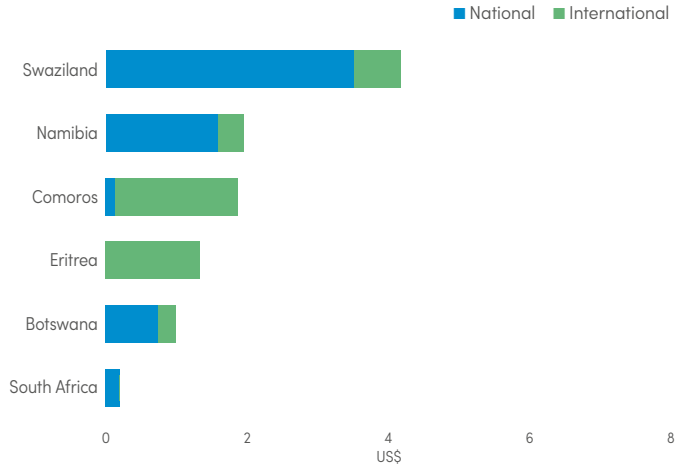


B. Malaria funding by source, 2010–2016



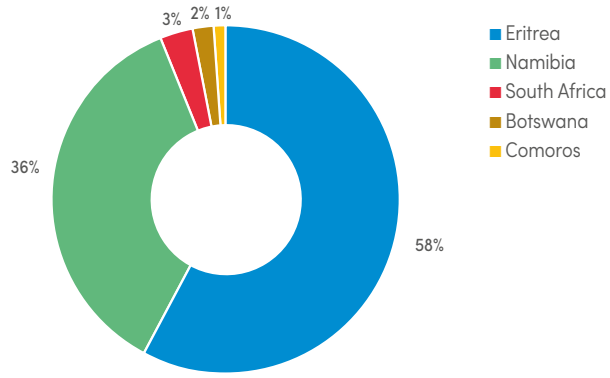
Global Fund, Global Fund to Fight AIDS, Tuberculosis and Malaria; UK, United Kingdom of Great Britain and Northern Ireland; USAID, United States Agency for International Development
* Excludes patient service delivery costs and out-of-pocket expenditure

C. Malaria funding* per person at risk, average 2014–2016

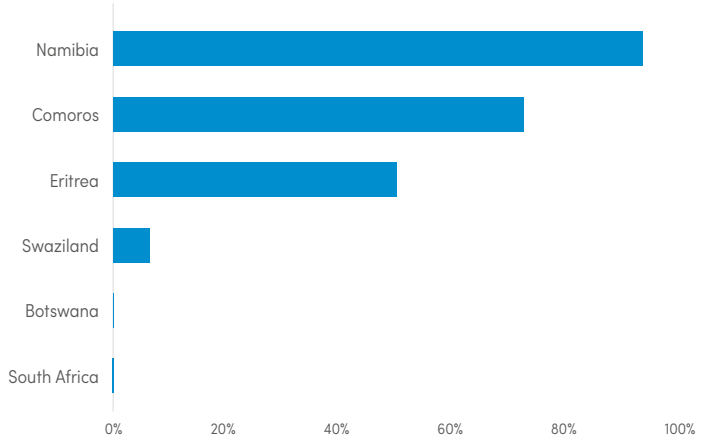


* Excludes cost related to health staff and out-of-pocket expenditure

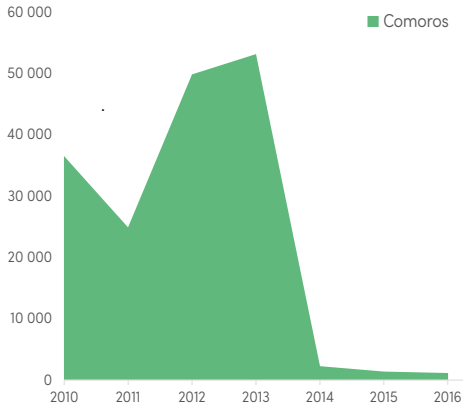
D. Share of estimated malaria cases, 2016



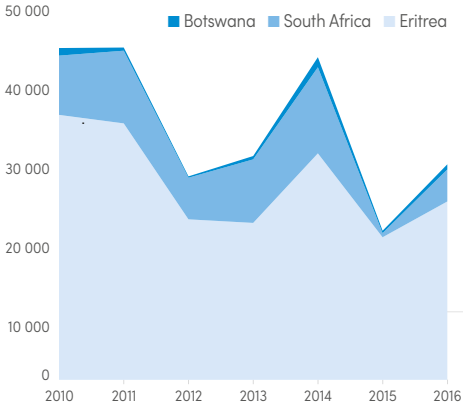
E. Proportion of population with access to either LLINs or IRS, 2016



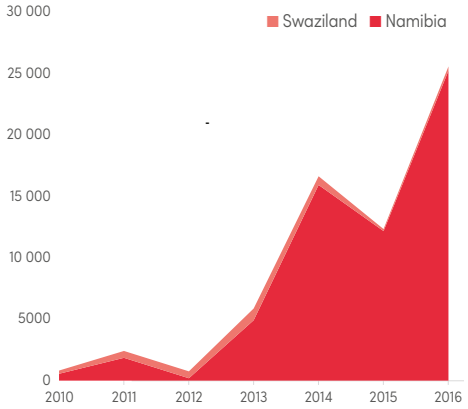
F. Countries projected to reduce case incidence by ≥40% by 2020



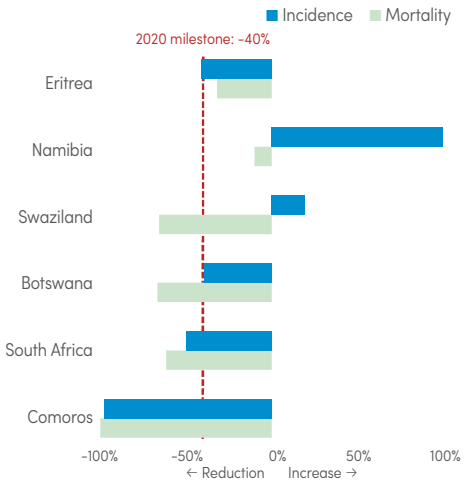
G. Countries projected to reduce case incidence by <40% by 2020



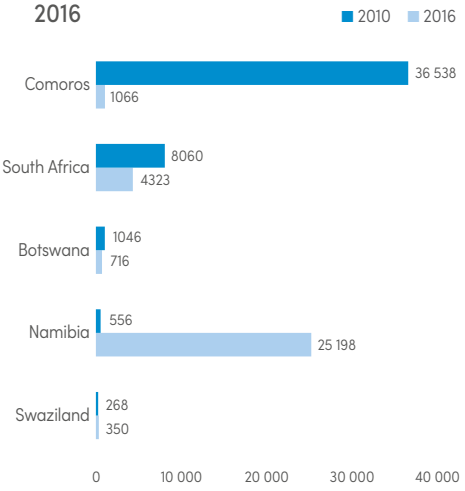
H. Countries with increase in case incidence, 2010–2016



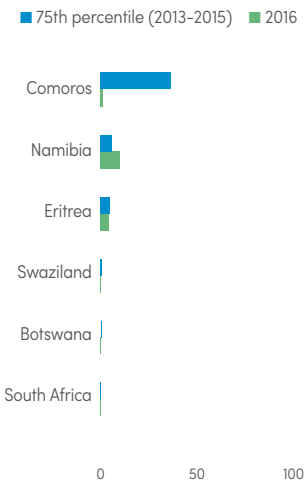
Ia. Change in reported malaria incidence and mortality rates, 2010–2016



Ib. Reported indigenous cases in countries with elimination activities, 2010 versus 2016



J. Incidence in 2016 compared to 75th percentile of 2013-2015



KEY MESSAGES

- About 16 million people in the six countries are at high risk of malaria. Transmission is focal, almost exclusively due to *P. falciparum* (except in Eritrea) and highly seasonal.
- The subregion had nearly 126 000 estimated malaria cases, with 56 000 reported confirmed cases and 126 reported deaths in 2016. The four frontline countries of the Elimination 8 (E8) initiative in southern Africa (Botswana, Namibia, South Africa and Swaziland) accounted for 55% of reported cases. Comoros and Eritrea are not part of the E8 initiative but are included here because of their very low transmission.
- Comoros is on track for a ≥40% reduction by 2020, and Botswana, Eritrea and South Africa are on track for a 20–40% reduction. Namibia and Swaziland are not on track because of the increase in cases in recent years – in Namibia from only 556 cases in 2010 to 25 198 cases in 2016 (a 45 times increase), and in Swaziland a 30% increase during the same period. All the countries except Comoros reported more cases in 2016 than in 2015. Despite the increase in cases, malaria deaths remained relatively low in the subregion, owing to improved access to treatment. The increases are due to many factors, including inadequate vector control, climatic factors (El Niño) in 2015–2016 and improved reporting. All the countries except Comoros undertake focalized IRS combined with LLINs.
- Challenges include inadequate coverage of vector control, importation risk from neighbouring countries and resurgence during the past 2 years.

Annex 2 - E. Regional profile: Region of the Americas

EPIDEMIOLOGY

Population at risk: 126.8 million

Parasites: *P. falciparum* (27%), *P. vivax* (69%) and other (4%)

Vectors: *An. albimanus, An. albitarsis, An. aquasalis, An. braziliensis, An. darlingi, An. neivai, An. nuneztovari, An. pseudopunctipennis* and *An. punctimacula*

FUNDING, 2010–2016

Decreased from US$ 192.3 million in 2010 to US$ 167.4 million in 2016 (13% decrease)

Proportion of domestic source in 2016: 85%

Regional funding mechanisms: Meso-America

INTERVENTIONS, 2010–2016

Countries with ≥50% coverage with either LLINs or IRS in 2016: Guatemala, Guyana and Nicaragua

Number of RDTs distributed in 2016: 847 000

Number of ACT courses distributed in 2016: 274 000

REPORTED CASES AND DEATHS, 2010–2016

Cases: Decreased from 678 000 in 2010 to 562 800 in 2016 (93% decrease)

Deaths: Decreased from 190 in 2010 to 110 in 2016 (42% decrease)

ESTIMATED CASES AND DEATHS, 2010–2016

Cases: Decreased from 1 million in 2010 to 875 300 in 2016 (16% decrease)

Deaths: Decreased from 831 in 2010 to 653 in 2016 (21% decrease)

ACCELERATION TO ELIMINATION, 2010–2016

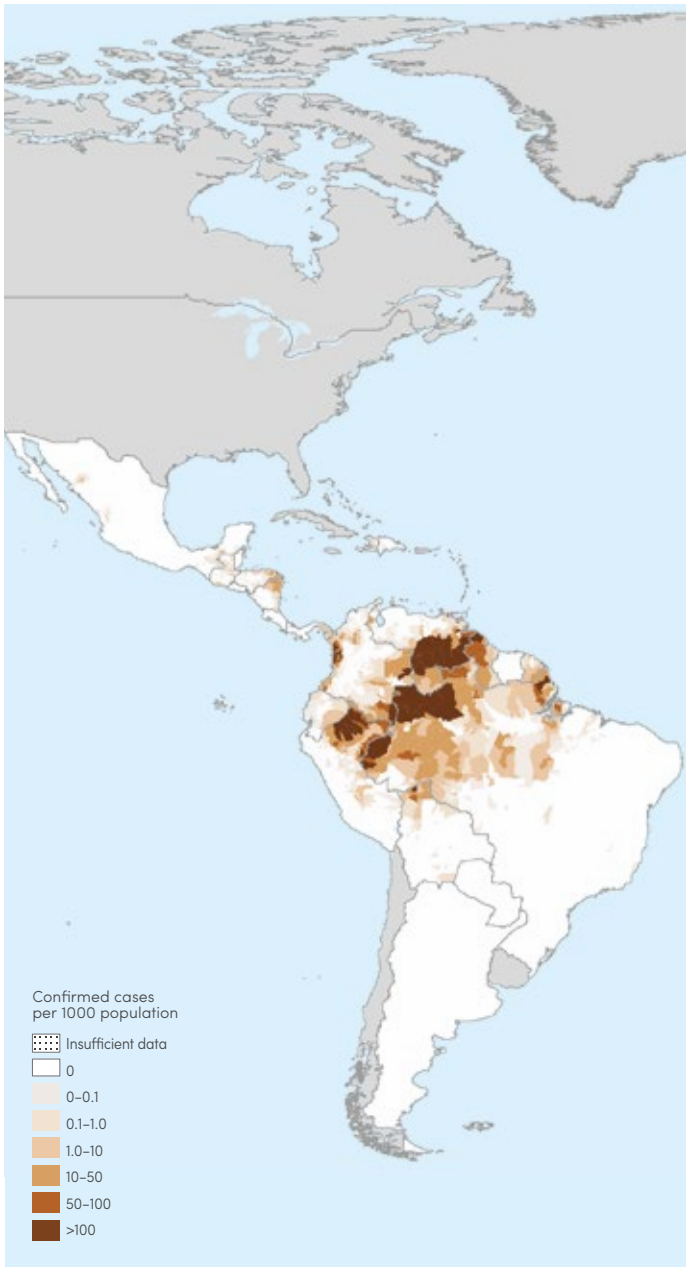
Countries with elimination programmes: Argentina, Belize, Costa Rica, Ecuador, El Salvador, Mexico, Paraguay and Suriname

Zero indigenous cases for 3 consecutive years: Argentina and Paraguay

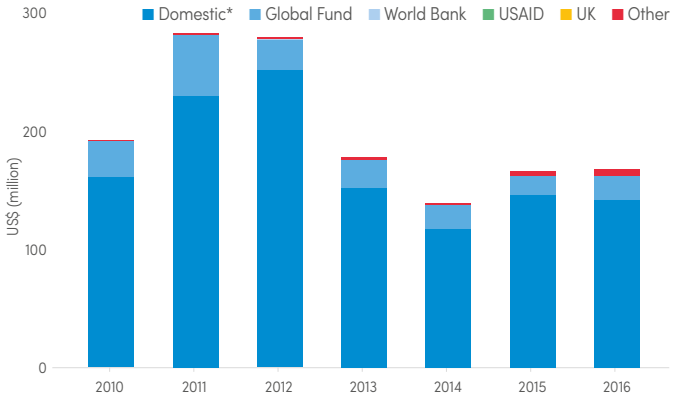
Zero indigenous cases in current year: Argentina and Paraguay

Certification in progress: Argentina and Paraguay

A. Confirmed malaria cases per 1000 population, 2016



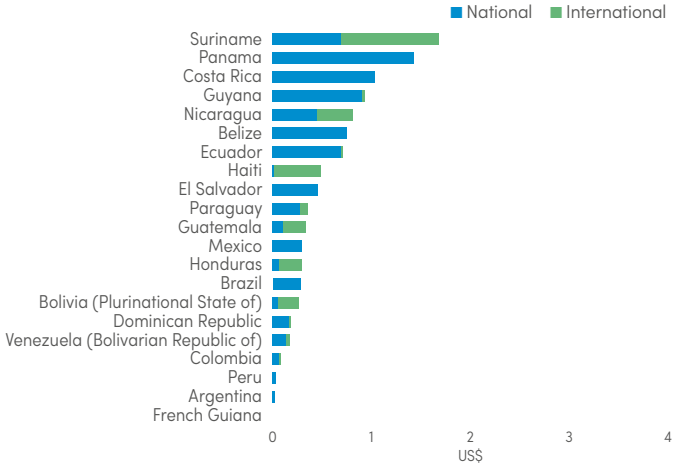
B. Malaria funding by source, 2010–2016



Global Fund, Global Fund to Fight AIDS, Tuberculosis and Malaria; UK, United Kingdom of Great Britain and Northern Ireland; USAID, United States Agency for International Development

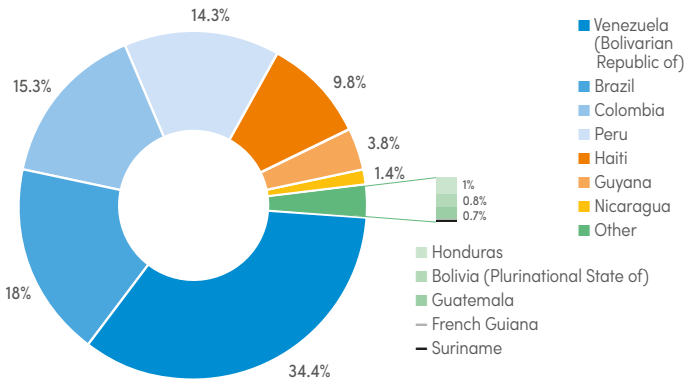
* Excludes patient service delivery costs and out-of-pocket expenditure

C. Malaria funding* per person at risk, average 2014–2016

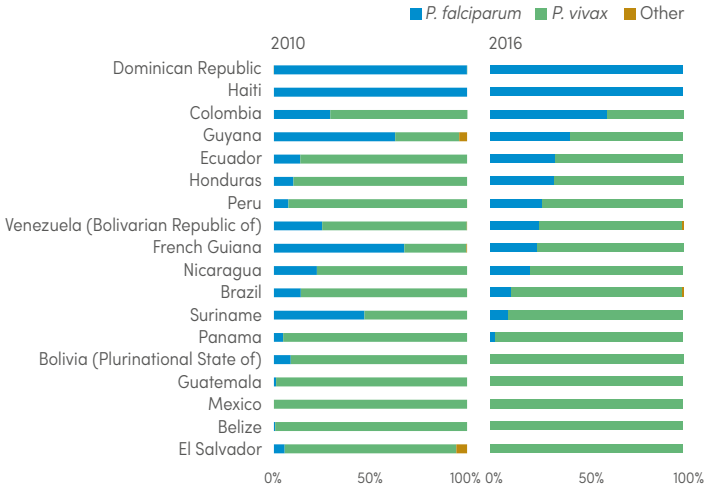


* Excludes cost related to health staff and out-of-pocket expenditure

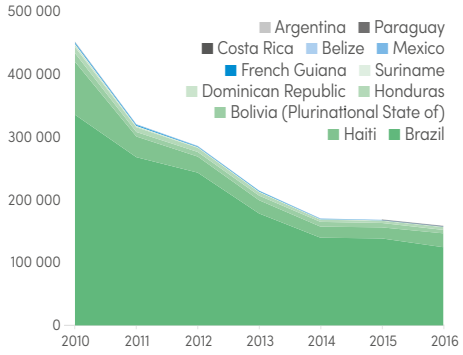
D. Share of estimated malaria cases, 2016



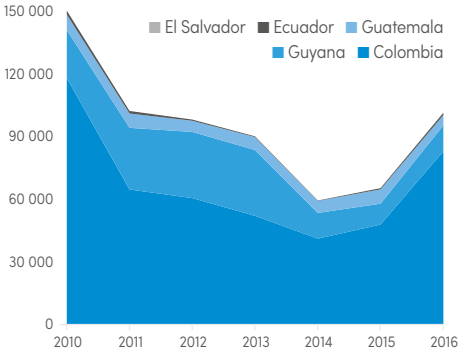
E. Proportion of *Plasmodium* species, 2010 and 2016



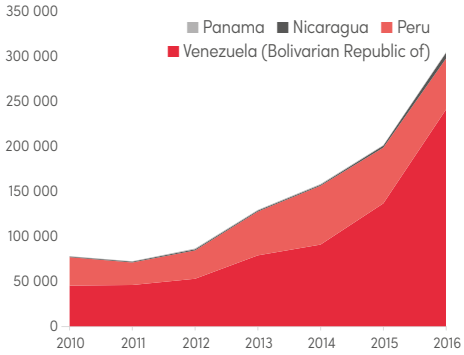
F. Countries and territories projected to reduce case incidence by ≥40% by 2020



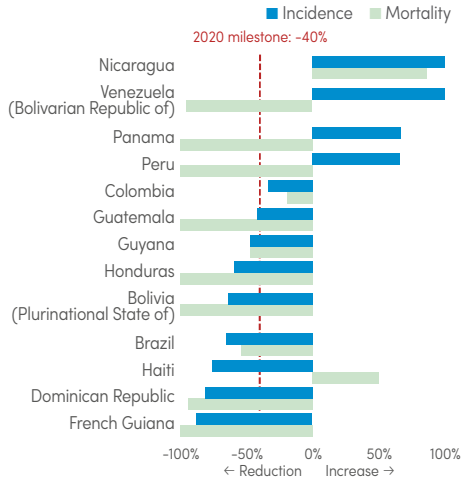
G. Countries projected to reduce case incidence by <40% by 2020



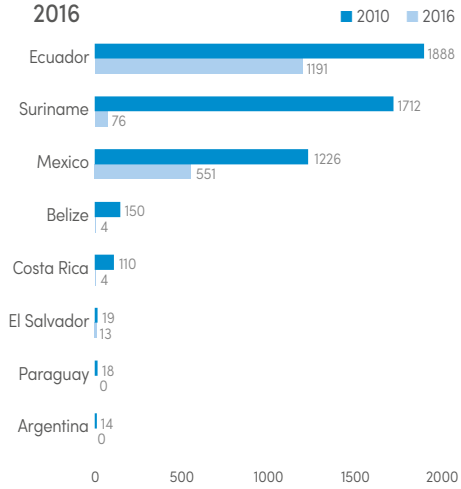
H. Countries with increase in case incidence, 2010–2016



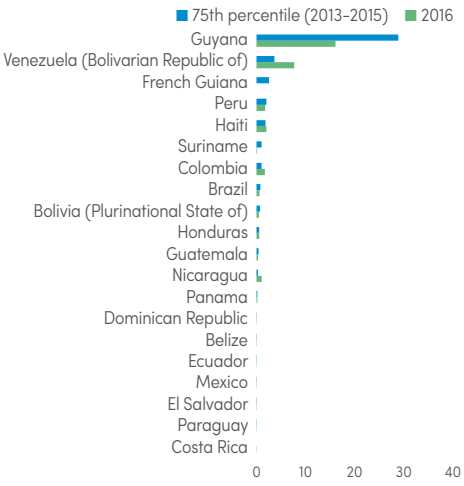
Ia. Change in reported malaria incidence and mortality rates, 2010–2016



Ib. Reported indigenous cases in countries with elimination activities, 2010 versus 2016



J. Incidence in 2016 compared to 75th percentile of 2013-2015

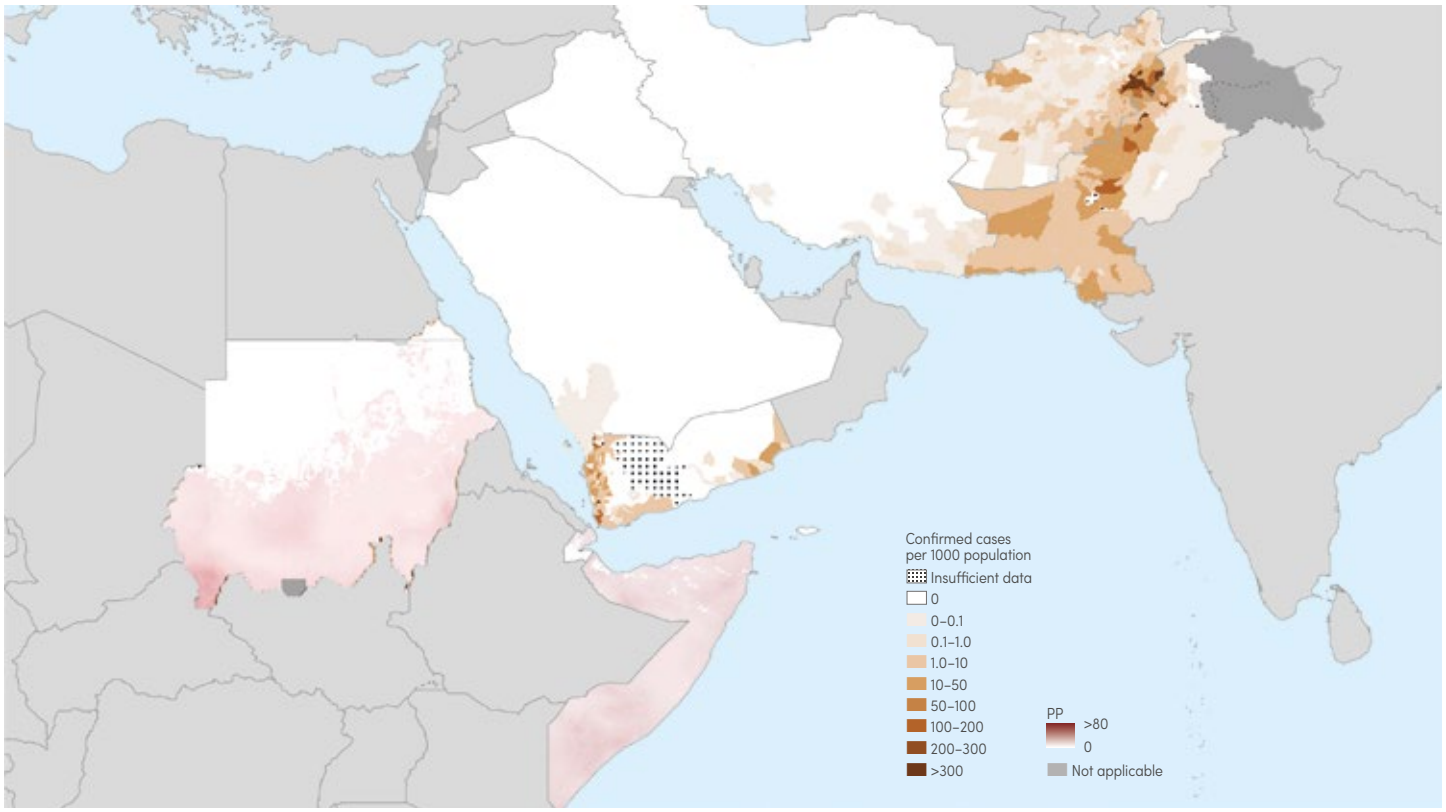


KEY MESSAGES

- Of the 18 endemic countries, 12 are on target to achieve a ≥40% reduction in case incidence by 2020, while five are on target for a 20–40% reduction. Four countries (Nicaragua, Panama, Peru and Venezuela [Bolivarian Republic of]) saw increases in 2016 compared to 2010. Cases in Colombia doubled between 2015 and 2016, despite earlier reduction. Brazil and Venezuela (Bolivarian Republic of) account for 65% of reported cases. The increase in cases in Peru from 2010 onwards has led to loss of the gains achieved since 2000.
- Despite increases in some countries, transmission is focalized; in particular, in Choco in Colombia, Loreto in Peru and Bolivar in Venezuela (Bolivarian Republic of). Similarly, nearly 45% of cases in Brazil come from 15 municipalities in Acre and Amazonas. Increases in other countries in 2016 are attributed to improved surveillance and focal outbreaks.
- Nine countries reported zero local *P. falciparum* cases for more than 3 years, Bolivia (Plurinational State of) and Guatemala reported <10, and Brazil reported a 72% decline between 2010 and 2016. Coverage of IRS and LLINs has declined in recent years while funding stagnated in the region.
- Two countries are in the process of certification for elimination. Nine countries in Central America and Hispaniola are taking part in the subregional initiative to eliminate malaria by 2020; three of these countries (Belize, Costa Rica and El Salvador) reported <15 cases each in 2016. Efforts are under way to enhance access to diagnosis and treatment, investigation of cases and adequate response.

Annex 2 - F. Regional profile: Eastern Mediterranean Region

A. Confirmed malaria cases per 1000 population/parasite prevalence (PP), 2016



EPIDEMIOLOGY

Population at risk: 301.2 million

Parasites: *P. falciparum* (38%), *P. vivax* (41%) and other (21%)

Vectors: *An. albimanus, An. arabiensis, An. bacroftii, An. balabacensis, An. culicifacies, An. fluviatilis, An. funestus, An. gambiae, An. hyrcanus, An. nili, An. pharoensis, An. pulcherrimus, An. sacharovi, An. sergentii, An. stephensi* and *An. superuictus*

FUNDING, 2010–2016

Increased from US$ 108.6 million reported in 2010 to US$ 148.8 million in 2016 (37% increase)

Proportion of domestic source in 2016: 38%

Regional funding mechanisms: none

REPORTED CASES AND DEATHS, 2010–2016

Cases: Remained stable between 2010 (1.15 million) and 2016 (1.18 million)

Country data in the health information system exclude community-based treatment except in Afghanistan

Deaths: Remained stable between 2010 (1143) and 2016 (1142)

ESTIMATED CASES AND DEATHS, 2010–2016

Cases: Increased from 3.92 million in 2010 to 4.25 million in 2016 (8% increase)

Deaths: Increased from 7189 in 2010 to 8159 in 2016 (13% increase)

INTERVENTIONS, 2010–2016

Countries with ≥50% coverage with either LLINs or IRS in 2016: Afghanistan, Sudan and Yemen

Number of RDTs distributed in 2016: 17.1 million

Number of ACT courses distributed in 2016: 4.3 million

ACCELERATION TO ELIMINATION, 2010–2016

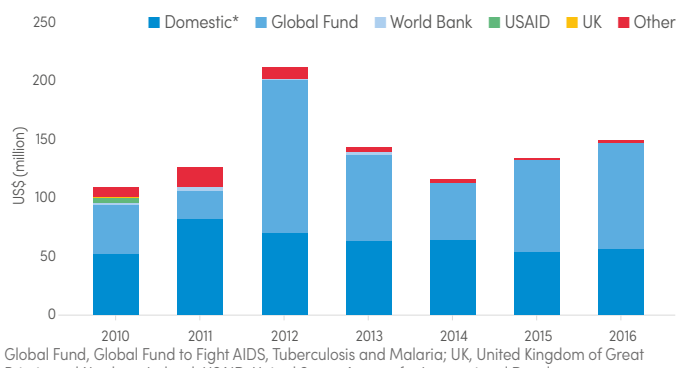
Countries with elimination programmes: Iran (Islamic Republic of) and Saudi Arabia

Zero indigenous cases for 3 consecutive years: Oman

Zero indigenous cases in current year: Oman

Certification in progress: no country

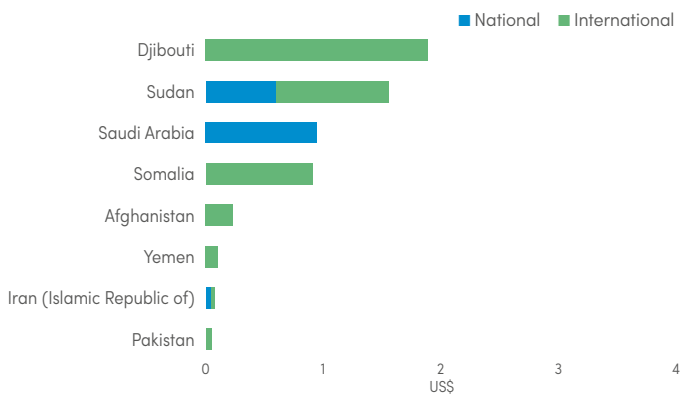
B. Malaria funding by source, 2010–2016



Global Fund, Global Fund to Fight AIDS, Tuberculosis and Malaria; UK, United Kingdom of Great Britain and Northern Ireland; USAID, United States Agency for International Development

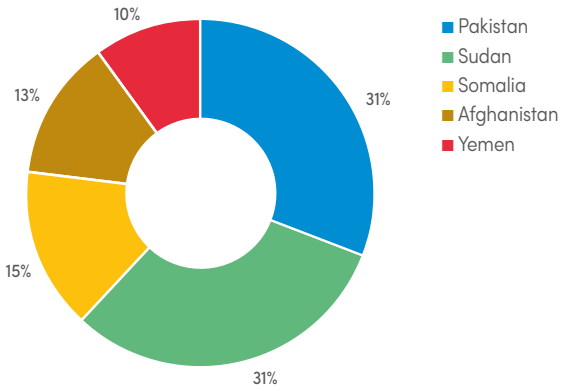
* Excludes patient service delivery costs and out-of-pocket expenditure

C. Malaria funding* per person at risk, average 2014–2016

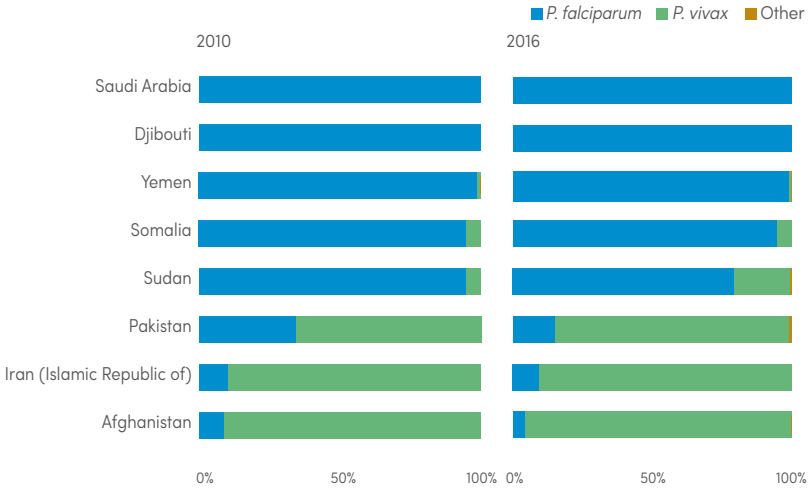


* Excludes cost related to health staff and out-of-pocket expenditure

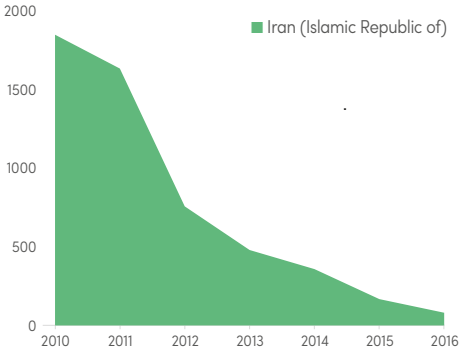
D. Share of estimated malaria cases, 2016



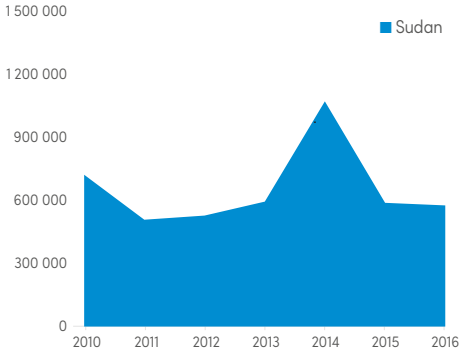
E. Proportion of *Plasmodium* species, 2010 and 2016



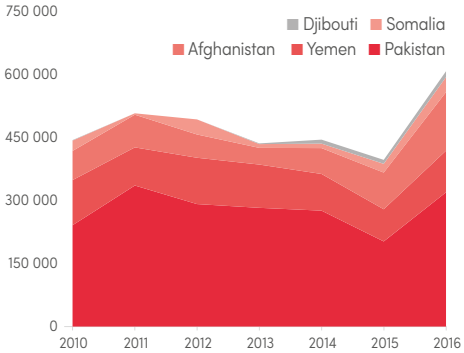
F. Countries projected to reduce case incidence by ≥40% by 2020



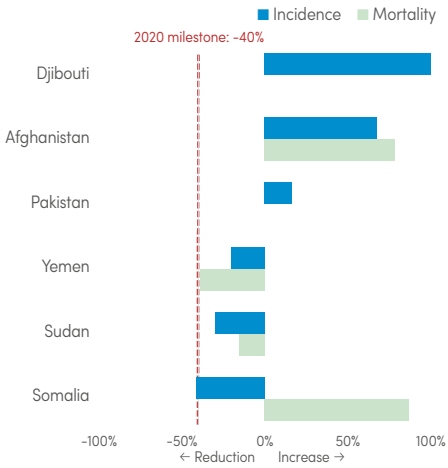
G. Countries projected to reduce case incidence by <40% by 2020



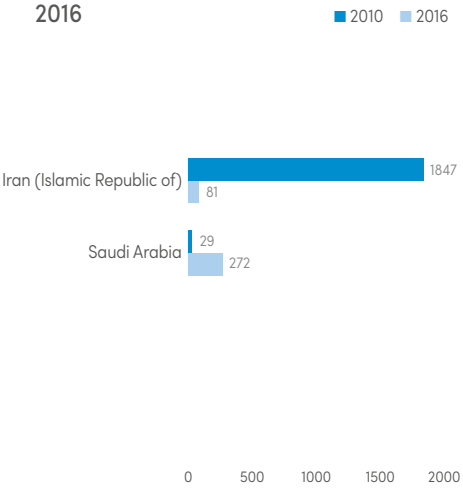
H. Countries with increase in case incidence, 2010–2016



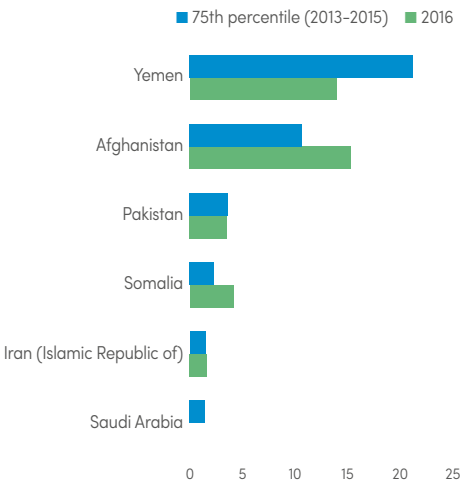
Ia. Change in reported malaria incidence and mortality rates, 2010–2016



Ib. Reported indigenous cases in countries with elimination activities, 2010 versus 2016



J. Incidence in 2016 compared to 75th percentile of 2013-2015



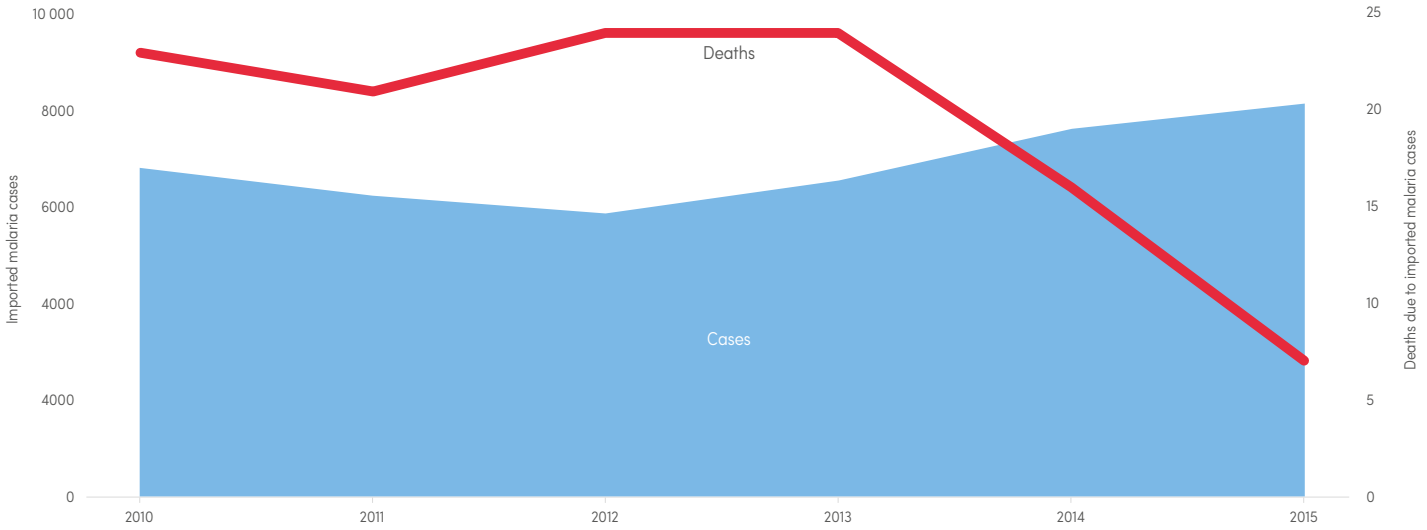
KEY MESSAGES

- Fourteen countries in the region are free of indigenous malaria and are at the stage of prevention of re-establishment, and eight countries are malaria endemic. Estimated malaria incidence in the region has declined since 2010 but increased in 2016, when the region reported a total of 3.6 million cases (presumed and confirmed) of which 1.18 million were confirmed in health facilities.
- Iran (Islamic Republic of) and Saudi Arabia are targeting elimination by 2020. Trends in Iran (Islamic Republic of) have declined from 1847 to 81 cases between 2010 and 2016. In Saudi Arabia, the number of cases remained below 100 between 2010 and 2015, but rose to 272 in 2016 mainly due to an increase in population movement and difficulties to access border areas with Yemen. The general health service in these countries undertakes continued vigilance, and provides free-of-charge diagnosis and treatment to all imported cases.
- The other endemic countries (Afghanistan, Djibouti, Pakistan, Somalia, Sudan and Yemen) are at the burden reduction stage. Sudan is on target for a 20–40% reduction. The downward trend in Yemen was reversed in 2016. Afghanistan was on a downward trend until 2013 but cases have continuously increased since 2014.
- Challenges include coverage of key malaria interventions still below the universal target in most endemic countries, inadequate funding and reliance on external resources, difficult operational environments and population displacements, availability of quality technical staff particularly at subnational level, weak surveillance and health information system. These may have resulted in the overall increase in cases during 2014–2016 in some countries of the region.

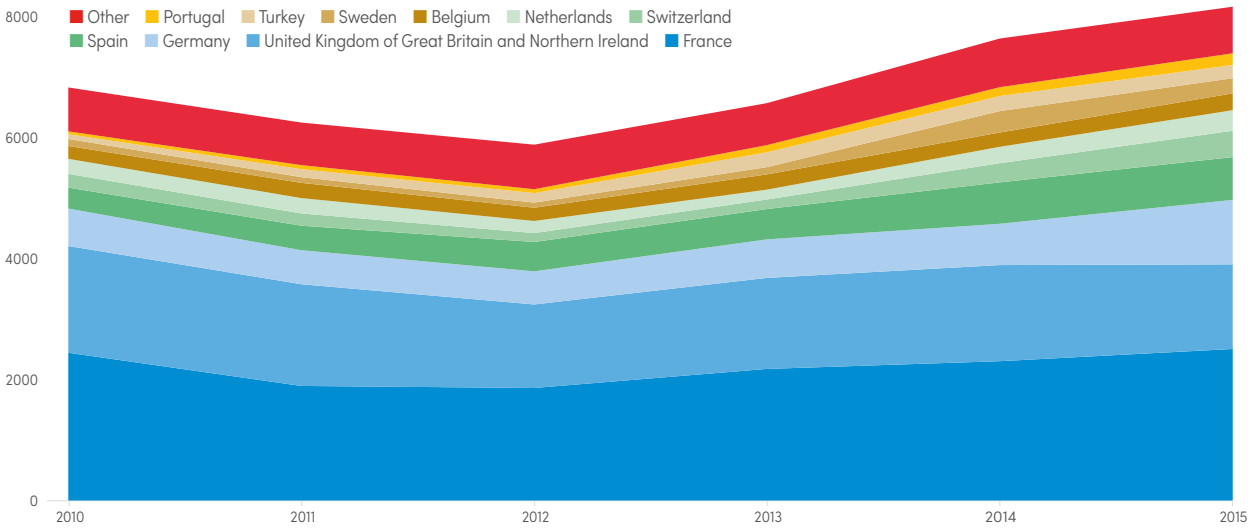
Annex 2 – G. Regional profile: European Region

A. Confirmed malaria cases per 1000 population, 2016

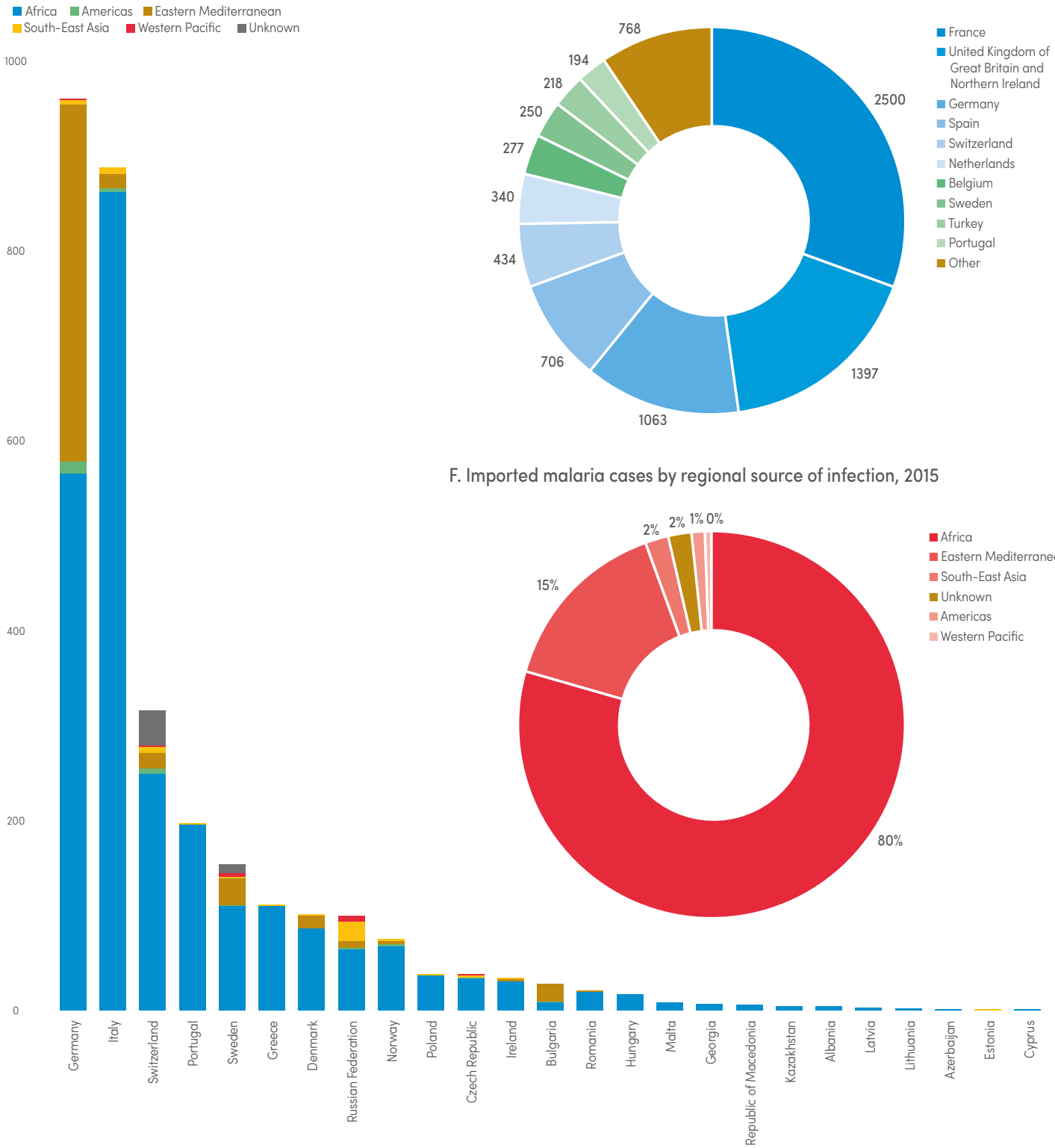
B. Imported malaria cases and associated deaths in Europe, 2010–2015



C. Trends of imported malaria cases in Europe, 2010–2015



D. Regional source of infection by country, 2015



E. Imported malaria cases by country, 2015

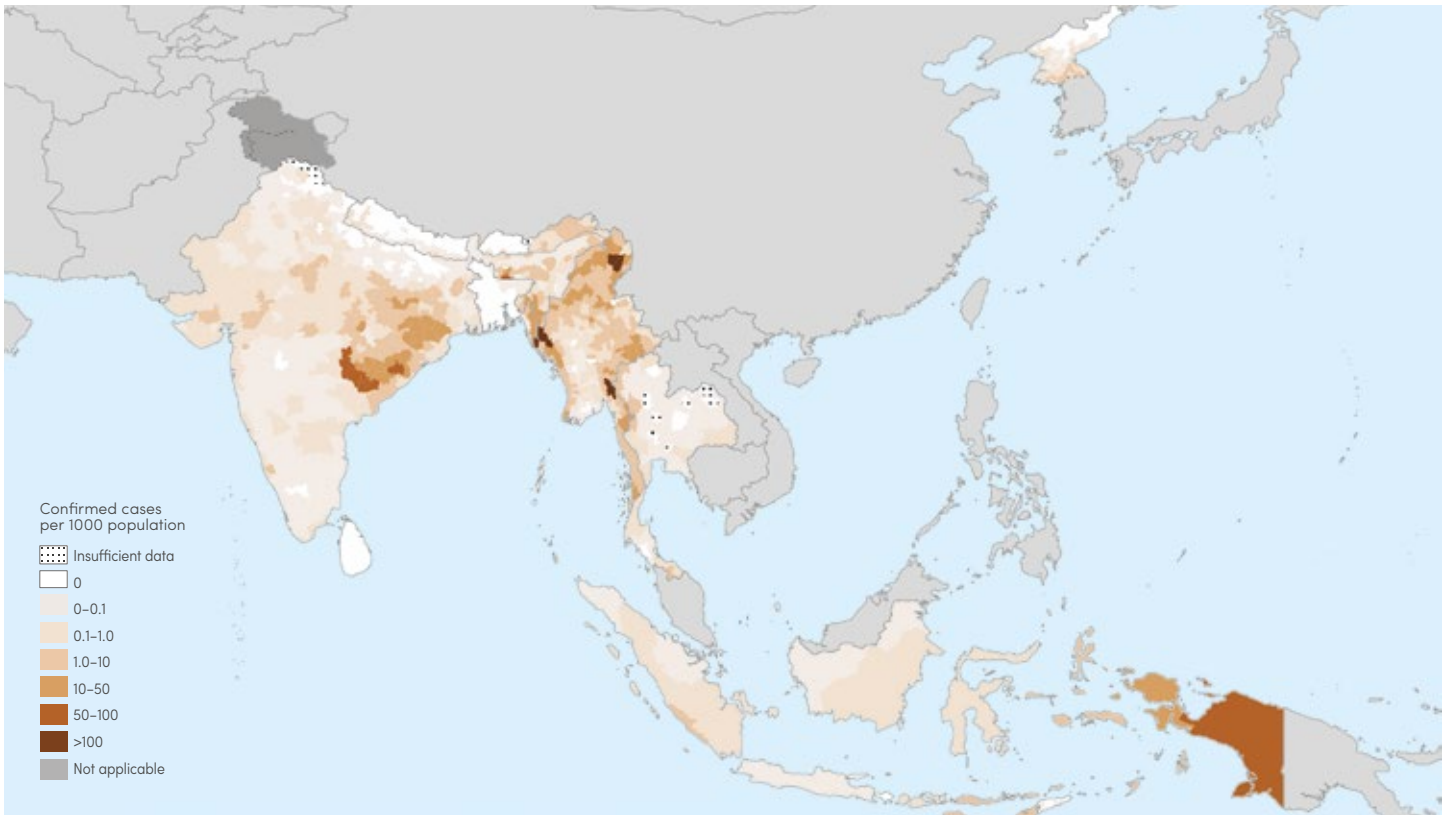
F. Imported malaria cases by regional source of infection, 2015

KEY MESSAGES

- Following interruption of indigenous malaria transmission in the WHO European Region in 2015, 10 countries that had been the last stronghold for malaria in the region – Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Russian Federation, Tajikistan, Turkey, Turkmenistan and Uzbekistan – confirmed their commitment to preventing malaria reintroduction by signing the Ashgabat Statement: *Preventing the re-establishment of malaria transmission in the WHO European Region.* The Ashgabat Statement reaffirms the commitment made in the 2005 Tashkent Declaration: "The move from malaria control to elimination" in the WHO European Region, which was signed by the same group of countries (except Russian Federation).
- The Tashkent Declaration represented a turning point in efforts to achieve a malaria-free Europe, using the *Regional Strategy: From malaria control to elimination in the WHO European Region 2006–2015*, enabling the affected European countries to reduce the number of indigenous malaria cases from nearly 91 000 in 1995 to zero in 2015. The Ashgabat Statement outlines the commitment to control malaria importation, prevent the re-establishment of local transmission and rapidly contain any resurgence of the disease. As long as malaria continues to circulate globally, people travelling to and from malaria endemic countries can import the disease to Europe.
- The Ashgabat Statement is serving as a platform for planning, implementing and monitoring activities to prevent the re-establishment of malaria in the region through enhanced vigilance especially of imported cases.

Annex 2 - H. Regional profile: South-East Asia Region

A. Confirmed malaria cases per 1000 population, 2016



EPIDEMIOLOGY

Population at risk: 1.35 billion
Parasites: *P. falciparum* (63%), *P. vivax* (35%) and other (2%)
Vectors: *An. albimanus, An. annularis, An. balabacensis, An. barbirostris, An. culicifacies, An. dirus, An. farauti, An. fluviatilis, An. maculatus, An. minimus, An. philippiensis, An. sinensis, An. stephensi, An. subpictus, An. sundaicus* and *An. varuna*

REPORTED CASES AND DEATHS, 2010–2016

Cases: Decreased from 2.6 million in 2010 to 1.4 million in 2016 (46% decrease)
Deaths: Decreased from 1403 in 2010 to 557 in 2016 (60% decrease)

INTERVENTIONS, 2010–2016

Countries with ≥50% coverage with either LLINs or IRS in 2016: Bhutan, Democratic People's Republic of Korea, Indonesia, Myanmar, Nepal and Timor-Leste
Number of RDTs distributed in 2016: 25 million
Number of ACT courses distributed in 2016: 900 000

FUNDING, 2010–2016

Decreased from US$ 239.7 million in 2010 to US$ 189.3 million in 2016 (21% decrease)
Proportion of domestic source in 2016: 48%
Regional funding mechanisms: Malaria Elimination in the Greater Mekong Region (MME): Myanmar and Thailand

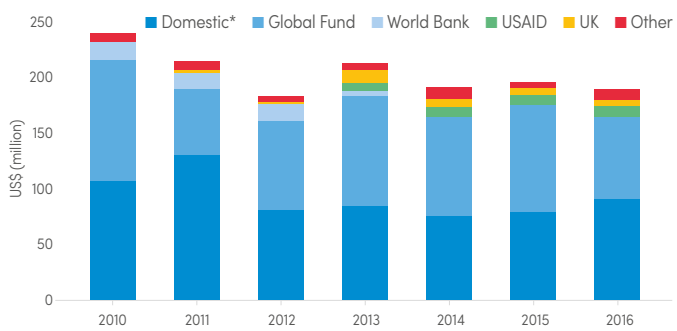
ESTIMATED CASES AND DEATHS, 2010–2016

Cases: Decreased from 26.2 million in 2010 to 14.6 million in 2016 (44% decrease)
Deaths: Decreased from 41 600 in 2010 to 26 600 in 2016 (36% decrease)

ACCELERATION TO ELIMINATION, 2010–2016

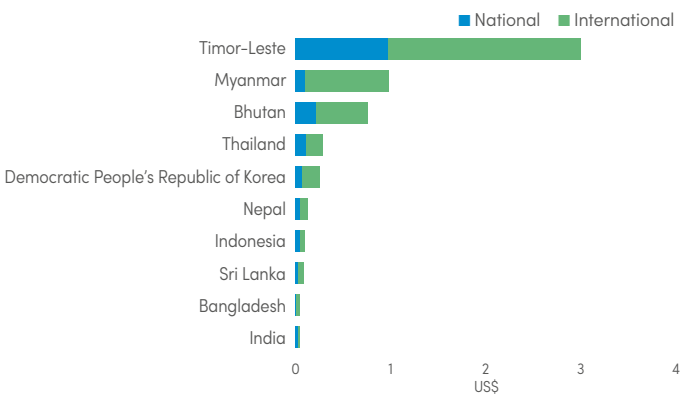
Countries with elimination programmes: Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Indonesia, Myanmar, Nepal and Thailand
Zero indigenous cases for 3 consecutive years: no country
Zero indigenous cases in current year: no country
Certification in progress: no country

B. Malaria funding by source, 2010–2016



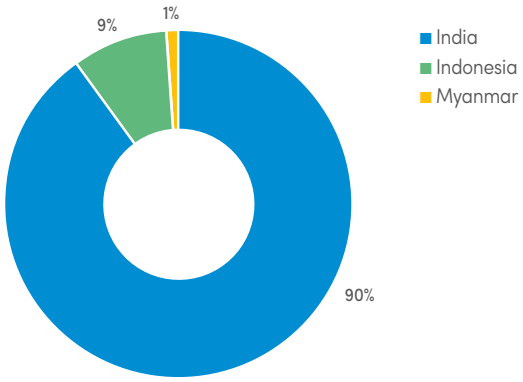
Global Fund, Global Fund to Fight AIDS, Tuberculosis and Malaria; UK, United Kingdom of Great Britain and Northern Ireland; USAID, United States Agency for International Development
* Excludes patient service delivery costs and out-of-pocket expenditure

C. Malaria funding* per person at risk, average 2014–2016

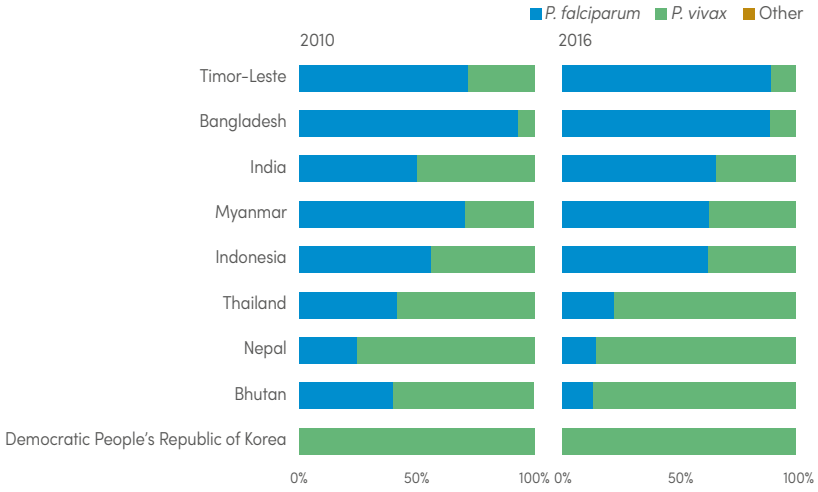


* Excludes cost related to health staff and out-of-pocket expenditure

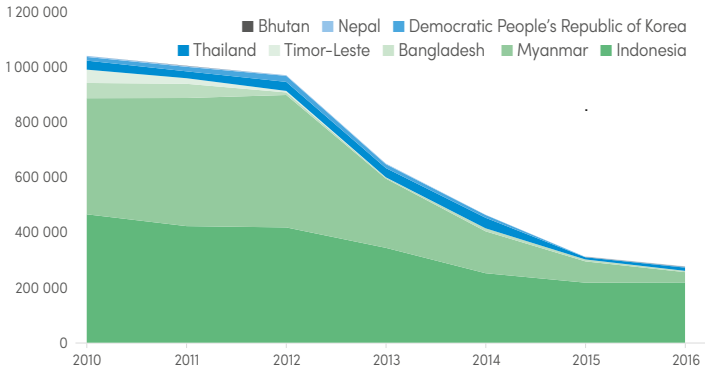
D. Share of estimated malaria cases, 2016



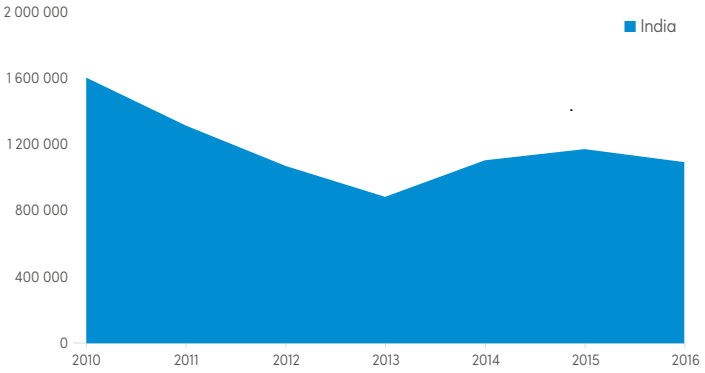
E. Proportion of *Plasmodium* species, 2010 and 2016



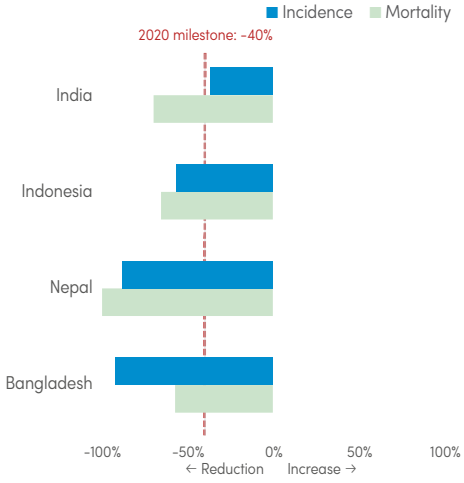
F. Countries projected to reduce case incidence by ≥40% by 2020



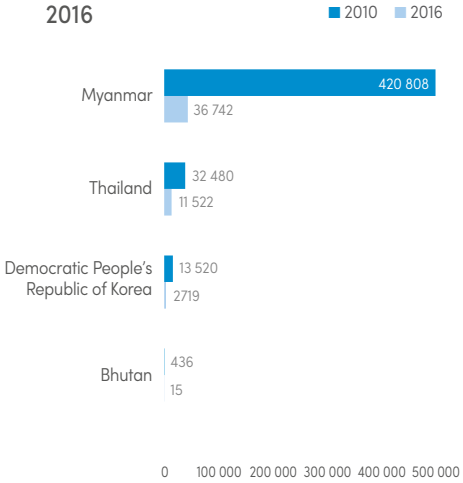
G. Countries projected to reduce case incidence by <40% by 2020



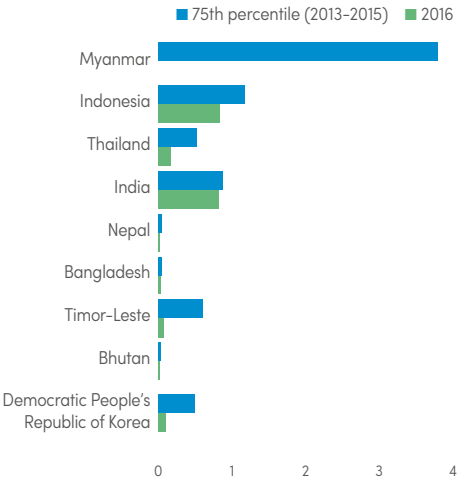
Ha. Change in reported malaria incidence and mortality rates, 2010–2016



Hb. Reported indigenous cases in countries with elimination activities, 2010 versus 2016



I. Incidence in 2016 compared to 75th percentile of 2013-2015



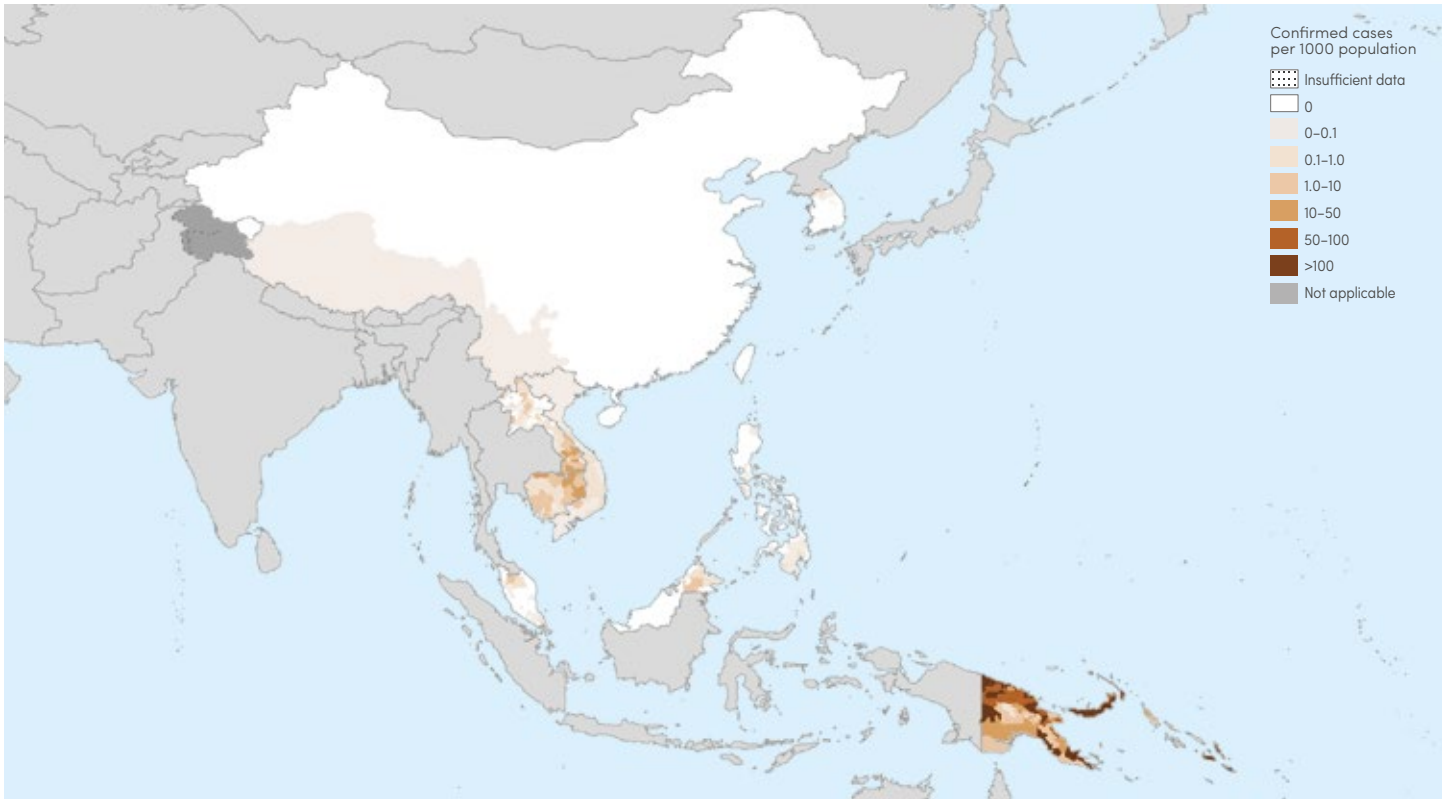
KEY MESSAGES

- Malaria is endemic in nine of the 11 countries of this region, accounting for nearly 70% of the burden outside the WHO African Region. Nearly 63% of the cases are due to *P. falciparum*. India and Indonesia accounted for 80% and 16% of the reported cases, and 60% and 30% of malaria deaths in 2016, respectively.
- Eight of the nine countries are on target to achieve a ≥40% reduction in case incidence by 2020, and India is on track for a 20–40% reduction. Bangladesh has for the first time reported <5000 cases, Timor-Leste continued to report <100 cases and Bhutan reported only 15 indigenous cases in 2016.
- Malaria deaths in the region decreased from 1403 in 2010 to 557 in 2016 (60% reduction). Bhutan and Timor-Leste reported zero deaths since 2013 and 2015, respectively. Odisha, the highest endemic state of India, reported an increase in cases in 2016 (double the number in 2013). The other countries had no major outbreaks reported.
- Maldives and Sri Lanka – both certified as malaria free in 2015 and 2016, respectively – have maintained their malaria free status. The region has the goal to become malaria free by 2030. According to Member States' national strategic plans, Bhutan is aiming for malaria free status by 2018, Democratic People's Republic of Korea, Nepal, Thailand and Timor-Leste by 2025, and the four remaining countries by 2030.*
- Challenges include decreased funding, multiple ACT failures in the countries of the Greater Mekong subregion and vector resistance to pyrethroids. Efforts are under way to improve reporting from the private sector and NGOs, and case-based surveillance to accelerate elimination.

* The 2016 WHO report, *Eliminating malaria*, identified three countries (Bhutan, Nepal and Timor-Leste) with the potential to eliminate malaria by 2020 if activities are accelerated.

Annex 2 - I. Regional profile: Western Pacific Region

A. Confirmed malaria cases per 1000 population, 2016



EPIDEMIOLOGY

Population at risk: 712 million
Parasites: *P. falciparum* (39%), *P. vivax* (26%) and other (35%)
Vectors: *An. anthropophagus, An. balabacensis, An. dirus, An. donaldi, An. farauti, An. flavirostris, An. jeyporiensis, An. koliensis, An. litoralis, An. maculatus, An. minimus, An. punctulatus, An. sinensis* and *An. sundaicus*

REPORTED CASES AND DEATHS, 2010–2016

Cases: Increased from 259 500 in 2010 to 581 200 in 2016 (124% increase)
Deaths: Decreased from 910 in 2010 to 341 in 2016 (63% decrease)

ACCELERATION TO INTERVENTIONS, 2010–2016

Countries with ≥50% coverage with either LLINs or IRS in 2016: Cambodia, Lao People's Democratic Republic, Papua New Guinea, Philippines, Solomon Islands and Vanuatu
Number of RDTs distributed in 2016: 3.6 million
Number of ACT courses distributed in 2016: 950 000

FUNDING, 2010–2016

Decreased from US$ 180 million in 2010 to US$ 90 million in 2016 (50% decrease)
Proportion of domestic source in 2016: 54%
Regional funding mechanisms: Malaria Elimination in the Greater Mekong Region (MME): Cambodia, China, Lao People's Democratic Republic and Viet Nam

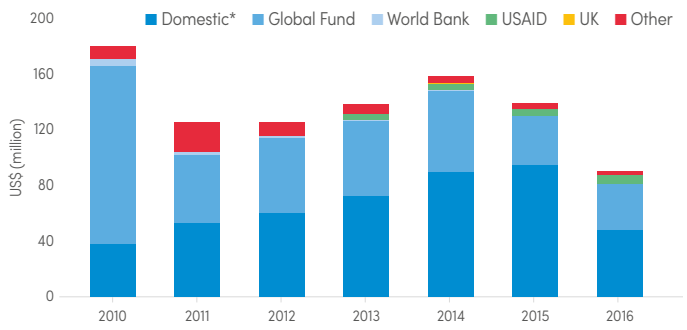
ESTIMATED CASES AND DEATHS, 2010–2016

Cases: Decreased from 1.78 million in 2010 to 1.63 million in 2016 (8% decrease)
Deaths: Decreased from 3767 in 2010 to 3341 in 2016 (11% decrease)

ELIMINATION, 2010–2016

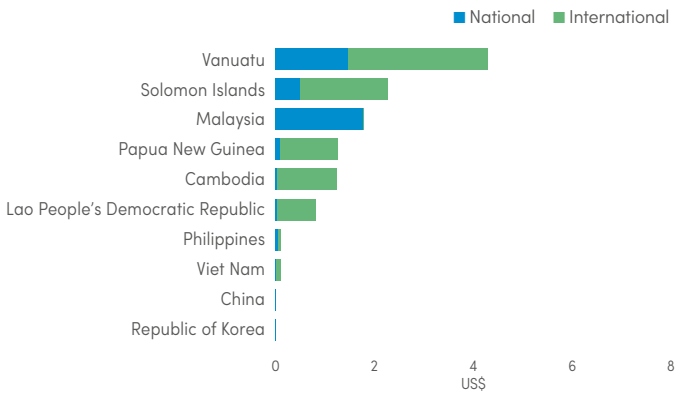
Countries with elimination programmes: Cambodia, China, Lao People's Democratic Republic, Malaysia, Republic of Korea and Viet Nam
Zero indigenous cases for 3 consecutive years: no country
Zero indigenous cases in current year: no country
Certification in progress: no country

B. Malaria funding by source, 2010–2016



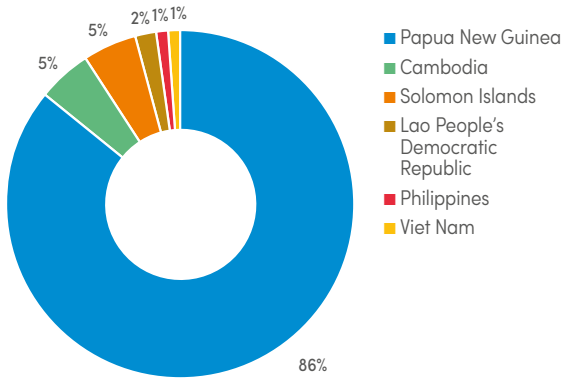
Global Fund, Global Fund to Fight AIDS, Tuberculosis and Malaria; UK, United Kingdom of Great Britain and Northern Ireland; USAID, United States Agency for International Development
* Excludes patient service delivery costs and out-of-pocket expenditure

C. Malaria funding* per person at risk, average 2014–2016

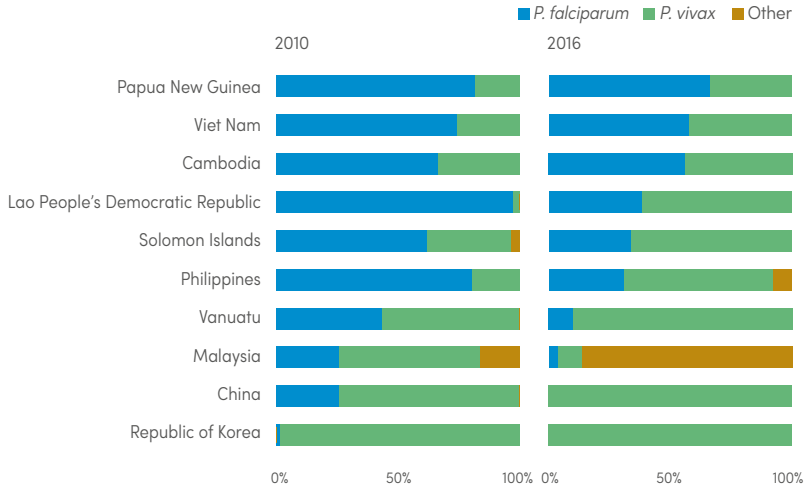


* Excludes cost related to health staff and out-of-pocket expenditure

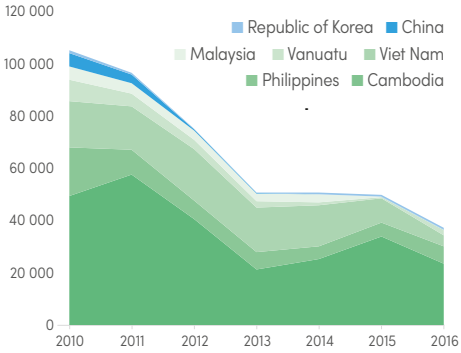
D. Share of estimated malaria cases, 2016



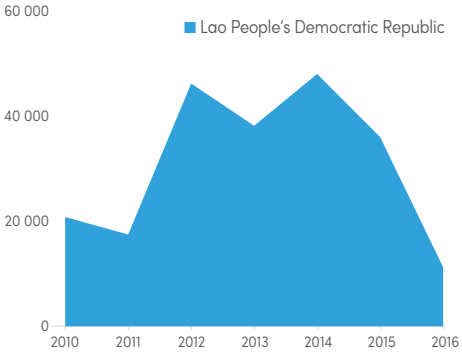
E. Proportion of *Plasmodium* species, 2010 and 2016



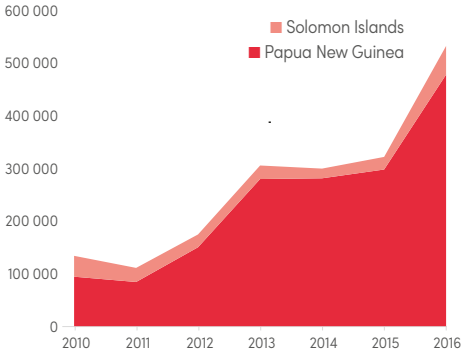
F. Countries projected to reduce case incidence by ≥40% by 2020



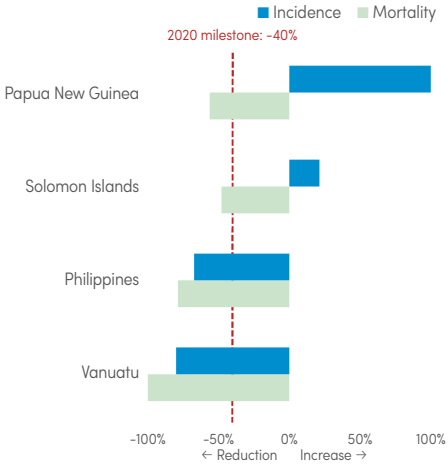
G. Countries projected to reduce case incidence by <40% by 2020



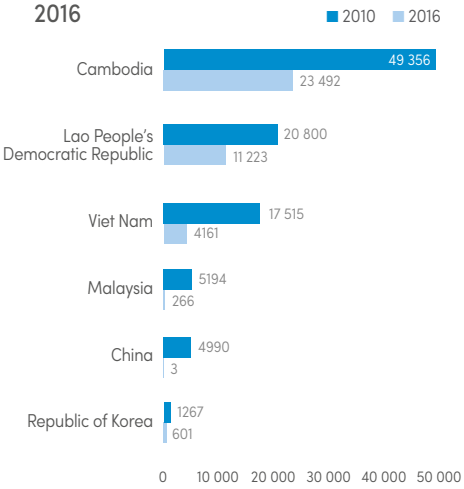
H. Countries with increase in case incidence, 2010–2016



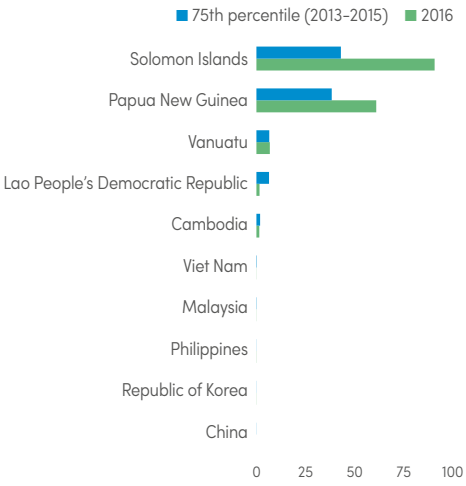
Ia. Change in reported malaria incidence and mortality rates, 2010–2016



Ib. Reported indigenous cases in countries with elimination activities, 2010 versus 2016



J. Incidence in 2016 compared to 75th percentile of 2013–2015



KEY MESSAGES

- Seven of the 10 malaria endemic countries are on target to achieve a ≥40% reduction in case incidence by 2020, while Lao People's Democratic Republic is on track for a 20–40% reduction. Papua New Guinea and Solomon Islands, accounting for 92% of the reported cases, reported a >400% and >40% increase in cases in 2016, respectively, partly due to inadequate access to services and improved surveillance.
- Malaria deaths decreased from 910 in 2010 to 341 in 2016 (63% reduction). Three countries (China, Republic of Korea and Vanuatu) reported zero malaria deaths in 2016. China, Malaysia and Republic of Korea are on course for elimination by 2020. China reported only three indigenous cases in 2016 from areas bordering Yunnan and Tibet. Transmission in Malaysia is limited to Sarawak and Sabah. The country is also facing increasing cases of *P. knowlesi*. The Philippines has initiated subnational elimination in Mindanao, islands of Palawan and Tawi-Tawi.
- Three countries of the Greater Mekong subregion – Cambodia, Lao People's Democratic Republic and Viet Nam – are supported through the Regional Artemisinin-resistance Initiative (financed by the Global Fund) to eliminate *P. falciparum* by 2025 and all species by 2030. These countries reported a 30% reduction of *P. falciparum* since 2010.
- Challenges include decreasing funding; multiple ACT failures; vector resistance to pyrethroids (Cambodia, China, Lao People's Democratic Republic, Philippines and Viet Nam), DDT (all except Viet Nam) and organophosphates (China); and resurgence of malaria. Substantial efforts are under way to improve access to services, and case-based surveillance to accelerate elimination.

Annex 3 – A. Policy adoption, 2016

WHO region Country/area	Insecticide-treated mosquito nets			Indoor residual spraying		Chemoprevention	
	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 recommended by malaria control programme	DDT is used for IRS	IPTp used to prevent malaria during pregnancy	Seasonal malaria chemo-prevention (SMC or IPTc) is used
AFRICAN							
Algeria	○	○	–	●	○	–	○
Angola	●	●	○	●	○	●	○
Benin	●	●	●	●	○	●	○
Botswana	●	●	●	●	●	○	○
Burkina Faso	●	●	●	●	○	●	○
Burundi	●	○	●	●	○	●	○
Cabo Verde	○	○	○	●	○	○	○
Cameroon	○	○	○	●	○	●	●
Central African Republic	●	○	○	●	○	●	○
Chad	●	●	●	●	○	●	●
Comoros	●	●	●	●	○	●	○
Congo	●	●	●	●	○	●	○
Côte d'Ivoire	●	○	●	○	○	●	○
Democratic Republic of the Congo	●	●	●	●	○	●	○
Equatorial Guinea	●	○	●	●	○	●	○
Eritrea	●	●	●	●	○	○	○
Ethiopia	●	●	●	●	○	○	○
Gabon	●	○	○	○	○	●	○
Gambia	●	●	●	●	●	●	●
Ghana	●	●	●	●	○	●	●
Guinea	●	●	●	●	○	●	●
Guinea-Bissau	●	○	●	○	○	●	●
Kenya	●	●	●	●	○	●	○
Liberia	●	●	●	●	○	●	○
Madagascar	●	●	●	●	○	●	○
Malawi	●	●	●	●	○	●	○
Mali	●	○	●	●	○	●	●
Mauritania	●	●	○	●	○	●	○
Mayotte	●	●	–	–	○	–	–
Mozambique	●	●	●	●	●	●	○
Namibia	●	●	●	●	●	●	○
Niger	●	●	○	●	○	●	●
Nigeria	●	●	●	●	○	●	●
Rwanda	●	○	●	●	○	○	○
Sao Tome and Principe	●	○	●	●	○	●	○
Senegal	●	●	●	●	○	●	○
Sierra Leone	●	●	●	●	○	●	○
South Africa	○	○	○	●	●	○	○
South Sudan[2]	●	●	●	●	○	●	○
Swaziland	●	○	●	●	●	○	○
Togo	●	●	●	●	○	●	●
Uganda	●	●	●	●	○	●	○
United Republic of Tanzania							
Mainland	○	○	○	●	○	●	○
Zanzibar	●	●	●	●	○	●	○
Zambia	●	●	●	●	●	●	○
Zimbabwe	●	●	○	●	●	●	○
AMERICAS							
Argentina	○	○	○	●	○	NA	NA
Belize	●	●	●	●	○	NA	NA
Bolivia (Plurinational State of)	●	●	●	●	○	NA	NA
Brazil	●	○	●	●	○	NA	NA
Colombia	●	●	●	●	○	NA	NA

Testing				Treatment				
Patients of all ages should get diagnostic test	Malaria diagnosis is free of charge in the public sector	RDTs used at community level	G6PD test is recommended before treatment with primaquine	ACT for treatment of *P. f.*	Pre-referral treatment with quinine or artemether IM or artesunate suppositories	Single dose of primaquine is used as gametocidal medicine for *P. falciparum*[1]	Primaquine is used for radical treatment of *P. vivax* cases	Directly observed treatment with primaquine is undertaken
–	●	–	○	NA	–	●	●	●
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●	●	●	○	●	○	○	●	●
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Annex 3 - A. Policy adoption, 2016

WHO region Country/area	Insecticide-treated mosquito nets			Indoor residual spraying		Chemoprevention	
	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 recommended by malaria control programme	DDT is used for IRS	IPTp used to prevent malaria during pregnancy	Seasonal malaria chemo-prevention (SMC or IPTc) is used
AMERICAS							
Costa Rica	●	●	●	●	○	NA	NA
Dominican Republic	●	●	○	●	○	NA	NA
Ecuador	●	●	●	●	○	NA	NA
El Salvador	○	●	○	●	○	NA	NA
French Guiana	○	●	●	●	○	NA	NA
Guatemala	●	●	●	●	○	NA	NA
Guyana	●	●	○	●	○	NA	NA
Haiti	●	○	●	○	○	NA	NA
Honduras	●	●	●	●	○	NA	NA
Mexico	●	●	●	●	○	NA	NA
Nicaragua	●	●	●	●	○	NA	NA
Panama	○	○	○	●	○	NA	NA
Paraguay	○	○	○	●	○	NA	NA
Peru	●	●	●	●	○	NA	NA
Suriname	●	○	○	○	○	NA	NA
Venezuela (Bolivarian Republic of)	●	●	●	●	○	NA	NA
EASTERN MEDITERRANEAN							
Afghanistan	●	●	●	●	○	NA	NA
Djibouti	●	○	●	●	○	○	○
Iran (Islamic Republic of)	●	●	●	●	○	NA	NA
Pakistan	●	●	●	●	○	NA	NA
Saudi Arabia	●	●	●	●	○	NA	NA
Somalia	●	●	●	●	○	●	○
Sudan	●	●	●	●	○	○	○
Yemen	●	●	●	●	○	NA	NA
SOUTH-EAST ASIA							
Bangladesh	●	●	●	●	○	NA	NA
Bhutan	●	●	●	●	○	NA	NA
Democratic People's Republic of Korea	●	●	●	●	○	NA	NA
India	●	●	●	●	●	NA	NA
Indonesia	●	●	●	●	○	NA	NA
Myanmar	●	●	●	●	○	NA	NA
Nepal	●	●	●	●	○	NA	NA
Thailand	●	●	●	●	○	NA	NA
Timor-Leste	●	●	●	●	○	NA	NA
WESTERN PACIFIC							
Cambodia	●	●	●	○	○	NA	NA
China	●	●	●	●	○	NA	NA
Lao People's Democratic Republic	●	●	●	●	○	NA	NA
Malaysia	●	●	–	●	○	NA	NA
Papua New Guinea	●	●	●	●	○	NA	NA
Philippines	●	●	○	●	○	NA	NA
Republic of Korea	●	○	–	–	○	NA	NA
Solomon Islands	●	●	○	●	○	NA	NA
Vanuatu	●	●	●	○	○	NA	NA
Viet Nam	●	●	●	●	○	NA	NA

ACT, artemisinin-based combination therapy; DDT, dichloro-diphenyl-trichloroethane; G6PD, glucose-6-phosphate dehydrogenase; IM, intramuscular; IPTc, intermittent preventive treatment in children; IPTp, intermittent preventive treatment in pregnancy; IRS, indoor residual spraying; ITN, insecticide-treated mosquito net; LLIN, long-lasting insecticidal net; NA, not applicable; NMCP, national malaria control programme; RDT, rapid diagnostic test; SMC, seasonal malaria chemoprevention

Testing				Treatment				
Patients of all ages should get diagnostic test	Malaria diagnosis is free of charge in the public sector	RDTs used at community level	G6PD test is recommended before treatment with primaquine	ACT for treatment of *P. f.*	Pre-referral treatment with quinine or artemether IM or artesunate suppositories	Single dose of primaquine is used as gametocidal medicine for *P. falciparum*[1]	Primaquine is used for radical treatment of *P. vivax* cases	Directly observed treatment with primaquine is undertaken
●	●	○	○	NA	–	●	●	●
●	●	○	○	NA	○	●	●	●
●	●	●	○	●	○	●	●	○
●	●	○	○	NA	○	●	●	●
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●	●	○	○	NA	○	●	●	●
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● = Actually implemented

○ = Not implemented

– = Question not answered or not applicable

[1] Single dose of primaquine (0.75 mg base/kg) for countries in the WHO Region of the Americas

[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)

Annex 3 – B. Antimalarial drug policy, 2016

WHO region Country/area	*P. falciparum*				*P. vivax*
	Uncomplicated unconfirmed	Uncomplicated confirmed	Severe	Prevention during pregnancy	Treatment
AFRICAN					
Algeria					CQ
Angola	AL; AS+AQ; DHA-PPQ	AL; AS+AQ; DHA-PPQ	AS; QN		
Benin	AL	AL	AS; QN		
Botswana	AL	AL	QN		
Burkina Faso	AL; AS+AQ	AL; AS+AQ	AS; QN	SP(IPT)	
Burundi	AS+AQ	AS+AQ	AS; QN		
Cabo Verde	AL	AL	QN		
Cameroon	AS+AQ	AS+AQ	AS, AM;QN		
Central African Republic	AL	AL	AS, AM; QN	SP(IPT)	
Chad	AL; AS+AQ	AL; AS+AQ	AS,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	AS, QN		
Equatorial Guinea	AS+AQ	AS+AQ	AS		
Eritrea	AS+AQ	AS+AQ	QN		AS+AQ+PQ
Ethiopia	AL	AL	AS; AM; QN		CQ
Gabon	AS+AQ	AS+AQ	AS; AM; QN		
Gambia	AL	AL	QN	SP(IPT)	
Ghana	AS+AQ	AL; AS+AQ	AS; AM; QN	SP(IPT)	
Guinea	AS+AQ	AS+AQ	AS	SP(IPT)	
Guinea-Bissau	AL	AL	AS;QN		
Kenya	AL	AL	AS; AM; QN		
Liberia	AS+AQ	AS+AQ	AS; AM; QN		
Madagascar	AS+AQ	AS+AQ	QN	SP(IPT)	
Malawi	AL	AL	AS; QN	SP(IPT)	
Mali	AS+AQ	AL; AS+AQ	QN	SP(IPT)	
Mauritania	AS+AQ	AL; AS+AQ	QN		
Mayotte		AL	QN; AS; QN+AS; AS+D; QN+D		CQ+PQ
Mozambique	AL	AL	AS, QN		
Namibia	AL	AL	QN		AL
Niger	AL	AL	AS; QN	SP(IPT)	
Nigeria	AL; AS+AQ	AL; AS+AQ	AS; AM; QN	SP(IPT)	
Rwanda	AL	AL	AS; QN		
Sao Tome and Principe	AS+AQ	AS+AQ	QN		
Senegal	AL; AS+AQ; DHA-PPQ	AL; AS+AQ; DHA-PPQ	AS; QN	SP(IPT)	
Sierra Leone	AS+AQ	AL; AS+AQ	AS; AM; QN	SP(IPT)	
South Africa		AL; QN+CL; QN+D	QN		AL+PQ; CQ+PQ
South Sudan[1]	AS+AQ	AS+AQ	AM; AS; QN		AS+AQ+PQ
Swaziland		AL	AS		
Togo	AL; AS+AQ	AL; AS+AQ	AS; AM; QN	SP(IPT)	
Uganda	AL	AL	AS, QN		
United Republic of Tanzania	AL; AS+AQ	AL; AS+AQ	AS, AM; QN		
Mainland	AL	AL	AS, AM; QN	SP(IPT)	
Zanzibar	AS+AQ	AS+AQ	AS; QN	SP(IPT)	
Zambia	AL	AL	AS; AM; QN		
Zimbabwe	AL	AL	QN		
AMERICAS					
Argentina	-	AL+PQ			CQ+PQ
Belize		CQ+PQ(1d)	QN		CQ+PQ(14d)
Bolivia (Plurinational State of)	-	AL	AS		CQ+PQ(7d)
Brazil	-	AL+PQ; AS+MQ+PQ	AS+CL: AM+CL; QN+CL		CQ+PQ(7d); CQ+PQ(14d)
Colombia	-	AL+PQ	AS	-	CQ+PQ(14d)
Costa Rica	-	CQ+PQ (1d)	AS	-	CQ+PQ(7d); CQ+PQ(14d)

WHO region Country/area	*P. falciparum*				*P. vivax*
	Uncomplicated unconfirmed	Uncomplicated confirmed	Severe	Prevention during pregnancy	Treatment
AMERICAS					
Dominican Republic	-	CQ+PQ(1d)	AS	-	CQ+PQ(14d)
Ecuador	-	AL+PQ	AS	-	CQ (3d)+PQ(7d)
El Salvador	-	CQ+PQ(1d)	QN	-	CQ+PQ(14d)
French Guiana	-	AL	AS	-	CQ+PQ(14d)
Guatemala	-	CQ+PQ(1d)	QN	-	CQ+PQ(14d)
Guyana	-	AL+PQ(1d)	AM	-	CQ+PQ(14d)
Haiti	-	CQ+PQ(1d)	QN	-	CQ+PQ(14d)
Honduras	-	CQ+PQ(1d)	QN; AS	-	CQ+PQ(14d)
Mexico	-	CQ+PQ	AM	-	CQ+PQ
Nicaragua	-	CQ+PQ(1d)	QN	-	CQ+PQ(7d)
Panama	-	AL+PQ(1d)	QN	-	CQ+PQ(7d); CQ+PQ(14d)
Paraguay	-	AL+PQ	AS		CQ+PQ
Peru	-	AS+MQ+PQ	AS+MQ	-	CQ+PQ(7d)
Suriname	-	AL+PQ(1d)	AS	-	CQ+PQ(14d)
Venezuela (Bolivarian Republic of)	-	AS+MQ+PQ	AM; QN	-	CQ+PQ(14d)
EASTERN MEDITERRANEAN					
Afghanistan	CQ	AS+SP+PQ	AS; AM; QN		CQ+PQ(8w)
Djibouti	AL	AL+PQ	QN		CQ+PQ (14d)
Iran (Islamic Republic of)		AS+SP+PQ	AS; QN		CQ+PQ(14d & 8w)
Pakistan	CQ	AS+SP+PQ	AS; QN		CQ+PQ(14d & 8w)
Saudi Arabia		AS+SP+PQ	AS; AM; QN		CQ+PQ(14d)
Somalia	AL	AL+PQ	AS; AM; QN	SP(IPT)	AL+PQ(14d)
Sudan	AL	AL	AS; QN		AL+PQ(14d)
Yemen	AS+SP	AS+SP	QN; AM		CQ+PQ(14d)
SOUTH-EAST ASIA					
Bangladesh		AL	AS+AL; 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; AL	AM; AS; QN		CQ+PQ(14d)
Indonesia		DHA-PP+PQ	AM; AS; QN		DHA-PP+PQ(14d)
Myanmar		AL; AM; AS+MQ; DHA-PPQ; PQ	AM; AS; QN		CQ+PQ(14d)
Nepal	CQ	AL+PQ	AS; QN		CQ+PQ(14d)
Thailand		DHA-PPQ	QN+D		CQ+PQ(14d)
Timor-Leste		AL+PQ	AM; AS; QN		CQ+PQ(14d)
WESTERN PACIFIC					
Cambodia		AS+MQ	AM; AS; QN		AS+MQ+PQ(14D)
China		ART+NQ; ART-PPQ; AS+AQ; DHA-PPQ	AM; AS; PYR		CQ+PQ(8d)
Lao People's Democratic Republic		AL	AS+AL		CQ+PQ(14d)
Malaysia		AS+MQ	AS+D; QN		CQ+PQ(14d)
Papua New Guinea		AL	AM; AS		AL+PQ
Philippines	AL	AL+PQ	QN+T; QN+D; QN+CL	SP(IPT)	CQ+PQ(14d)
Republic of Korea	CQ				CQ+PQ(14d)
Solomon Islands	AL	AL	AL; AS		AL+PQ(14d)
Vanuatu		AL	AS	CQ(weekly)	AL+PQ(14d)
Viet Nam	DHA-PPQ	DHA-PPQ	AS; QN		CQ+PQ(14d)

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)

Annex 3 - C. Funding for malaria control, 2014–2016

WHO region Country/area	Year	Contributions reported by donors			
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	UK[4]
AFRICAN					
Angola	2014	-254 141	29 580 000	0	0
	2015	1 337 036	28 364 000	0	0
	2016	2 615 348	27 000 000	0	0
Benin	2014	13 367 291	16 830 000	465 203	0
	2015	2 697 704	16 714 500	1 991 818	0
	2016	2 376 388	16 500 000	2 018 014	0
Botswana	2014	0	0	0	0
	2015	1 672 894	0	0	0
	2016	0	0	0	0
Burkina Faso	2014	6 082 881	9 690 000	1 752 599	141 765
	2015	26 989 184	12 156 000	-4 985	136 734
	2016	28 525 086	14 000 000	-5 050	116 451
Burundi	2014	4 869 728	9 690 000	640 773	0
	2015	3 476 029	12 156 000	1 505 077	0
	2016	7 560 132	9 500 000	1 524 871	0
Cabo Verde	2014	0	0	0	0
	2015	514 050	0	0	0
	2016	31 405	0	0	0
Cameroon	2014	8 785 586	0	0	0
	2015	45 085 291	0	0	0
	2016	10 634 568	0	0	0
Central African Republic	2014	2 031 751	0	0	0
	2015	2 686 793	0	0	0
	2016	2 132 104	0	0	0
Chad	2014	12 839 706	0	0	0
	2015	3 733 548	0	0	0
	2016	32 976 575	0	0	0
Comoros	2014	1 129 466	0	0	0
	2015	75 361	0	0	0
	2016	2 895 669	0	0	0
Congo	2014	0	0	0	0
	2015	-278 074	0	0	0
	2016	0	0	0	0
Côte d'Ivoire	2014	28 046 499	0	0	0
	2015	15 245 468	0	0	0
	2016	59 615 505	0	0	0
Democratic Republic of the Congo	2014	79 679 445	51 000 000	-31 889	17 067 184
	2015	128 000 000	50 650 000	0	4 676 856
	2016	115 500 000	50 000 000	0	3 983 090
Equatorial Guinea	2014	-140 883	0	0	0
	2015	-138 309	0	0	0
	2016	0	0	0	0
Eritrea	2014	6 933 657	0	0	0
	2015	7 381 838	0	0	0
	2016	6 627 263	0	0	0
Ethiopia	2014	10 088 281	45 900 000	0	0
	2015	36 858 309	44 572 000	0	0
	2016	25 249 808	40 000 000	0	0

Contributions reported by countries							
Government (NMCP)	Global Fund	World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[6]
38 574 885	5 378 690		27 000 000				
47 356 258 [5]	2 675 645		28 000 000				
	16 852 909		27 000 000				
2 000 000	0					78 462	
602 901	0					214 930	
17 540 458 [5]	13 424 427	230 534	3 387 786		148 346	179 879	
1 972 980	0	0	0	0		0	0
1 303 371	280 899	0	0	0		0	0
1 311 075	2 019 079	0	0	0		0	0
3 870 328	2 433 376	697 173	8 571 017	70 804	19 048	136 540	379 610
576 253	42 735 771	284 328	8 579 441	9 454	11 800	305 704	2 533 200
8 410 046	41 106 186	2 522 884	5 849 900		20 367	179 278	3 638 120
2 001 113	6 027 330		9 229 345	0	79 050	475 936	1 324 385
2 999 812	4 523 416		9 500 000		32 595	47 445 292	
3 195 161	4 759 452		9 500 000		18 579	786 133	
511 243	64 285				19 638		
1 520 070 [5]	325 273				99 519		
1 229 033 [5]	315 038				59 219		
43 709 021 [5]	147 856 497		1 123 490		460 000	14 718	669 000
12 122 087 [5]	54 918 697				221 000		
	14 478 500				747 500		2 024 000
530 000 [5]	2 852 385				20 500	5 596 000	
530 000 [5]	0				100 000		
530 000	4 724 918				150 000		
9 122 400 [5]	30 125 205			239 735	54 574	2 667 358	673 440
895 199	6 141 762				20 000	216 491	
1 000 000 [5]	504 853			73 721	1 000	263 754	
178 862	1 074 877	0	0	0	104 000	51 630	58 500
175 124	224 643	0	0	0	30 000	6 221	0
175 124	2 154 616				15 000		
7 240 000	0				45 000		3 827
7 240 000	0	0	0	0	68 000	18 000	0
3 272 727	0	0	0	0	24 727	2 863	0
283 975	60 031		17 573		11 155	52 241	
1 886 662	25 744 972	0	0	0	0	26 915	40 998
4 694 133	60 352 423	0	0	0	13 627	35 933	
8 104 841	102 540 781	0	34 000 000	24 838 023	2 100 000	7 196 262	0
7 014 345	107 594 221	0	34 000 000	23 018 218	2 933 630	808 130	0
9 254 005	143 685 771	0	49 325 000	8 063 499	3 677 567	4 771 747	0
	0						
	0						
	0						
0	4 906 745	0	0		58 832	0	0
0	6 216 618	0	0	0	46 081	0	0
	16 685 629	0	0	0	200 000	0	0
	93 201 479						
	18 448 416		3 800 000				13 114 670
	49 500 000		10 600 000				13 500 000

Annex 3 - C. Funding for malaria control, 2014–2016

WHO region Country/area	Year	Contributions reported by donors			
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	UK[4]
AFRICAN					
Gabon	2014	-157 924	0	0	0
	2015	-301 410	0	0	0
	2016	-551	0	0	0
Gambia	2014	4 217 650	0	0	2 777 653
	2015	3 616 801	0	0	2 935 395
	2016	3 043 329	0	0	2 499 958
Ghana	2014	15 137 754	28 560 000	-176 299	12 724 910
	2015	49 200 527	28 364 000	0	5 746 882
	2016	37 675 591	28 000 000	0	4 894 388
Guinea	2014	9 327 240	12 750 000	0	0
	2015	11 261 412	12 662 500	0	0
	2016	27 985 091	15 000 000	0	0
Guinea-Bissau	2014	2 387 627	0	0	0
	2015	2 474 035	0	0	0
	2016	8 745 839	0	0	0
Kenya	2014	50 532 001	35 700 000	0	9 433 997
	2015	4 232 333	35 455 000	0	14 662 890
	2016	10 905 047	35 000 000	0	12 487 794
Liberia	2014	10 613 399	12 240 000	0	0
	2015	7 422 218	12 156 000	0	0
	2016	6 116 348	14 000 000	0	0
Madagascar	2014	509 303	26 520 000	0	0
	2015	23 709 302	26 338 000	0	0
	2016	11 958 119	26 000 000	0	0
Malawi	2014	7 271 845	22 440 000	0	0
	2015	29 468 309	22 286 000	0	0
	2016	15 872 372	22 000 000	0	0
Mali	2014	11 019 080	25 500 000	0	249 991
	2015	7 249 296	25 325 000	0	95 563
	2016	9 323 291	25 000 000	0	81 388
Mauritania	2014	0	0	0	183 180
	2015	-189 273	0	0	14 085
	2016	1 786 610	0	0	11 996
Mayotte	2014	0	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0
Mozambique	2014	35 335 125	29 580 000	958 738	0
	2015	18 626 168	29 377 000	-460 827	0
	2016	59 221 741	29 000 000	-466 887	0
Namibia	2014	567 945	0	0	0
	2015	-433 987	0	0	0
	2016	2 123 377	0	0	0
Niger	2014	24 489 836	0	0	0
	2015	7 677 557	0	0	0
	2016	8 854 502	0	0	0
Nigeria	2014	147 800 000	76 500 000	54 702 633	24 033 630
	2015	84 081 057	75 975 000	5 334 081	18 974 837
	2016	102 200 000	75 000 000	5 404 232	16 160 106

Contributions reported by countries							
Government (NMCP)	Global Fund	World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[6]
121 958	0	0	0	0	34 855	0	
27 677 576 [5]	0	0	0	0	47 147	0	272 289
	0	0	0	0		0	
882 535	5 934 320				132 833	150 000	120 814
876 759	2 887 213	0	0	0		3 062	2 406 568
	9 352 149				0	0	1 031 868
8 855 177	64 952 156		4 730 000	825 000	32 514	7 519	6 429
9 832 327	39 759 327	0	28 000 000	520 000	60 000	0	0
9 856 505	36 596 848	0	28 000 000	9 883 185	300 000	0	0
956 833	15 603 972		12 052 476		105 114	36 639	16 581
4 817 845	28 859 411		12 500 000	3 979 774	21 886	10 419	
4 229 893	36 810 868		15 000 000	2 235 000	91 500	5 001	636 998
767 496	2 952 761	0	0	0	16 869	7 231	0
829 303	536 775	0	0	0			0
1 590 508	8 972 945	0	0	0			269 981
1 178 804	48 916 476		32 400 000	25 635 413	832 402		
1 548 277	64 945 727		32 400 000		604 058	100 000	
	0						
11 341 797	10 399 555	0	12 000 000	0		0	0
	0						
	0						
43 387	2 524 013	600 000	25 920 000	0	3 369 341	254 170	0
33 120	23 199 442	0	26 000 000	213 615	298 946	70 000	56 422
42 500	6 395 563	0	26 000 000	0	486 635		
	8 023 075		19 118 000		150 000		
4 266 640 [5]	22 777 197		12 234 171				1 082 008
	0						
1 775 161	26 392 018	0	25 500 000		95 000	1 437 552	
2 437 492	21 201 959	0	25 500 000		120 000	574 693	5 326 854
3 322 612	16 374 449		25 500 000		4 983	2 203 890	
2 328 000	0				46 000	42 000	
173 720	0				67 000	67 000	
2 450 845	0	3 500 400			220	384 900	
	0						
	0						
	0						
4 186 129	37 646 902	3 500 000	29 023 096			268 993	
5 178 112	4 357 070	0	29 000 000	0	200 000	1 688 356	139 501
2 766 214	190 374 239		290 000		325 000	1 250 640	
2 816 280	2 910 095	0	0	0	100 000	0	0
3 810 220	2 172 606			0	100 000	0	136 929
5 218 841	4 227 559	0	0	0	100 000	0	878 882
6 900 000	2 494 013	0	0	0	70 248	1 249 000	44 000
6 462 202	9 324 003	0	72 000	0	86 567	18 500	0
3 428 219	14 911 144	641 402	106 000	0	75 586	39 712	39 712
3 458 666	45 365 288	31 868 767	73 771 000	20 157 565	861 615	1 000 000	
2 802 754	144 939 060		75 000 000	12 322 449	964 784		4 809 717
	372 939 170		71 500 000	2 967 421			

Annex 3 - C. Funding for malaria control, 2014–2016

WHO region Country/area	Year	Contributions reported by donors			
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	UK[4]
AFRICAN					
Rwanda	2014	15 735 725	17 850 000	0	0
	2015	11 035 459	18 234 000	0	0
	2016	21 756 393	18 000 000	0	0
Sao Tome and Principe	2014	3 372 187	0	0	148 016
	2015	1 102 608	0	0	0
	2016	2 827 056	0	0	0
Senegal	2014	22 107 955	24 480 000	0	101 210
	2015	16 064 463	24 312 000	0	0
	2016	9 815 055	24 000 000	0	0
Sierra Leone	2014	14 063 841	0	1 657 970	1 650 197
	2015	6 257 709	0	0	0
	2016	5 543 537	0	0	0
South Africa	2014	0	0	0	42 346
	2015	0	0	0	101 897
	2016	0	0	0	86 782
South Sudan[7]	2014	14 538 582	6 120 000	0	10 477 297
	2015	28 720 476	6 078 000	0	18 680 486
	2016	6 358 496	6 000 000	0	15 909 419
Swaziland	2014	1 687 295	0	0	0
	2015	-9 362	0	0	0
	2016	860 971	0	0	0
Togo	2014	7 561 549	0	0	0
	2015	581 555	0	720 784	0
	2016	4 711 895	0	730 264	0
Uganda	2014	14 507 681	34 680 000	0	22 199 178
	2015	19 405 993	34 442 000	0	20 749 437
	2016	73 185 026	34 000 000	0	17 671 461
United Republic of Tanzania[8]	2014	29 522 667	46 920 000	0	11 028 654
	2015	57 208 352	46 598 000	0	4 890 641
	2016	61 452 199	46 000 000	0	4 165 162
Mainland	2014	0	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0
Zanzibar	2014	0	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0
Zambia	2014	0	24 480 000	-72 379	9 015 509
	2015	9 657 417	24 312 000	121 578	0
	2016	26 509 052	25 000 000	123 177	0
Zimbabwe	2014	10 909 733	15 300 000	0	0
	2015	24 597 474	15 195 000	0	0
	2016	16 314 961	15 000 000	0	0
AMERICAS					
Belize	2014	0	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0
Bolivia (Plurinational State of)	2014	1 344 538	0	0	0
	2015	1 180 099	0	0	0
	2016	4 150 580	0	0	0

Contributions reported by countries							
Government (NMCP)	Global Fund	World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[6]
0	0	0	0	0	0	0	0
	10 893 838		18 000 000				
1 006 923	25 671 350		18 000 000		72 000		
1 663 325	1 715 622	0	0	1 020 102	125 209	0	1 600
930 233	1 668 679	0	0	1 000 000	60 006	1 293	1 600
4 737 539	2 261 202	0	0	1 000 000	52 985	2 826	4 584
213 986	15 023 299	0	25 302 960	0	12 491	200 000	0
2 069 404	2 427 578	1 000 000	23 666 000	0	0	200 000	25 705
4 816 000	1 865 570	0	24 000 000	0	7 828	28 795	24 167
	13 525 631	0	0	6 156 320	50 000	17 912	2 200 067
	5 353 621	0	0	0	101 207	100 847	
346 772 [5]	5 389 748				36 569	55 295	
17 398 691	0			68 180			
7 752 321	0	0	0	41 140	40 000	0	0
17 429 771	0	0	0	0	0	0	75 061
8 919 615 [5]	21 517 835	0	6 000 000	9 512 176			
8 919 615 [5]	6 545 239	0	6 000 000	12 079 880	941 876	29 015 974	
8 919 615 [5]	37 371 510	0	6 000 000	6 000 808	4 779 900	12 812 860	
679 403	1 203 444				0		0
11 664 060	1 714 840						
1 109 858	1 719 139	0	0	0		0	
15 679 595	4 897 544	17 304	0	0	1 779	222 460	0
	0						
79 723	2 973 548	943 022	0	0	7 158	169 496	
4 617 443	24 195 015	3 418 520	33 000 000	39 623 353		1 359 595	4 896 045
8 035 963	74 643 525	0	33 000 000	32 222 500		743 791	4 899 062
7 585 730	31 501 450	0	33 000 000	29 246 018		743 791	3 772 657
	0						
	0						
	0						
6 022 000	145 506 422	0	450 000	0	500	0	0
867 190 476	28 982 597	0	1 060 714	77 966 100	0	0	480 412
5 858 187	103 964 466	37 578 250	2 025 000	4 982 394	0	0	0
5 419 364	2 126 000	0	1 525 000	50 000	350	0	
	0						
22 071	639 075	0	863 539	484 175	0	0	0
15 462 950	24 362 218		24 000 000			20 000	6 000 000
22 640 090	10 614 665		24 000 000		170 500	1 006 000	6 500 000
25 500 000	20 134 623		24 000 000		200 000		
954 000	7 626 664		12 000 000			42 500	
500 000	33 425 777		12 000 000		39 649		
958 000	21 823 373		12 000 000		46 698		
270 000	10 121	0	6 761	0	0	0	
297 500	189 879	0	12 747	0	0	0	0
248 000	0	0	1 419	0	0	0	0
718 391	1 631 520	0	0	0	0	0	0
531 609	1 170 000	0	0	0	38 991	0	0
531 756	2 846 786	0	0	0		0	

Annex 3 - C. Funding for malaria control, 2014–2016

WHO region Country/area	Year	Contributions reported by donors			
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	UK[4]
AMERICAS					
Brazil	2014	0	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0
Colombia	2014	2 952 081	0	0	0
	2015	-579 893	0	0	0
	2016	0	0	0	0
Costa Rica	2014	0	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0
Dominican Republic	2014	524 984	0	0	0
	2015	-23 979	0	0	0
	2016	0	0	0	0
Ecuador	2014	1 022 289	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0
El Salvador	2014	0	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0
French Guiana	2014	0	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0
Guatemala	2014	4 476 189	0	0	0
	2015	4 843 318	0	0	0
	2016	1 784 460	0	0	0
Guyana	2014	0	0	0	0
	2015	55 096	0	0	0
	2016	-58 728	0	0	0
Haiti	2014	4 622 395	0	0	0
	2015	4 576 785	0	0	0
	2016	6 152 134	0	0	0
Honduras	2014	986 741	0	0	0
	2015	3 348 937	0	0	0
	2016	1 178 066	0	0	0
Mexico	2014	0	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0
Nicaragua	2014	1 030 296	0	0	0
	2015	562 941	0	0	0
	2016	5 068 397	0	0	0
Panama	2014	0	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0
Paraguay	2014	0	0	0	0
	2015	0	0	0	0
	2016	1 517 493	0	0	0
Peru	2014	0	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0

Contributions reported by countries							
Government (NMCP)	Global Fund	World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[6]
72 248 286 [5]	0	0	47 495	0	0	0	0
60 803 769 [5]	0	0	273 530	0	0	0	0
44 240 812 [5]	0	0		0	0	0	0
11 493 708	3 257 687	0	96 194	0	0	0	0
13 059 553	0	0	73 391	0	0	0	0
10 159 785	0	0	147 210	0	14 660	0	0
	0	0	0	0	0	0	0
5 000 000 [5]	64 496	0	0	0	0	0	0
	14 000	0	1 624	0	3 000	0	0
1 883 503	852 947	0	0	0	0	0	106 598
2 663 837	72 511	0	0	0	0	0	213 094
4 372 339	0	0	0	0	0	0	334 363
	983 835	0	98 057	0		0	
2 444 718	0	0		0	141 000	0	
20 000 000 [5]	0						
	0	0	0	0	54 340	0	0
	0	0	13 376	0	11 563	0	0
	166 311	0	1 089	0		0	65 789
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
542 663	3 278 171	0	92 462	0	0	0	0
2 610 850	8 232 108	0	56 824	0	0	0	0
3 067 361	10 669 242	0		0		0	
800 439	451 597	0	115 708	0	140 486	0	0
1 023 795	337 939	0	288 169	0	47 500	0	0
	338 772	0	98 000	0	50 000	0	0
108 696 [5]	2 653 285	0		598 573	245 000	0	0
152 174 [5]	5 144 270	0	62 156	470 000	231 185		2 694 312
362 174 [5]	4 926 108	0	0	500 000	227 455		4 360 177
543 312	792 634	0	113 187	0	0	0	6 046
	0	0	118 071		18 457	0	
543 312	3 413 845		7 840				
23 827 054	0	0	0	0	0	0	0
46 662 926	0	0	0	0	0	0	0
43 376 321	0	0	0	0	0	0	0
2 596 547	1 214 811	0	51 323	0	21 868	0	0
2 886 581	1 013 568	0	47 409		9 937		
3 898 744	3 727 737	0		0	8 250	0	
7 469 311 [5]	100 000	0	77 562	0	0	0	0
7 964 427	10 000	0	49 079	0	11 000	0	0
7 645 191	0	0	23 247	0	9 665	0	
5 574 580	0	0	0	0	5 740	0	0
2 264 399	0	0	0	0	16 800	0	0
2 264 399	1 517 493	0	0	0		0	0
	0	0	91 037	0		0	0
2 134 919 [5]	0	0	98 598	0		0	0
1 969 288	0	0	183 809	0		0	0

Annex 3 - C. Funding for malaria control, 2014–2016

WHO region Country/area	Year	Contributions reported by donors			
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	UK[4]
AMERICAS					
Suriname	2014	161 926	0	0	0
	2015	1 291 082	0	0	0
	2016	163 871	0	0	0
Venezuela (Bolivarian Republic of)	2014	0	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0
EASTERN MEDITERRANEAN					
Afghanistan	2014	8 571 431	0	-892 270	0
	2015	8 392 469	0	-557 745	0
	2016	5 706 151	0	-565 080	0
Djibouti	2014	0	0	154 416	0
	2015	-287 635	0	175 460	0
	2016	4 547 153	0	177 767	0
Iran (Islamic Republic of)	2014	2 718 537	0	0	0
	2015	2 512 580	0	0	0
	2016	1 726 286	0	0	0
Pakistan	2014	9 183 606	0	0	0
	2015	8 602 305	0	0	0
	2016	10 875 717	0	0	0
Saudi Arabia	2014	0	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0
Somalia	2014	9 865 831	0	0	0
	2015	10 159 581	0	0	0
	2016	9 433 517	0	0	0
Sudan	2014	16 374 420	0	0	0
	2015	46 129 869	0	0	0
	2016	53 412 091	0	0	0
Yemen	2014	2 057 886	0	0	0
	2015	1 789 920	0	0	0
	2016	4 517 020	0	0	0
SOUTH-EAST ASIA					
Bangladesh	2014	4 483 314	0	0	0
	2015	6 839 955	0	0	0
	2016	6 389 846	0	0	0
Bhutan	2014	244 687	0	0	0
	2015	571 738	0	0	0
	2016	437 520	0	0	0
Democratic People's Republic of Korea	2014	6 838 697	0	0	0
	2015	3 475 237	0	0	0
	2016	3 629 084	0	0	0
India	2014	4 571 581	0	306 651	0
	2015	33 188 117	0	0	0
	2016	4 077 028	0	0	0
Indonesia	2014	11 717 891	0	0	145 806
	2015	12 683 107	0	0	42 737
	2016	10 821 533	0	0	36 398

Contributions reported by countries							
Government (NMCP)	Global Fund	World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[6]
1 650 498	479 600	0	30 198	400 541	77 264	0	0
1 049 230	975 757	0	47 762	400 541	41 437	0	0
	0						
1 000 000 [5]	0	0	0				
19 600 139	0	0	0				
3 869 229	945 713	0	0	0		0	0
	9 083 870				113 341		
	4 571 460				89 167		
	9 762 977				12 905		
	0						
	0						
2 598 332 [5]	4 547 153						
6 300 000	2 979 260				34 000		
2 500 000	2 418 943				5 000		
2 500 000	1 364 857						
	10 718 906				154 000		
	5 910 215				89 000		
16 400 000	11 536 047				300 000		
30 000 000	0				0		0
30 000 000	0	0	0	0	0	0	0
30 000 000	0	0	0	0	7 500	0	0
67 740	9 604 810	0	0	0	85 000	0	0
79 488	7 365 620	0	0	0	121 800		0
81 200	9 946 059	0	0	0	135 000		0
27 316 109 [5]	35 883 294				446 160		
21 536 529 [5]	16 251 350	0	0	0	471 552	0	0
24 209 740 [5]	61 304 230	0	0	0	93 302	1 200 574	0
2 293 553	2 110 776			258 495	465 713		1 674 350
0	3 008 564				390 259		
0	1 140 758	0	0	0	105 000	0	
5 642 718	8 912 484						
942 538	9 507 849	0	0	0	65 000	0	0
1 184 500	9 734 466	0	0	0	188 000	0	0
180 328	390 420				10 000		166 639
179 104	487 909	0	0	0	5 552	0	0
163 046	550 197	0	0	0	40 273	0	72 424
2 000 000	1 571 206	0	0	0	98 000	0	0
2 050 000	6 817 631	0	0	0	30 200	0	
2 080 000	3 775 232	0	0	0	35 000	0	
77 461 828	16 129 032	0					
77 461 828	5 244 575	0	0	0		0	
77 461 828	15 892 221	0	0	0		0	
15 956 285 [5]	15 913 410	0	0	0	277 282	3 490 400	0
10 940 000 [5]	10 966 688	0	0	0	277 282	1 691 397	0
20 307 710 [5]	10 821 533	0	0	0	228 000	1 938 220	0

Annex 3 - C. Funding for malaria control, 2014–2016

WHO region Country/area	Year	Contributions reported by donors			
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	UK[4]
SOUTH-EAST ASIA					
Myanmar	2014	34 681 659	8 160 000	0	7 351 563
	2015	28 145 785	9 117 000	0	5 689 759
	2016	33 646 118	10 000 000	0	4 845 739
Nepal	2014	1 849 372	0	0	0
	2015	1 740 647	0	0	0
	2016	2 976 255	0	0	0
Thailand	2014	20 870 397	0	0	0
	2015	6 807 416	0	0	0
	2016	8 740 652	0	0	0
Timor-Leste	2014	1 558 397	0	0	0
	2015	2 548 036	0	0	0
	2016	3 102 901	0	0	0
WESTERN PACIFIC					
Cambodia	2014	24 365 967	4 590 000	0	0
	2015	8 892 603	4 558 500	0	0
	2016	8 045 321	6 000 000	0	0
China	2014	-1 773 012	0	0	0
	2015	-7 365	0	0	0
	2016	-304 319	0	0	0
Lao People's Democratic Republic	2014	4 376 769	0	581 232	0
	2015	5 176 188	0	67 609	0
	2016	5 681 906	0	68 498	0
Malaysia	2014	0	0	0	202 601
	2015	0	0	0	328 709
	2016	0	0	0	279 948
Papua New Guinea	2014	11 189 870	0	0	115 679
	2015	7 833 985	0	0	77 267
	2016	7 562 557	0	0	65 805
Philippines	2014	7 071 104	0	0	0
	2015	4 326 902	0	0	0
	2016	3 389 228	0	0	0
Republic of Korea	2014	0	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0
Solomon Islands	2014	0	0	0	0
	2015	690 889	0	0	0
	2016	2 437 861	0	0	0
Vanuatu	2014	0	0	0	0
	2015	0	0	0	0
	2016	0	0	0	0
Viet Nam	2014	9 876 642	0	0	0
	2015	7 870 861	0	0	0
	2016	5 846 063	0	0	0

NMCP, national malaria control programme; PMI, United States President's Malaria Initiative; UK, United Kingdom of Great Britain and Northern Ireland government; UNICEF, United Nations Children's Fund; USAID, United States Agency for International Development; World Health Organization, WHO

[1] Source: Global Fund to Fight AIDS, Tuberculosis and Malaria

[2] Source: www.foreignassistance.gov

[3] Source: Organisation for Economic Co-operation and Development (OECD) creditor reporting system (CRS) database

[4] Source: OECD CRS database

[5] Budget not expenditure

Contributions reported by countries							
Government (NMCP)	Global Fund	World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[6]
	42 620 577		6 565 881	451 400	25 000		5 561 917
5 272 824 [5]	31 629 898	0	6 500 000	2 800 000	25 000	0	0
6 437 430 [5]	55 302 769		9 000 000	6 607 886	25 000		
	0				46 500		
2 315 400 [5]	5 199 862				45 000		
966 200 [5]	10 228 041				23 000		
7 546 409	20 175 612	0	345 667	0	0	0	0
7 934 078	13 830 845	0	685 341	0	0	0	0
8 502 036	13 984 633	0	0	0	103 514	0	61 463
	3 482 955						
791 375	2 610 355	0	0	0	27 280	0	0
1 523 993	3 261 859	0	0	0	45 868	0	20 000
714 343	2 917 174	0	4 500 000	0	334 029	0	
692 698	4 042 964	0	4 500 000	0	406 393	0	
31 300	2 002 435	0	6 000 000	0	304 651	0	
23 113 017	0				0		0
18 574 013	0						
	0						
247 375	2 475 938	0	0	0	113 000	0	43 620
212 238	6 458 501	0	216 986	600 000	198 357	0	0
655 798	5 050 407	0	340 021	184 632	75 000	0	45 199
60 648 325	0				0		0
65 408 655	0						
42 319 091	0	0	0	0	0	0	0
377 000	695 052	0	0	0	0	0	0
1 637 421	11 000 000						
181 200	5 900 000	0	0	0	0	0	0
6 720 000	7 395 343	0	0	0	0	0	0
6 720 000	6 087 433	0	0	0	0	0	0
6 720 000 [5]	3 944 923	0	0	0	0	0	0
681 189	0				0		0
561 372	0	0	0	0	0	0	0
565 790	0	0	0	0	0	0	0
271 730	1 362 022	0	0	1 820 735	654 985	0	0
267 444	2 232 220	0	0	1 017 390	464 914	0	0
348 196	584 376	0	0	448 718	358 000	0	0
812 377 [5]	1 310 500	0	0	1 064 592	287 615	0	0
83 179	687 267	0	0	424 136	175 894	0	0
223 752	927 486	0	0	249 071	148 217	0	0
2 666 667	15 263 816	0	0	0	640 700	0	0
2 666 666	5 528 000	0	0	0	560 000	0	200 000
801 554	11 088 506				200 764		200 000

[6] Other contributions as reported by countries (e.g. NGOs and foundations).

[7] South Sudan became an independent 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 contemporary South Sudan) and low-transmission areas (15 northern states which correspond to contemporary Sudan) are reported separately.

[8] Where national totals for the United Republic of Tanzania are unavailable, refer to the sum of Mainland and Zanzibar

* Negative disbursements reflect recovery of funds on behalf of the financing organization

Annex 3 - D. Commodities distribution and coverage, 2014–2016

WHO region Country/area	Year	No. of LLIN sold or delivered	Modelled proportion of population with access to an ITN (%)	No. of people protected by IRS	IRS coverage (%)	No of RDTs distributed	Any first-line treatment courses delivered (including ACT)	ACT treatment courses delivered
AFRICAN								
Algeria	2014	0	-	-	-	-	266	92
	2015	0	-	-	-	0	747	-
	2016	0	-	-	-	-	-	-
Angola	2014	2 978 937	33	58 370	<1	-	-	-
	2015	2 138 331	42	-	-	2 500 000	3 185 160	3 185 160
	2016	3 507 740	40	-	-	3 000 000	4 000 000	4 000 000
Benin	2014	6 203 924	46	789 883	7	1 332 948	1 101 154	1 101 154
	2015	392 110	77	802 597	7	1 486 667	1 177 261	1 177 261
	2016	720 706	51	853 221	8	1 500 047	1 199 055	1 199 055
Botswana	2014	-	-	205 831	14	2 838	5 906	5 906
	2015	50 000	-	143 268	10	1 600	1 386	1 386
	2016	116 048	-	115 973	8	2 196	1 634	1 634
Burkina Faso	2014	239 559	82	0	0	6 224 055	7 494 498	7 494 498
	2015	481 107	73	0	0	8 290 188	7 824 634	7 824 634
	2016	10 924 031	79	-	-	11 974 810	9 519 568	9 519 568
Burundi	2014	5 752 583	64	0	0	3 089 202	4 772 805	4 263 178
	2015	726 767	83	-	-	5 075 437	4 798 379	4 798 376
	2016	755 182	70	-	-	8 077 703	8 277 026	8 031 773
Cabo Verde	2014	0	-	25 780	19	-	46	41
	2015	0	-	308 586	100	6 620	26	26
	2016	0	-	504 179	100	8 906	71	71
Cameroon	2014	-	34	0	0	-	1 270 172	1 270 172
	2015	2 751 112	32	-	-	1 573 992	826 434	826 434
	2016	9 588 733	63	-	-	1 380 725	1 093 036	1 093 036
Central African Republic	2014	555 334	40	-	-	303 582	522 270	522 270
	2015	1 170 566	62	-	-	759 245	1 043 674	1 043 674
	2016	57 110	73	-	-	1 651 645	1 714 647	1 714 647
Chad	2014	6 321 676	63	-	-	1 144 686	1 038 000	1 038 000
	2015	1 218 640	79	-	-	1 057 033	1 326 091	1 326 091
	2016	384 606	68	-	-	882 617	-	-
Comoros	2014	13 576	80	22 475	3	5 375	4 750	4 750
	2015	16 969	66	20 275	3	14 813	577	550
	2016	451 358	72	-	-	61 600	1 373	1 373
Congo	2014	180 595	61	0	0	19 746	0	0
	2015	447	49	-	-	0	1 304 959	1 304 959
	2016	1 291	34	-	-	45 000	0	0
Côte d'Ivoire	2014	12 627 282	51	-	-	-	-	-
	2015	3 663 080	83	-	-	5 600 100	3 296 991	3 296 991
	2016	1 177 906	73	-	-	5 351 325	4 964 065	4 964 065
Democratic Republic of the Congo	2014	13 918 109	48	194 566	<1	13 962 862	19 008 927	19 008 927
	2015	15 419 488	60	77 643	<1	13 574 891	9 871 484	9 871 484
	2016	31 439 920	77	916 524	1	18 630 636	17 258 290	17 258 290
Equatorial Guinea	2014	10 010	13	165 944	20	9 801	14 577	-
	2015	-	21	-	-	-	-	-
	2016	-	26	-	-	-	-	-
Eritrea	2014	0	31	320 881	6	54 516	216 195	216 195
	2015	2 054 194	38	328 915	6	645	255 602	255 602
	2016	156 553	48	364 007	7	0	177 525	177 525
Ethiopia	2014	13 388 552	48	16 709 249	25	7 416 167	7 321 471	5 321 471
	2015	17 233 074	57	16 147 333	24	13 148 960	7 036 620	6 049 320
	2016	13 266 926	62	15 050 413	22	9 742 450	6 530 973	5 239 080
Gabon	2014	10 000	17	-	-	-	984 423	984 423
	2015	10 730	13	-	-	-	-	-
	2016	9 660	9	0	0	0	0	0

WHO region Country/area	Year	No. of LLIN sold or delivered	Modelled proportion of population with access to an ITN (%)	No. of people protected by IRS	IRS coverage (%)	No of RDTs distributed	Any first-line treatment courses delivered (including ACT)	ACT treatment courses delivered
AFRICAN								
Gambia	2014	1 046 510	80	350 442	18	603 900	319 182	319 182
	2015	93 375	83	438 234	22	875 850	351 677	351 677
	2016	113 385	69	399 176	19	1 017 889	272 895	272 895
Ghana	2014	5 190 887	74	2 154 924	8	9 309 200	14 267 045	14 267 045
	2015	8 423 676	79	1 325 507	5	3 778 325	3 009 365	3 009 365
	2016	5 962 179	83	1 409 967	5	4 823 250	2 289 145	2 289 145
Guinea	2014	73 145	77	–	–	2 870 250	1 312 802	644 829
	2015	741 450	65	–	–	2 412 597	1 645 493	–
	2016	8 236 154	64	–	–	2 138 494	3 362 668	3 362 668
Guinea-Bissau	2014	1 109 568	75	–	–	917 200	171 540	171 540
	2015	62 942	88	–	–	261 868	139 341	104 730
	2016	71 500	79	–	–	238 412	133 647	115 361
Kenya	2014	5 450 064	65	0	0	5 500 000	10 839 611	10 614 717
	2015	11 637 493	73	0	0	4 319 000	11 052 564	10 321 221
	2016	2 005 477	76	0	0	334 118	11 327 340	11 327 340
Liberia	2014	236 996	40	0	0	58 248	100 535	96 787
	2015	2 914 331	69	0	0	–	–	–
	2016	–	87	–	–	–	–	–
Madagascar	2014	105 442	65	1 307 384	6	2 839 325	1 648 093	1 648 093
	2015	11 249 042	68	1 327 326	5	4 962 600	2 040 289	2 040 289
	2016	464 407	78	2 856 873	11	1 352 225	757 613	757 613
Malawi	2014	1 423 507	65	–	–	8 197 250	8 735 160	8 735 160
	2015	1 100 000	58	–	–	8 462 325	6 240 060	6 240 060
	2016	9 093 657	74	–	–	8 746 750	6 799 354	6 440 490
Mali	2014	3 790 403	54	836 568	5	2 563 993	2 211 118	2 211 118
	2015	6 080 030	73	494 163	3	4 381 050	3 761 319	3 761 319
	2016	2 189 027	80	788 711	4	3 250 000	3 511 970	3 511 970
Mauritania	2014	178 922	13	–	–	269 941	176 192	176 192
	2015	240 000	13	–	–	360 000	–	109 000
	2016	51 000	11	–	–	208 650	174 420	84 000
Mayotte	2014	5 252	–	450	<1	–	–	–
	2015	–	–	–	–	–	–	–
	2016	–	–	–	–	–	–	–
Mozambique	2014	6 112 245	59	5 597 770	21	17 374 342	15 976 059	15 976 059
	2015	5 126 340	71	3 659 845	13	17 219 225	13 653 685	13 653 685
	2016	4 527 936	73	–	–	19 822 825	14 136 250	14 136 250
Namibia	2014	163 526	–	467 930	25	3 312	80 215	80 215
	2015	488 661	–	386 759	20	30 120	79 215	79 215
	2016	0	–	485 730	24	15 185	21 519	21 519
Niger	2014	2 048 430	32	0	0	4 197 381	5 731 036	5 731 036
	2015	6 253 448	52	0	0	3 039 594	3 698 674	3 698 674
	2016	746 469	65	0	0	4 622 433	3 257 506	3 257 506
Nigeria	2014	23 328 225	41	316 255	<1	10 679 235	22 145 889	22 145 889
	2015	27 628 073	51	–	–	41 089 368	20 249 636	41 089 368
	2016	9 896 250	55	130 061	<1	11 178 434	9 177 309	9 177 309
Rwanda	2014	1 373 582	87	1 243 704	11	444 729	1 917 021	1 917 021
	2015	2 066 915	84	2 013 652	17	2 015 100	4 392 006	4 392 006
	2016	2 882 445	84	2 484 672	21	–	–	–
Sao Tome and Principe	2014	11 385	–	124 692	67	58 005	1 456	1 456
	2015	113 221	–	143 571	75	72 407	1 704	1 704
	2016	11 922	–	149 930	77	117 676	2 121	2 121
Senegal	2014	3 785 595	74	708 999	5	1 193 075	703 712	703 712
	2015	556 135	79	514 833	3	2 570 500	958 492	958 492
	2016	8 960 663	83	496 728	3	1 823 405	709 394	709 394

Annex 3 - D. Commodities distribution and coverage, 2014–2016

WHO region Country/area	Year	No. of LLIN sold or delivered	Modelled proportion of population with access to an ITN (%)	No. of people protected by IRS	IRS coverage (%)	No of RDTs distributed	Any first-line treatment courses delivered (including ACT)	ACT treatment courses delivered
AFRICAN								
Sierra Leone	2014	3 846 204	58	0	0	2 057 306	1 391 273	1 391 273
	2015	395 061	83	–	–	2 494 935	1 687 031	1 687 031
	2016	452 608	75	–	–	3 093 725	4 714 900	4 714 900
South Africa	2014	0	–	5 650 177	100	499 086	14 036	14 036
	2015	0	–	1 178 719	22	16 007	28 709	28 709
	2016	0	–	1 165 955	21	227 325	12 677	12 677
South Sudan[1]	2014	663 795	70	737 438	6	3 941 300	8 372 384	8 372 384
	2015	458 890	55	296 977	2	4 049 559	9 971 675	9 971 675
	2016	2 756 572	48	–	–	5 147 954	13 617 422	13 617 422
Swaziland	2014	5 399	–	3 971	1	–	588	558
	2015	3 808	–	–	–	58 700	491	396
	2016	4 758	–	24 179	7	56 780	600	600
Togo	2014	4 042 425	66	0	0	1 633 891	1 134 604	1 208 529
	2015	8 600	82	–	–	1 633 891	1 508 016	1 208 529
	2016	–	61	–	–	1 428 696	1 064 876	1 049 903
Uganda	2014	10 615 631	77	3 219 122	9	17 157 725	21 698 700	21 698 700
	2015	1 442 500	79	3 700 470	9	27 110 800	30 166 620	30 166 620
	2016	899 823	67	3 811 484	9	1 089 215	29 667 150	29 667 150
United Republic of Tanzania	2014	–	30	–	–	–	–	–
	2015	–	18	–	–	–	–	–
	2016	–	23	–	–	–	–	–
Mainland	2014	510 000	30	2 000 000	4	24 126 300	19 937 820	19 937 820
	2015	20 794 000	18	14 386 280	28	16 416 675	10 160 910	10 160 910
	2016	11 731 272	23	2 377 403	4	23 223 400	13 786 620	13 786 620
Zanizibar	2014	109 189	–	224 900	15	–	–	–
	2015	347 998	–	298 645	20	615 275	3 750	3 750
	2016	756 445	–	27 664	2	24 026	11 100	10 020
Zambia	2014	6 368 026	83	5 538 574	35	7 500 000	13 000 845	13 000 845
	2015	1 506 206	86	5 930 141	37	11 310 350	14 365 969	14 365 969
	2016	1 292 400	78	6 737 918	40	15 286 570	19 084 818	19 084 818
Zimbabwe	2014	1 743 542	37	3 460 871	29	2 446 996	960 455	960 455
	2015	84 087	38	3 548 246	29	1 981 613	847 333	847 333
	2016	1 752 855	34	3 674 932	29	3 154 200	934 580	934 580
AMERICAS								
Argentina	2014	0	–	300	<1	–	50	0
	2015	0	–	1 895	<1	–	50	0
	2016	0	–	–	–	–	30	0
Belize	2014	2 452	–	21 413	9	0	19	0
	2015	4 152	–	36 796	15	0	13	0
	2016	4 000	–	35 264	14	0	5	0
Bolivia (Plurinational State of)	2014	23 580	–	16 573	<1	–	7 401	325
	2015	17 514	–	11 138	<1	–	6 907	6 907
	2016	84 000	–	12 689	<1	–	5 553	5 553
Brazil	2014	229 947	–	96 675	<1	47 375	346 015	70 965
	2015	0	–	929 834	2	101 700	290 580	94 380
	2016	0	–	98 562	<1	68 650	369 390	101 890
Colombia	2014	169 500	–	519 333	5	2 960	86 228	32 489
	2015	25 100	–	252 500	2	0	108 469	55 469
	2016	306 498	–	1 180 400	11	21 575	202 175	94 494
Costa Rica	2014	0	–	0	0	–	6	3
	2015	0	–	0	0	–	8	4
	2016	206	–	430	<1	0	13	3

WHO region Country/area	Year	No. of LLIN sold or delivered	Modelled proportion of population with access to an ITN (%)	No. of people protected by IRS	IRS coverage (%)	No of RDTs distributed	Any first-line treatment courses delivered (including ACT)	ACT treatment courses delivered
AMERICAS								
Dominican Republic	2014	6 733	–	6 066	<1	54 425	496	7
	2015	105 906	–	100 090	2	50 220	661	3
	2016	1 483	–	40 510	<1	89 800	755	40
Ecuador	2014	–	–	–	–	–	–	–
	2015	120 532	–	–	–	–	686	227
	2016	51 795	–	–	–	–	1 191	403
El Salvador	2014	0	–	6 424	<1	0	4 710	0
	2015	0	–	37 500	3	0	16 029	0
	2016	0	–	27 338	2	0	144	0
French Guiana	2014	2 990	–	–	–	–	–	–
	2015	0	–	–	–	–	–	–
	2016	4 455	–	–	–	–	–	–
Guatemala	2014	49 905	–	1 700	<1	50 459	–	–
	2015	600 049	–	–	–	108 900	0	0
	2016	485 010	–	–	–	92 100	0	0
Guyana	2014	152 996	–	25 592	3	0	12 354	12 354
	2015	24 201	–	146	<1	0	9 984	3 219
	2016	8 320	–	0	0	8 268	10 979	3 759
Haiti	2014	2 000	–	0	0	126 637	2 030 300	–
	2015	0	–	–	–	233 152	26 151	–
	2016	10 000	–	–	–	274 404	19 702	–
Honduras	2014	25 118	–	116 490	2	4 275	54 466	8
	2015	36 149	–	125 975	2	9 750	–	8
	2016	82 608	–	739 665	10	27 300	43 097	45
Mexico	2014	7 500	–	47 775	2	0	4 592	6
	2015	15 000	–	214 032	8	0	3 133	6
	2016	61 000	–	112 184	4	0	596	13
Nicaragua	2014	83 279	–	56 675	2	15 620	1 142	0
	2015	0	–	59 282	2	12 527	2 307	–
	2016	191 178	–	147 801	6	20 840	6 284	–
Panama	2014	0	–	11 422	<1	0	874	0
	2015	0	–	11 581	<1	0	562	0
	2016	0	–	9 675	<1	0	811	0
Paraguay	2014	0	–	19 425	8	–	8	7
	2015	0	–	12 809	5	0	8	6
	2016	0	–	600	<1	0	10	7
Peru	2014	45 000	–	69 155	<1	–	65 252	10 416
	2015	64 687	–	142 253	1	–	66 609	13 618
	2016	430	–	30 499	<1	150 000	74 554	6 500
Suriname	2014	0	–	0	0	24 425	401	144
	2015	0	–	–	–	17 625	–	–
	2016	37 000	–	–	–	13 825	–	–
Venezuela (Bolivarian Republic of)	2014	2 666	–	4 189 850	40	–	120 979	32 005
	2015	1 041	–	2 739 290	26	–	136 389	35 509
	2016	30 000	–	29 232	<1	80 000	240 613	61 034
EASTERN MEDITERRANEAN								
Afghanistan	2014	4 325 552	–	0	0	355 160	21 625	21 625
	2015	58 830	–	–	–	98 065	–	200
	2016	992 319	–	–	–	758 675	93 335	89 500
Djibouti	2014	25 000	9	36 630	8	–	–	–
	2015	0	10	–	–	–	–	–
	2016	33 851	12	–	–	–	–	–

Annex 3 - D. Commodities distribution and coverage, 2014–2016

WHO region Country/area	Year	No. of LLIN sold or delivered	Modelled proportion of population with access to an ITN (%)	No. of people protected by IRS	IRS coverage (%)	No of RDTs distributed	Any first-line treatment courses delivered (including ACT)	ACT treatment courses delivered
EASTERN MEDITERRANEAN								
Iran (Islamic Republic of)	2014	70 360	-	289 249	36	-	8 830	8 830
	2015	91 845	-	217 773	27	114 450	37 971	2 042
	2016	6 393	-	172 666	21	120 000	-	-
Pakistan	2014	1 519 947	-	1 103 480	<1	857 690	907 200	162 880
	2015	1 822 015	-	1 685 264	<1	770 074	890 500	80 000
	2016	2 675 281	-	552 500	<1	13 446 268	850 000	62 000
Saudi Arabia	2014	1 450 000	-	752 851	30	-	1 155	1 155
	2015	125 000	-	131 661	5	-	1 444	1 444
	2016	0	-	307 927	12	-	3 922	3 922
Somalia	2014	413 000	23	61 362	<1	617 640	155 450	155 450
	2015	291 085	23	15 645	<1	424 140	386 200	386 200
	2016	655 798	21	11 015	<1	602 640	412 300	412 300
Sudan	2014	4 432 714	48	3 942 110	10	2 200 000	3 823 175	3 823 175
	2015	2 729 334	49	2 460 816	6	4 344 150	2 551 310	2 551 310
	2016	5 370 774	43	3 678 400	9	2 375 275	3 847 768	3 847 768
Yemen	2014	375 899	-	2 188 436	11	412 350	215 486	215 486
	2015	847 946	-	798 707	4	334 525	153 682	153 682
	2016	1 482 982	-	548 436	3	442 570	283 408	283 408
SOUTH-EAST ASIA								
Bangladesh	2014	728 773	-	0	0	211 662	75 479	58 770
	2015	2 380 759	-	-	-	259 171	40 742	35 708
	2016	41 255	-	-	-	420 049	28 407	24 431
Bhutan	2014	10 609	-	144 669	26	-	118	118
	2015	26 000	-	70 926	12	16 875	416	416
	2016	22 322	-	66 675	11	12 600	216	216
Democratic People's Republic of Korea	2014	0	-	2 617 120	27	0	11 212	0
	2015	864 750	-	1 146 750	12	253 320	29 272	0
	2016	0	-	1 152 402	12	182 980	23 231	0
India	2014	0	-	45 150 612	4	15 562 000	211 500	211 500
	2015	7 241 418	-	41 849 017	3	21 182 000	2 123 760	2 123 760
	2016	500 000	-	43 477 154	4	21 082 000	2 123 760	300 000
Indonesia	2014	6 416 947	-	103 285	<1	879 650	212 346	212 165
	2015	56 337	-	53 497	<1	300 000	406 614	406 614
	2016	2 977 539	-	6 240	<1	1 382 208	438 178	438 178
Myanmar	2014	904 613	-	48 626	<1	3 048 440	281 103	281 103
	2015	3 398 941	-	129 545	<1	1 309 300	243 515	243 515
	2016	3 965 187	-	44 484	<1	1 596 525	126 585	126 585
Nepal	2014	1 064 518	-	372 000	5	60 000	24 500	195
	2015	304 437	-	329 905	4	56 000	3 350	300
	2016	290 647	-	286 865	3	61 000	4 500	274
Sri Lanka	2014	0	-	50	<1	16 500	49	23
	2015	104 000	-	22 115	<1	19 900	36	18
	2016	16 465	-	57 111	1	31 950	41	19
Thailand	2014	528 850	-	362 469	3	258 823	19 314	19 314
	2015	251 500	-	348 713	3	15 400	31 875	8 125
	2016	465 600	-	237 398	2	68 500	40 801	14 321
Timor-Leste	2014	99 572	-	110 707	56	86 592	347	105
	2015	24 607	-	93 019	46	90 818	80	56
	2016	309 067	-	166 426	81	114 263	84	84

WHO region Country/area	Year	No. of LLIN sold or delivered	Modelled proportion of population with access to an ITN (%)	No. of people protected by IRS	IRS coverage (%)	No of RDTs distributed	Any first-line treatment courses delivered (including ACT)	ACT treatment courses delivered
WESTERN PACIFIC								
Cambodia	2014	70 411	-	0	0	538 500	118 483	114 159
	2015	1 517 074	-	-	-	483 600	128 004	122 013
	2016	4 089 321	-	-	-	400 350	98 990	88 990
China	2014	19 899	-	504 936	<1	-	43 150	9 350
	2015	29 611	-	1 697 188	<1	-	67 555	20 710
	2016	26 562	-	272 108	<1	-	6 290	4 130
Lao People's Democratic Republic	2014	276 655	-	4 691	<1	312 075	50 092	50 092
	2015	152 791	-	-	-	324 225	86 456	86 456
	2016	1 213 755	-	-	-	270 950	63 889	62 994
Malaysia	2014	622 673	-	615 384	51	-	3 923	3 182
	2015	285 946	-	489 030	40	-	2 311	1 616
	2016	284 031	-	513 076	42	0	2 302	2 197
Papua New Guinea	2014	1 613 140	-	-	-	963 900	802 080	802 080
	2015	991 440	-	-	-	1 000 000	728 310	728 310
	2016	944 847	-	-	-	1 733 500	540 400	540 400
Philippines	2014	996 180	-	1 175 136	2	201 775	30 095	30 095
	2015	932 736	-	847 845	1	79 300	16 989	16 989
	2016	806 603	-	1 025 096	2	256 875	6 810	6 810
Republic of Korea	2014	5 250	-	-	-	-	638	-
	2015	5 250	-	-	-	4 900	699	-
	2016	2 000	-	-	-	4 900	673	-
Solomon Islands	2014	47 258	-	128 673	23	47 450	147 430	147 430
	2015	10 721	-	175 683	30	107 425	242 456	242 456
	2016	291 339	-	16 179	3	542 975	237 492	237 492
Vanuatu	2014	42 916	-	0	0	50 000	24 000	24 000
	2015	38 211	-	-	-	53 400	20 256	20 256
	2016	110 215	-	-	-	39 525	11 729	11 729
Viet Nam	2014	526 366	-	616 670	<1	434 160	194 397	106 100
	2015	658 450	-	620 093	<1	459 332	97 570	45 000
	2016	200 000	-	417 142	<1	408 055	71 853	2 358

ACT, artemisinin-based combination therapy; IRS, indoor residual spraying; ITN, insecticide-treated mosquito net; LLIN, long-lasting insecticidal net; RDT, rapid diagnostic test

[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)

Annex 3 - E. Household survey results, 2014–2016

WHO region Country/area	Source	% of households that have at least one ITN	% of households with at least one ITN for every two persons who slept in the household the previous night	% of the population with access to an ITN in their household	% of existing ITNs in households used the previous night	% of the population who slept under an ITN the previous night	% of children <5 years who slept under an ITN the previous night
AFRICAN							
Angola	DHS 2015–16	30.9	11.3	19.7	71	17.6	21.7
Burkina Faso	MIS 2014	89.8	49.2	71.2	85.2	67	75.3
Chad	DHS 2014–15	77.3	42.4	61.2	48.6	33.3	36.4
Democratic Republic of the Congo	DHS 2013–14	70	25.4	46.5	82.8	50.2	55.8
Ethiopia	DHS 2016						
Ghana	DHS 2014	68.3	45.2	59	48.6	35.7	46.6
Ghana	MIS 2016	73	50.9	65.8	47.7	41.7	52.2
Kenya	DHS 2014	58.9	34.5	48.2	77.3	42.6	54.3
Kenya	MIS 2015	62.5	40	52.5	75.2	47.6	56.1
Madagascar	MIS 2016	79.5	44.4	62.1	78.7	68.2	73.4
Malawi	MIS 2014	70.2	30.3	51.8	83.6	52.5	67.1
Malawi	DHS 2015–16	56.9	23.5	38.8	73.3	33.9	42.7
Mali	MIS 2015	93	39.3	69.5	90.7	63.9	71.2
Nigeria	MIS 2015	68.8	34.9	54.7	60.8	37.3	43.6
Rwanda	DHS 2014–15	80.6	42.6	63.8	77.4	61.4	67.7
Senegal	DHS 2016	82.4	56.4	75.7	68.2	63.1	66.6
Senegal	DHS 2015	76.8	40.5	66	70.1	51	55.4
Senegal	DHS 2014	74.4	36.3	58.4	62.8	40.4	43.2
Togo	DHS 2013–14	65.4	32.9	48.8	61.2	33.6	42.8
Uganda	MIS 2014–15	90.2	62.3	78.8	74.4	68.6	74.3
United Republic of Tanzania (mainland)	DHS 2015–16	65.6	38.8	55.9	69.4	49	54.4
Zambia	DHS 2013–14	67.7	27.4	46.6	63.6	34.9	40.6
Zimbabwe	DHS 2015	47.9	26.4	37.2	18.8	8.5	9
AMERICAS							
Guatemala	DHS 2014						
EASTERN MEDITERRANEAN							
Afghanistan	DHS 2015	26	2.9	13.2	21.4	3.9	4.6
SOUTH-EAST ASIA							
Bangladesh	DHS 2014						
Myanmar	DHS 2015–16	26.8	14.1	21.2	58.3	15.6	18.6
WESTERN PACIFIC							
Cambodia	DHS 2014						

ACT, artemisinin-based combination therapy; ANC, antenatal care; DHS, demographic and health survey; IPT, intermittent preventive treatment; IRS, indoor residual spraying; ITN, insecticide-treated mosquito net; MIS, malaria indicator survey

Source: Demographic and Health Survey (DHS) and Malaria Indicator Survey (MIS): STATcompiler - http://www.statcompiler.com/

% of pregnant women who slept under an ITN the previous night	% of households sprayed by IRS within last 12 months	% of households with = 1 ITN for 2 pers. and/or sprayed by IRS within last 12 months	% of women who received at least 3 doses of IPT during ANC visits during their last pre-gnancy	% of children aged 6-59 months with		% of children <5 years with fever in last 2 weeks		
				a hemoglobin measurement <8 g/dL	a positive microscopy blood smear	for whom advice or treatment was sought	who received an ACT among those who received any antimalarial	who had a finger or heel stick
23	1.6	12.5	19	5.7		50.8	76.7	34.3
77.1	0.4	48.9	21.5	25.9	45.7	61.4	27.9	30.3
34.7	0.6	42.4	7.6			36.9	10	12.9
60.2		25.3	5.4	8.2	22.6	55.3	17	18.6
				7.5		35.3	11.5	
43.3	9.7	50.4	38.5	8.3	26.7	76.9	78.2	34.3
50	8.1	53.6	59.6	6.9	20.6	72.1	60.7	30.3
50.6	0.8	34.6	10.1			71.7	85.8	34.9
57.8		39.7	21.9	2.2	5	71.9	91.6	39.2
68.5	6.9	47.9	10.3	2.3	6.9	55.5	17	15.5
62.4	8.5	36.6		6.4	33.2	58.8	92.7	32.4
43.9	4.9	27	30	6.4		66.9	91.8	52
77.9	4	41.8	16	19.9	35.7	49.2	28.9	14.2
49	1.3	35.5	19	9.3	27.4	66.1	37.5	12.6
72.9		42.5		2.3	2.2	56.7	98.7	36.1
69	5.3	58		5.6	0.9	49.5		13
51.8	4.8	43		7.4	0.3	49.3		9.5
38.1	8.7	41.9	2.5	5.3	1.2	57.2	10.6	6.7
40		32.8	19	8.7	36.4	60.1	49.6	23.8
75.4	4.9	64	25.2	4.7	20	82	86.7	35.8
53.9	5.5	41	7.7	4.8	5.6	80.1	84.9	35.9
41	28.4	46.9	49.6			75.3	90.4	48.6
6.1	21.3	39.4		1.5		49.8		12.7
				0.2		50.1		
4.1						63.3	4.4	7.9
						55.4		
18.4				3.4		65		3
				0.5		60.6		

Annex 3 - F.a. Estimated malaria cases and deaths, 2010–2016

WHO region Country/area	Year	Cases			Deaths		
		Lower	Point	Upper	Lower	Point	Upper
AFRICAN							
Algeria	2010		≤10			≤10	
	2011		≤10			0	
	2012		≤100			0	
	2013		0			0	
	2014		0			0	
	2015		0			0	
	2016		0			0	
Angola	2010	1 845 000	2 975 000	4 350 000	9 000	11 980	15 300
	2011	1 894 000	2 910 000	4 220 000	8 000	11 590	14 800
	2012	1 881 000	3 021 000	4 460 000	8 000	11 480	14 610
	2013	1 904 000	3 400 000	5 350 000	9 000	11 720	14 870
	2014	1 914 000	3 450 000	5 470 000	9 000	11 970	15 120
	2015	1 881 000	3 430 000	5 560 000	9 000	11 900	14 990
	2016	1 903 000	3 470 000	5 600 000	9 000	11 950	15 000
Benin	2010	2 008 000	2 974 000	4 290 000	5 000	6 000	8 000
	2011	1 985 000	2 931 000	4 170 000	5 000	6 000	7 000
	2012	2 104 000	3 058 000	4 500 000	5 000	6 000	8 000
	2013	2 016 000	3 137 000	4 570 000	5 000	6 000	8 000
	2014	1 976 000	3 091 000	4 540 000	5 000	6 000	7 000
	2015	2 051 000	3 190 000	4 670 000	5 000	6 000	8 000
	2016	2 080 000	3 230 000	4 730 000	5 000	6 000	8 000
Botswana	2010	1 800	5 000	16 950		≤100	
	2011	600	1 200	4 000		≤10	
	2012	270	500	1 600		≤10	
	2013	600	1 200	4 000		≤10	
	2014	1 800	4 000	11 230		≤10	
	2015	500	900	2 700		≤10	
	2016	1 000	1 900	6 000		≤10	
Burkina Faso	2010	6 030 000	8 510 000	11 250 000	30 520	37 000	43 600
	2011	6 030 000	8 400 000	11 140 000	26 510	32 100	37 600
	2012	5 830 000	8 110 000	10 810 000	22 380	26 910	31 450
	2013	5 480 000	7 590 000	10 260 000	18 440	21 970	25 500
	2014	5 400 000	7 440 000	10 080 000	18 090	21 490	24 880
	2015	5 580 000	7 700 000	10 470 000	18 200	21 580	24 960
	2016	5 720 000	7 890 000	10 740 000	18 020	21 300	24 580
Burundi	2010	1 065 000	2 001 000	3 220 000	4 000	5 000	6 000
	2011	1 042 000	1 887 000	2 955 000	4 000	5 000	6 000
	2012	1 011 000	1 706 000	2 589 000	4 000	5 000	6 000
	2013	916 000	1 683 000	2 678 000	4 000	5 000	6 000
	2014	903 000	1 654 000	2 625 000	4 000	5 000	6 000
	2015	870 000	1 613 000	2 555 000	4 000	5 000	6 000
	2016	888 000	1 644 000	2 604 000	4 000	5 000	6 000
Cabo Verde	2010		≤100			≤10	
	2011		≤10			≤10	
	2012		≤10			0	
	2013		≤100			0	
	2014		≤100			≤10	
	2015		≤10			0	
	2016		≤100			≤10	
Cameroon	2010	3 600 000	5 550 000	8 360 000	7 000	10 000	12 000
	2011	3 360 000	5 210 000	7 810 000	6 000	9 000	10 920
	2012	3 069 000	5 090 000	7 660 000	6 000	9 000	10 760
	2013	3 154 000	5 330 000	8 120 000	7 000	9 000	10 960
	2014	3 159 000	5 380 000	8 230 000	6 000	9 000	10 680
	2015	3 170 000	5 360 000	8 200 000	6 000	8 000	10 210
	2016	3 220 000	5 440 000	8 320 000	6 000	8 000	10 000
Central African Republic	2010	916 000	1 605 000	2 515 000	5 000	6 000	7 000
	2011	803 000	1 549 000	2 461 000	4 000	5 000	6 000
	2012	719 000	1 526 000	2 416 000	4 000	5 000	6 000
	2013	643 000	1 491 000	2 389 000	4 000	4 000	5 000
	2014	608 000	1 463 000	2 360 000	3 000	4 000	5 000
	2015	572 000	1 409 000	2 287 000	3 000	4 000	4 000
	2016	581 000	1 431 000	2 322 000	2 900	4 000	4 000

WHO region Country/area	Year	Cases			Deaths		
		Lower	Point	Upper	Lower	Point	Upper
AFRICAN							
Chad	2010	762 000	1 889 000	3 700 000	5 000	7 000	9 000
	2011	734 000	1 809 000	3 450 000	5 000	7 000	9 000
	2012	696 000	1 840 000	3 840 000	5 000	7 000	9 000
	2013	722 000	1 835 000	3 810 000	6 000	7 000	9 000
	2014	750 000	1 901 000	3 900 000	6 000	7 000	9 000
	2015	769 000	1 963 000	4 070 000	6 000	7 000	9 000
	2016	793 000	2 014 000	4 170 000	6 000	7 000	9 000
Comoros	2010		36 500			≤100	
	2011		24 860			≤100	
	2012		49 800		≤10	120	200
	2013		53 200		≤10	130	210
	2014		2 200			≤10	
	2015		1 300			≤10	
	2016		1 100			≤10	
Congo	2010	453 000	847 000	1 534 000	1 600	1 800	2 000
	2011	481 000	869 000	1 577 000	1 600	1 800	2 000
	2012	467 000	900 000	1 565 000	1 600	1 900	2 100
	2013	467 000	936 000	1 554 000	1 700	1 900	2 200
	2014	494 000	988 000	1 638 000	1 800	2 000	2 200
	2015	511 000	1 030 000	1 724 000	1 800	2 000	2 300
	2016	522 000	1 049 000	1 758 000	1 800	2 000	2 300
Côte d'Ivoire	2010	6 480 000	9 530 000	13 740 000	20 840	26 030	31 210
	2011	5 840 000	8 640 000	12 770 000	14 530	18 340	22 150
	2012	4 160 000	6 640 000	10 170 000	8 000	10 500	12 790
	2013	3 440 000	5 580 000	9 010 000	6 000	8 000	10 150
	2014	3 170 000	5 270 000	8 590 000	6 000	8 000	9 000
	2015	3 072 000	5 160 000	8 460 000	6 000	7 000	9 000
	2016	3 146 000	5 290 000	8 660 000	6 000	7 000	9 000
Democratic Republic of the Congo	2010	19 100 000	28 390 000	40 200 000	84 300	104 100	123 900
	2011	18 330 000	27 210 000	39 400 000	71 700	88 400	105 100
	2012	16 380 000	24 720 000	37 200 000	58 400	71 700	85 000
	2013	15 360 000	23 420 000	36 200 000	53 500	65 300	77 200
	2014	15 100 000	23 250 000	36 200 000	53 000	64 500	76 000
	2015	13 970 000	22 130 000	35 100 000	49 700	60 100	70 500
	2016	14 280 000	22 640 000	35 900 000	50 100	60 500	70 800
Equatorial Guinea	2010	93 900	192 000	313 700	400	500	600
	2011	151 700	277 100	425 000	600	700	900
	2012	185 400	301 000	458 000	600	800	1 000
	2013	206 500	329 000	489 000	800	900	1 100
	2014	174 800	281 600	405 000	700	800	1 000
	2015	173 700	284 400	408 000	600	800	900
	2016	178 100	291 700	419 000	600	800	900
Eritrea	2010	57 800	92 200	131 100	≤100	180	400
	2011	53 500	84 600	118 800	≤100	160	300
	2012	36 100	58 200	84 100		≤100	
	2013	34 100	54 600	77 700		≤100	
	2014	47 100	74 300	104 700	≤10	160	300
	2015	29 880	47 300	66 600		≤100	
	2016	44 000	72 800	107 400	≤10	170	400
Ethiopia	2010	608 000	4 840 000	14 020 000	180	9 000	33 700
	2011	616 000	3 260 000	11 140 000	170	5 000	21 840
	2012	645 000	3 650 000	12 490 000	180	6 000	24 990
	2013	574 000	3 780 000	12 940 000	150	7 000	29 400
	2014	612 000	3 170 000	7 350 000	200	5 000	16 420
	2015	586 000	2 818 000	6 460 000	180	5 000	15 440
	2016	573 000	2 588 000	5 850 000	170	5 000	14 630
Gabon	2010	85 600	220 000	397 000	290	300	400
	2011	114 600	265 100	471 000	310	400	400
	2012	145 400	326 000	625 000	300	400	400
	2013	157 500	375 000	690 000	400	400	500
	2014	166 900	392 000	712 000	400	400	500
	2015	170 900	401 000	730 000	400	400	500
	2016	173 700	408 000	743 000	400	500	500

Annex 3 - F.a. Estimated malaria cases and deaths, 2010–2016

WHO region Country/area	Year	Cases			Deaths		
		Lower	Point	Upper	Lower	Point	Upper
AFRICAN							
Gambia	2010	326 000	434 000	567 000	500	600	700
	2011	357 000	445 000	537 000	500	600	700
	2012	404 000	512 000	628 000	500	600	700
	2013	332 000	432 000	540 000	500	600	700
	2014	219 600	285 300	356 000	500	600	700
	2015	320 000	416 000	519 000	500	600	700
	2016	203 500	264 200	329 000	500	600	700
Ghana	2010	5 910 000	8 730 000	12 340 000	13 800	16 060	18 310
	2011	6 250 000	9 070 000	12 770 000	13 810	16 020	18 230
	2012	5 890 000	8 670 000	12 370 000	12 800	14 700	16 600
	2013	5 510 000	8 250 000	12 080 000	12 240	13 940	15 650
	2014	5 360 000	8 040 000	11 840 000	11 790	13 330	14 870
	2015	5 190 000	7 890 000	11 710 000	11 490	12 900	14 300
	2016	5 300 000	8 060 000	11 950 000	11 510	12 880	14 250
Guinea	2010	2 973 000	4 420 000	6 270 000	9 000	11 050	13 320
	2011	3 170 000	4 550 000	6 300 000	9 000	11 090	13 360
	2012	3 380 000	4 680 000	6 350 000	9 000	11 270	13 580
	2013	3 260 000	4 650 000	6 410 000	8 000	10 460	12 560
	2014	3 270 000	4 680 000	6 460 000	8 000	10 190	12 230
	2015	3 210 000	4 640 000	6 460 000	8 000	9 000	11 210
	2016	3 310 000	4 790 000	6 660 000	7 000	9 000	11 040
Guinea-Bissau	2010	78 400	145 400	262 800	500	600	700
	2011	72 400	152 000	289 500	500	600	700
	2012	66 100	149 400	324 000	500	600	700
	2013	55 500	151 000	342 000	500	600	700
	2014	52 200	142 700	331 000	500	600	700
	2015	46 900	130 300	311 500	500	600	700
	2016	47 900	132 600	317 000	500	600	700
Kenya	2010	1 611 000	2 922 000	4 880 000	9 000	10 000	11 220
	2011	1 477 000	2 723 000	4 600 000	9 000	10 190	11 480
	2012	1 450 000	2 811 000	4 770 000	9 000	10 230	11 490
	2013	1 552 000	3 059 000	5 290 000	9 000	10 330	11 560
	2014	1 753 000	3 420 000	5 860 000	9 000	10 540	11 770
	2015	1 781 000	3 470 000	5 960 000	9 000	10 650	11 860
	2016	1 814 000	3 520 000	6 040 000	10 000	10 780	11 970
Liberia	2010	810 000	1 294 000	1 968 000	2 100	2 500	2 900
	2011	739 000	1 234 000	1 941 000	1 900	2 300	2 600
	2012	657 000	1 125 000	1 920 000	1 700	2 000	2 300
	2013	642 000	1 131 000	2 038 000	1 700	2 000	2 300
	2014	652 000	1 154 000	2 073 000	1 700	2 000	2 300
	2015	581 000	1 076 000	2 016 000	1 600	1 900	2 100
	2016	593 000	1 094 000	2 047 000	1 700	1 900	2 200
Madagascar	2010	516 000	920 000	1 450 000	≤100	2 400	5 000
	2011	476 000	843 000	1 267 000	≤100	2 200	5 000
	2012	934 000	1 673 000	2 663 000	120	4 000	10 000
	2013	967 000	1 650 000	2 576 000	120	4 000	9 000
	2014	757 000	1 215 000	1 781 000	≤100	3 100	6 000
	2015	1 472 000	2 358 000	3 450 000	180	6 000	12 460
	2016	943 000	1 504 000	2 203 000	110	4 000	8 000
Malawi	2010	4 030 000	5 870 000	8 070 000	9 000	11 010	12 890
	2011	3 740 000	5 410 000	7 620 000	8 000	10 000	11 220
	2012	3 270 000	4 670 000	6 670 000	7 000	8 000	10 000
	2013	2 829 000	4 190 000	5 980 000	7 000	8 000	9 000
	2014	3 028 000	4 500 000	6 440 000	7 000	8 000	9 000
	2015	2 952 000	4 390 000	6 310 000	6 000	7 000	8 000
	2016	3 025 000	4 510 000	6 470 000	6 000	7 000	8 000
Mali	2010	3 830 000	5 360 000	7 500 000	11 370	14 410	17 450
	2011	4 220 000	5 870 000	8 190 000	12 840	16 310	19 780
	2012	4 930 000	6 820 000	9 390 000	15 870	20 260	24 650
	2013	5 380 000	7 450 000	10 130 000	17 790	22 770	27 750
	2014	5 470 000	7 550 000	10 300 000	17 140	21 910	26 680
	2015	5 550 000	7 680 000	10 510 000	16 510	21 070	25 640
	2016	5 700 000	7 910 000	10 830 000	16 380	20 890	25 400

WHO region Country/area	Year	Cases			Deaths		
		Lower	Point	Upper	Lower	Point	Upper
AFRICAN							
Mauritania	2010	22 560	136 100	298 900	900	1 100	1 300
	2011	36 200	148 100	309 700	900	1 100	1 300
	2012	12 950	79 100	183 000	900	1 100	1 300
	2013	13 190	74 200	166 600	1 000	1 100	1 300
	2014	74 200	207 000	402 000	1 000	1 200	1 400
	2015	99 000	250 000	473 000	1 000	1 200	1 400
	2016	139 500	313 000	563 000	1 000	1 200	1 400
Mayotte	2010	280	500	1 600		≤10	
	2011	≤100	120	400		0	
	2012		≤100			0	
	2013		≤10			0	
	2014		≤10			0	
	2015		0			0	
	2016		≤100			0	
Mozambique	2010	6 260 000	8 720 000	11 740 000	13 660	16 670	19 670
	2011	6 580 000	9 050 000	12 300 000	13 640	16 600	19 550
	2012	6 720 000	9 520 000	13 140 000	14 020	17 050	20 080
	2013	6 320 000	9 320 000	13 250 000	13 540	16 380	19 220
	2014	5 990 000	8 920 000	12 630 000	12 690	15 230	17 760
	2015	5 800 000	8 680 000	12 420 000	12 020	14 290	16 570
	2016	5 930 000	8 870 000	12 700 000	12 110	14 370	16 630
Namibia	2010	1 100	3 000	7 000		≤10	
	2011	3 000	4 000	6 000		≤100	
	2012	3 100	7 000	10 810		≤100	
	2013	7 000	9 000	11 080		≤100	
	2014	22 140	28 770	35 800		≤100	
	2015	16 890	21 990	27 420		≤100	
	2016	35 000	45 500	56 700	≤10	120	220
Niger	2010	3 810 000	6 800 000	11 190 000	16 290	21 180	26 070
	2011	3 660 000	7 180 000	11 690 000	16 340	21 210	26 080
	2012	3 640 000	7 250 000	11 950 000	15 540	20 110	24 680
	2013	3 430 000	7 080 000	11 840 000	14 240	18 350	22 450
	2014	3 510 000	7 270 000	12 170 000	14 050	18 050	22 050
	2015	3 590 000	7 490 000	12 580 000	13 570	17 370	21 170
	2016	3 760 000	7 830 000	13 150 000	13 930	17 800	21 680
Nigeria	2010	39 200 000	55 900 000	76 700 000	94 200	121 000	147 800
	2011	37 500 000	54 500 000	76 900 000	85 500	109 800	134 100
	2012	35 900 000	53 600 000	79 500 000	80 500	103 400	126 200
	2013	34 900 000	54 600 000	81 100 000	82 000	105 200	128 300
	2014	35 400 000	55 500 000	82 400 000	82 100	105 300	128 500
	2015	35 500 000	56 200 000	83 500 000	78 700	100 800	123 000
	2016	36 200 000	57 300 000	85 300 000	78 700	100 700	122 800
Rwanda	2010	738 000	1 086 000	1 475 000	3 000	4 000	4 000
	2011	238 400	328 000	430 000	3 100	3 000	4 000
	2012	545 000	710 000	899 000	3 000	4 000	4 000
	2013	1 072 000	1 334 000	1 623 000	3 000	4 000	4 000
	2014	1 793 000	2 233 000	2 717 000	3 000	4 000	4 000
	2015	2 787 000	3 470 000	4 230 000	4 000	4 000	4 000
	2016	3 760 000	4 680 000	5 690 000	4 000	4 000	4 000
Sao Tome and Principe	2010		2 700			≤100	
	2011		8 000			≤100	
	2012		12 550			≤10	
	2013		9 000			≤100	
	2014		1 800			0	
	2015		2 100			0	
	2016		2 200			0	
Senegal	2010	811 000	1 307 000	1 914 000	3 000	4 000	5 000
	2011	742 000	1 202 000	1 741 000	3 000	4 000	4 000
	2012	772 000	1 266 000	1 854 000	3 000	4 000	4 000
	2013	969 000	1 588 000	2 318 000	4 000	4 000	4 000
	2014	675 000	1 065 000	1 522 000	4 000	4 000	5 000
	2015	770 000	1 069 000	1 397 000	4 000	4 000	5 000
	2016	541 000	753 000	982 000	4 000	4 000	5 000

Annex 3 - F.a. Estimated malaria cases and deaths, 2010–2016

WHO region Country/area	Year	Cases			Deaths		
		Lower	Point	Upper	Lower	Point	Upper
AFRICAN							
Sierra Leone	2010	1 494 000	2 587 000	3 810 000	10 530	13 340	16 160
	2011	1 527 000	2 545 000	3 790 000	10 000	12 130	14 650
	2012	1 535 000	2 480 000	3 690 000	9 000	10 750	12 930
	2013	1 505 000	2 405 000	3 750 000	7 000	9 000	11 190
	2014	1 445 000	2 346 000	3 720 000	7 000	8 000	10 000
	2015	1 292 000	2 223 000	3 600 000	6 000	7 000	8 000
	2016	1 307 000	2 244 000	3 640 000	6 000	7 000	8 000
South Africa	2010		8 000			≤100	
	2011		10 000			≤100	
	2012		6 000			≤100	
	2013		9 000			100	
	2014		11 700			170	
	2015		600			110	
	2016		4 000			≤100	
South Sudan[1]	2010	844 000	1 764 000	2 984 000	5 000	6 000	7 000
	2011	811 000	1 730 000	3 025 000	5 000	6 000	7 000
	2012	816 000	1 727 000	3 170 000	5 000	6 000	7 000
	2013	792 000	1 734 000	3 280 000	5 000	6 000	7 000
	2014	895 000	1 929 000	3 610 000	5 000	6 000	7 000
	2015	857 000	1 872 000	3 550 000	5 000	6 000	7 000
	2016	889 000	1 945 000	3 690 000	5 000	6 000	7 000
Swaziland	2010		270			0	
	2011		500			≤10	
	2012		600			≤10	
	2013		1 000			≤10	
	2014		700			≤10	
	2015		160			0	
	2016		400			0	
Togo	2010	1 772 000	2 568 000	3 740 000	5 000	6 000	7 000
	2011	1 779 000	2 574 000	3 580 000	4 000	5 000	6 000
	2012	1 813 000	2 639 000	3 670 000	4 000	5 000	6 000
	2013	1 833 000	2 690 000	3 770 000	4 000	5 000	6 000
	2014	1 791 000	2 658 000	3 740 000	4 000	5 000	5 000
	2015	1 812 000	2 683 000	3 780 000	4 000	4 000	5 000
	2016	1 850 000	2 741 000	3 870 000	4 000	4 000	5 000
Uganda	2010	8 990 000	13 410 000	19 920 000	20 330	25 370	30 410
	2011	8 020 000	12 310 000	18 980 000	16 590	20 580	24 560
	2012	6 540 000	10 370 000	16 250 000	13 080	16 000	18 930
	2013	5 010 000	8 270 000	13 060 000	10 780	12 930	15 080
	2014	4 700 000	7 920 000	12 560 000	10 570	12 590	14 600
	2015	4 460 000	7 610 000	12 150 000	10 240	12 080	13 920
	2016	4 550 000	7 770 000	12 390 000	10 280	12 060	13 850
United Republic of Tanzania	2010	4 350 000	7 070 000	10 870 000	15 070	17 540	20 010
	2011	3 920 000	6 470 000	9 910 000	14 920	17 240	19 560
	2012	3 450 000	5 800 000	8 520 000	14 860	17 050	19 230
	2013	3 520 000	5 920 000	8 680 000	15 610	17 920	20 240
	2014	3 870 000	6 460 000	9 440 000	16 080	18 430	20 780
	2015	3 990 000	6 660 000	9 720 000	16 370	18 690	21 010
	2016	4 120 000	6 880 000	10 040 000	16 640	18 930	21 210
Zambia	2010	1 490 000	2 212 000	3 149 000	5 000	6 000	7 000
	2011	1 529 000	2 251 000	3 250 000	5 000	6 000	7 000
	2012	1 774 000	2 595 000	3 800 000	5 000	6 000	7 000
	2013	2 192 000	3 290 000	4 880 000	6 000	7 000	8 000
	2014	2 237 000	3 350 000	4 980 000	6 000	7 000	8 000
	2015	2 030 000	3 083 000	4 680 000	6 000	7 000	8 000
	2016	2 075 000	3 149 000	4 780 000	6 000	7 000	8 000
Zimbabwe	2010	619 000	1 146 000	1 838 000	≤100	2 900	7 000
	2011	464 000	770 000	1 128 000	≤100	2 000	4 000
	2012	401 000	667 000	975 000	≤100	1 700	4 000
	2013	613 000	1 018 000	1 491 000	≤100	2 600	6 000
	2014	777 000	1 293 000	1 891 000	≤100	3 000	7 000
	2015	567 000	944 000	1 381 000	≤100	2 400	5 000
	2016	406 000	675 000	990 000	≤100	1 700	4 000

WHO region Country/area	Year	Cases			Deaths		
		Lower	Point	Upper	Lower	Point	Upper
AMERICAS							
Belize	2010		150			0	
	2011		≤100			0	
	2012		≤100			0	
	2013		≤100			0	
	2014		≤100			0	
	2015		≤10			0	
	2016		≤10			0	
Bolivia (Plurinational State of)	2010	6 000	17 190	35 900		≤100	
	2011	3 000	9 000	18 410		≤10	
	2012	3 000	9 000	18 800		≤10	
	2013	3 000	9 000	18 480		≤10	
	2014	3 000	9 000	18 830		≤10	
	2015	3 000	9 000	17 400		≤10	
	2016	2 400	7 000	14 030		≤10	
Brazil	2010	370 000	423 000	474 000		≤100	
	2011	295 400	338 000	378 000		≤100	
	2012	268 200	307 000	343 000		≤100	
	2013	196 700	225 000	251 600		≤100	
	2014	154 100	176 200	196 900		≤100	
	2015	153 000	174 900	195 500		≤100	
	2016	137 300	157 100	175 700		≤100	
Colombia	2010	133 700	180 900	231 700		≤100	
	2011	73 100	98 900	126 600		≤100	
	2012	68 300	92 600	118 500		≤100	
	2013	58 800	79 600	101 900		≤10	
	2014	46 400	62 700	80 300		≤100	
	2015	54 700	74 100	94 900		≤100	
	2016	98 800	134 400	173 200		≤100	
Dominican Republic	2010	4 000	5 000	6 000		≤100	
	2011	1 800	2 200	2 700		≤10	
	2012	1 100	1 300	1 600		≤10	
	2013	600	800	1 000		≤10	
	2014	500	600	800		≤10	
	2015	700	900	1 000		≤10	
	2016	800	1 000	1 100		≤10	
Ecuador	2010		1 900			0	
	2011		1 200			0	
	2012		500			0	
	2013		400			0	
	2014		240			0	
	2015		600			0	
	2016		1 200			0	
El Salvador	2010		≤100			0	
	2011		≤10			0	
	2012		≤100			0	
	2013		≤10			0	
	2014		≤10			0	
	2015		≤10			0	
	2016		≤100			0	
French Guiana	2010	700	2 000	4 000		≤10	
	2011	500	1 500	3 100		≤10	
	2012	400	1 100	2 300		≤10	
	2013	400	1 100	2 200		≤10	
	2014	200	600	1 100		≤10	
	2015	100	300	600		0	
	2016	≤100	160	300		0	
Guatemala	2010	3 000	9 000	19 250		≤10	
	2011	3 000	9 000	17 510		≤10	
	2012	2 300	7 000	13 590		≤10	
	2013	2 700	8 000	15 780		≤10	
	2014	2 500	7 000	14 470		≤10	
	2015	3 000	9 000	17 210		≤10	
	2016	2 100	6 000	12 310		≤10	

Annex 3 - F.a. Estimated malaria cases and deaths, 2010–2016

WHO region Country/area	Year	Cases			Deaths		
		Lower	Point	Upper	Lower	Point	Upper
AMERICAS							
Guyana	2010	33 200	45 600	59 800		≤100	
	2011	42 700	58 700	77 100	≤10	110	210
	2012	45 800	63 000	82 500	≤10	110	210
	2013	56 800	84 800	121 600	≤100	140	270
	2014	22 310	33 300	47 700		≤100	
	2015	18 040	26 920	38 700		≤100	
	2016	22 370	33 300	47 800		≤100	
Haiti	2010	111 500	207 600	336 000	≤100	500	1 200
	2011	102 800	177 900	275 900	≤100	500	1 000
	2012	78 300	134 000	207 000	≤10	300	700
	2013	66 800	114 500	176 900	≤10	290	600
	2014	43 400	68 900	97 300	≤10	180	400
	2015	43 200	68 500	96 700	≤10	180	400
	2016	54 000	85 700	121 000	≤10	220	400
Honduras	2010	14 960	20 340	26 250		≤100	
	2011	11 530	15 490	19 830		≤10	
	2012	10 000	13 020	16 520		≤10	
	2013	8 000	10 960	13 910		≤10	
	2014	5 000	7 000	9 000		≤10	
	2015	5 000	7 000	9 000		≤10	
	2016	7 000	9 000	11 140		≤10	
Mexico	2010		1 200			0	
	2011		1 100			0	
	2012		800			0	
	2013		500			0	
	2014		700			0	
	2015		500			0	
	2016		600			0	
Nicaragua	2010	1 100	1 400	1 700		≤10	
	2011	1 400	1 800	2 300		≤10	
	2012	1 900	2 500	3 000		≤10	
	2013	1 800	2 300	2 800		≤10	
	2014	1 800	2 300	2 800		≤10	
	2015	4 000	5 000	6 000		≤10	
	2016	10 000	12 460	15 380		≤100	
Panama	2010	400	500	500		≤10	
	2011	400	400	400		0	
	2012	900	1 000	1 100		≤10	
	2013	700	800	900		0	
	2014	900	1 000	1 100		0	
	2015	600	700	700		0	
	2016	800	900	1 000		0	
Peru	2010	50 400	63 100	76 500		0	
	2011	41 600	52 600	64 000		≤10	
	2012	54 700	69 400	85 000		≤10	
	2013	84 700	107 700	132 000		≤10	
	2014	113 500	144 200	176 500		≤10	
	2015	107 600	136 700	167 500		≤10	
	2016	98 600	125 000	153 100		≤10	
Suriname	2010		1 700			≤10	
	2011		800			≤10	
	2012		400			0	
	2013		700			≤10	
	2014		400			≤10	
	2015		≤100			0	
	2016		≤100			0	
Venezuela (Bolivarian Republic of)	2010	19 690	56 600	118 100		≤100	
	2011	20 740	57 400	117 100	≤10	100	250
	2012	23 060	66 200	133 900		≤100	
	2013	34 800	98 500	199 300	≤100	110	260
	2014	40 300	113 900	229 900	≤100	120	270
	2015	60 800	171 200	343 000	≤100	160	400
	2016	104 800	300 900	608 000	≤100	280	600

WHO region Country/area	Year	Cases			Deaths		
		Lower	Point	Upper	Lower	Point	Upper
EASTERN MEDITERRANEAN							
Afghanistan	2010	207 600	348 000	534 000	≤100	200	400
	2011	246 400	424 000	655 000	≤100	230	400
	2012	168 200	285 500	442 000	≤100	120	230
	2013	116 800	194 200	299 900		≤100	
	2014	180 800	275 200	398 000	≤100	130	230
	2015	261 900	398 000	571 000	≤100	190	300
	2016	398 000	556 000	751 000	≤100	270	500
Djibouti	2010	400	1 000	2 300		≤10	
	2011	300	900	2 700		≤10	
	2012	290	1 400	4 000		≤10	
	2013	400	2 100	7 000		≤10	
	2014	400	2 200	7 000		≤10	
	2015	400	2 200	7 000		≤10	
	2016	400	2 300	7 000		≤10	
Iran (Islamic Republic of)	2010		1 800			0	
	2011		1 600			0	
	2012		800			0	
	2013		500			0	
	2014		400			0	
	2015		170			≤10	
	2016		≤100			0	
Pakistan	2010	777 000	1 645 000	3 004 000	230	1 900	4 000
	2011	1 060 000	2 101 000	3 660 000	300	2 000	4 000
	2012	924 000	1 857 000	3 310 000	270	1 900	4 000
	2013	863 000	1 588 000	2 706 000	250	1 200	2 200
	2014	839 000	1 547 000	2 649 000	240	1 100	2 100
	2015	612 000	1 161 000	2 038 000	180	900	1 800
	2016	874 000	1 307 000	1 933 000	210	1 100	2 000
Saudi Arabia	2010		≤100			0	
	2011		≤100			0	
	2012		≤100			0	
	2013		≤100			0	
	2014		≤100			0	
	2015		≤100			0	
	2016		270			0	
Somalia	2010	167 100	276 500	442 000	≤100	700	1 600
	2011	160 200	283 200	478 000	≤100	800	1 800
	2012	206 600	424 000	810 000	≤100	1 300	3 100
	2013	291 100	638 000	1 306 000	≤100	2 000	5 000
	2014	322 000	645 000	1 481 000	≤100	2 100	5 000
	2015	320 000	642 000	1 474 000	≤100	2 100	5 000
	2016	326 000	650 000	1 490 000	≤100	2 100	5 000
Sudan	2010	770 000	1 131 000	1 927 000	110	3 200	7 000
	2011	743 000	1 089 000	1 805 000	110	3 000	6 000
	2012	768 000	1 132 000	1 885 000	110	3 100	7 000
	2013	785 000	1 210 000	2 075 000	120	3 000	7 000
	2014	829 000	1 268 000	2 160 000	120	4 000	8 000
	2015	841 000	1 288 000	2 199 000	130	4 000	8 000
	2016	855 000	1 305 000	2 222 000	130	4 000	8 000
Yemen	2010	330 000	506 000	763 000	≤100	1 200	2 600
	2011	269 700	409 000	614 000	≤100	1 000	2 100
	2012	327 000	495 000	742 000	≤100	1 200	2 500
	2013	302 300	458 000	686 000	≤100	1 100	2 300
	2014	254 000	384 000	574 000	≤100	900	1 900
	2015	222 300	336 000	502 000	≤100	800	1 700
	2016	287 100	433 000	647 000	≤100	1 100	2 200
EUROPEAN							
Tajikistan	2010	120	130	140		0	
	2011		≤100			0	
	2012		≤100			0	
	2013		≤10			0	
	2014		≤10			0	
	2015		0			0	
	2016		0			0	

Annex 3 - F.a. Estimated malaria cases and deaths, 2010–2016

WHO region Country/area	Year	Cases			Deaths		
		Lower	Point	Upper	Lower	Point	Upper
SOUTH-EAST ASIA							
Bangladesh	2010	64 400	79 300	95 300	≤10	190	300
	2011	57 300	69 700	82 500	≤10	170	300
	2012	11 340	13 750	16 330		≤100	
	2013	4 000	5 000	6 000		≤100	
	2014	11 110	12 990	14 840		≤100	
	2015	7 000	8 000	10 000		≤100	
	2016	5 000	6 000	7 000		≤100	
Bhutan	2010		400			≤10	
	2011		190			≤10	
	2012		≤100			≤10	
	2013		≤100			0	
	2014		≤100			0	
	2015		≤100			0	
	2016		≤100			0	
Democratic People's Republic of Korea	2010		13 520			0	
	2011		16 760			0	
	2012		21 850			0	
	2013		14 410			0	
	2014		10 540			0	
	2015		800			0	
	2016		2 700			0	
India	2010	15 580 000	21 090 000	28 440 000	2 800	32 600	65 400
	2011	13 330 000	17 930 000	24 010 000	2 500	26 890	49 500
	2012	10 880 000	14 640 000	19 640 000	2 000	21 440	39 500
	2013	8 680 000	11 540 000	15 290 000	1 500	17 820	35 500
	2014	8 900 000	11 850 000	15 720 000	1 500	21 560	40 500
	2015	9 580 000	12 670 000	16 660 000	1 600	23 390	43 800
	2016	9 400 000	13 170 000	18 300 000	1 600	23 990	46 500
Indonesia	2010	2 107 000	2 715 000	3 510 000	400	4 000	8 000
	2011	1 926 000	2 469 000	3 170 000	300	4 000	7 000
	2012	1 919 000	2 453 000	3 142 000	300	4 000	7 000
	2013	1 579 000	2 017 000	2 584 000	270	3 100	6 000
	2014	1 158 000	1 479 000	1 893 000	200	2 400	4 000
	2015	999 000	1 274 000	1 630 000	170	2 000	4 000
	2016	1 004 000	1 281 000	1 643 000	160	2 200	4 000
Myanmar	2010	1 437 000	2 155 000	3 147 000	250	4 000	8 000
	2011	1 128 000	1 506 000	1 987 000	180	2 800	5 000
	2012	1 364 000	1 974 000	2 815 000	230	4 000	8 000
	2013	446 000	585 000	766 000	≤100	1 100	2 100
	2014	274 400	360 000	472 000	≤100	700	1 300
	2015	200 000	236 500	273 900	≤100	400	700
	2016	120 600	142 600	165 000	≤100	240	400
Nepal	2010	20 270	43 400	80 800		≤100	
	2011	17 800	32 700	56 300		≤100	
	2012	10 960	20 520	36 400		≤100	
	2013	10 000	16 230	26 080		≤100	
	2014	4 000	8 000	14 170		≤10	
	2015	3 000	7 000	12 230		≤10	
	2016	2 500	4 000	7 000		≤10	
Thailand	2010		32 500			≤100	
	2011		24 900			≤100	
	2012		32 600			≤100	
	2013		33 300			≤100	
	2014		37 900			≤100	
	2015		8 000			≤100	
	2016		11 520			≤100	
Timor-Leste	2010	78 800	113 300	153 500	≤100	220	400
	2011	27 780	36 200	45 900		≤100	
	2012	7 000	8 000	10 000		≤100	
	2013	1 300	1 600	1 900		≤10	
	2014	400	500	600		0	
	2015	≤100	120	150		0	
	2016	120	140	170		0	

WHO region Country/area	Year	Cases			Deaths		
		Lower	Point	Upper	Lower	Point	Upper
WESTERN PACIFIC							
Cambodia	2010	139 800	175 000	213 200	≤100	300	600
	2011	162 900	203 600	248 000	≤100	400	600
	2012	116 900	146 000	178 000	≤100	220	400
	2013	61 100	76 500	93 300	≤100	110	180
	2014	71 700	89 700	109 100	≤100	150	270
	2015	96 300	120 300	146 700	≤100	210	400
	2016	66 600	83 300	101 400	≤100	140	250
China	2010		5 000			≤100	
	2011		3 000			≤100	
	2012		240			0	
	2013		≤100			0	
	2014		≤100			0	
	2015		≤100			0	
	2016		≤10			0	
Lao People's Democratic Republic	2010	39 300	51 000	63 500	≤10	120	230
	2011	33 000	42 800	53 300		≤100	
	2012	86 800	112 700	140 500	≤100	250	500
	2013	72 100	93 500	116 600	≤100	170	300
	2014	90 500	117 300	146 100	≤100	180	300
	2015	67 800	87 900	109 500	≤100	120	200
	2016	21 130	27 390	34 100		≤100	
Malaysia	2010		5 000			≤100	
	2011		4 000			≤100	
	2012		4 000			≤100	
	2013		2 900			≤10	
	2014		3 100			≤10	
	2015		240			≤10	
	2016		270			≤10	
Papua New Guinea	2010	506 000	1 342 000	2 348 000	120	2 900	7 000
	2011	437 000	1 130 000	1 967 000	≤100	2 600	6 000
	2012	528 000	1 452 000	2 718 000	120	3 000	8 000
	2013	901 000	1 617 000	2 492 000	140	4 000	8 000
	2014	828 000	1 260 000	1 739 000	150	2 400	5 000
	2015	687 000	1 014 000	1 402 000	110	2 100	4 000
	2016	990 000	1 407 000	1 887 000	150	3 000	6 000
Philippines	2010	35 800	53 200	72 400	≤10	110	230
	2011	17 940	25 970	34 800		≤100	
	2012	13 140	18 630	24 610		≤100	
	2013	11 720	16 290	21 240		≤100	
	2014	9 000	12 210	15 910		≤100	
	2015	14 810	20 580	26 810		≤100	
	2016	12 000	16 630	21 660		≤100	
Republic of Korea	2010		1 300			≤10	
	2011		500			≤10	
	2012		400			0	
	2013		400			0	
	2014		600			0	
	2015		600			0	
	2016		600			0	
Solomon Islands	2010	67 600	95 900	133 500	≤100	170	400
	2011	45 700	66 200	94 000	≤10	120	230
	2012	39 800	55 000	75 100		≤100	
	2013	41 300	56 400	76 400		≤100	
	2014	24 300	30 780	38 500		≤100	
	2015	31 590	39 400	48 500		≤100	
	2016	70 300	86 000	103 200	≤100	110	180
Vanuatu	2010	10 890	13 780	17 120		≤100	
	2011	7 000	10 000	12 960		≤100	
	2012	5 000	7 000	9 000		≤100	
	2013	4 000	5 000	6 000		≤10	
	2014	1 500	1 900	2 600		≤10	
	2015	500	600	700		0	
	2016	2 800	4 000	5 000		≤10	

Annex 3 - F.a. Estimated malaria cases and deaths, 2010–2016

WHO region Country/area	Year	Cases			Deaths		
		Lower	Point	Upper	Lower	Point	Upper
WESTERN PACIFIC							
Viet Nam	2010	21 840	25 460	29 020		≤100	
	2011	19 650	22 630	25 460		≤100	
	2012	23 150	26 610	29 850		≤100	
	2013	20 160	23 140	25 960		≤100	
	2014	18 460	21 200	23 740		≤100	
	2015	10 940	12 560	14 070		≤100	
	2016	5 000	6 000	6 000		≤10	

[1] South Sudan became an independent 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 contemporary South Sudan) and low-transmission areas (15 northern states which correspond to contemporary Sudan) are reported separately.

WHO region Country/area	Year	Cases			Deaths		
		Lower	Point	Upper	Lower	Point	Upper
REGIONAL SUMMARY							
African	2010	185 400 000	204 500 000	243 900 000	492 000	538 000	585 000
	2011	178 600 000	196 700 000	237 600 000	446 000	484 000	524 000
	2012	173 100 000	190 800 000	235 100 000	409 000	445 000	482 000
	2013	170 100 000	189 300 000	234 500 000	394 000	430 000	469 000
	2014	170 900 000	190 000 000	234 700 000	389 000	423 000	457 000
	2015	171 100 000	190 800 000	236 000 000	377 000	409 000	442 000
	2016	175 100 000	194 500 000	240 800 000	375 000	407 000	438 000
Americas	2010	902 000	1 038 000	1 193 000	250	800	1 500
	2011	719 000	826 000	946 000	250	800	1 400
	2012	677 000	769 000	873 000	210	600	1 100
	2013	645 000	745 000	865 000	220	600	1 000
	2014	536 000	628 000	747 000	160	400	700
	2015	560 000	684 000	859 000	170	400	700
	2016	666 000	875 000	1 185 000	260	700	1 100
Eastern Mediterranean	2010	2 938 000	3 910 000	5 650 000	2 600	7 000	11 760
	2011	3 220 000	4 310 000	6 210 000	2 700	7 000	11 420
	2012	3 180 000	4 200 000	6 080 000	2 900	8 000	12 420
	2013	3 180 000	4 090 000	5 890 000	2 600	8 000	13 030
	2014	3 270 000	4 120 000	6 030 000	2 500	8 000	13 130
	2015	3 058 000	3 830 000	5 620 000	2 400	8 000	12 970
	2016	3 550 000	4 250 000	5 920 000	2 700	8 000	13 680
European	2010	180	200	210		0	
	2011		≤100			0	
	2012		≤100			0	
	2013		≤10			0	
	2014		≤10			0	
	2015		0			0	
	2016		0			0	
South-East Asia	2010	20 660 000	26 250 000	33 700 000	9 000	41 700	74 900
	2011	17 430 000	22 080 000	28 210 000	8 000	33 900	57 000
	2012	15 290 000	19 160 000	24 320 000	7 000	29 130	48 300
	2013	11 280 000	14 210 000	17 940 000	4 000	22 150	40 100
	2014	10 780 000	13 760 000	17 610 000	3 000	24 740	43 800
	2015	11 100 000	14 210 000	18 200 000	3 000	25 900	46 400
	2016	10 810 000	14 610 000	19 710 000	3 000	26 520	49 300
Western Pacific	2010	939 000	1 768 000	2 767 000	800	4 000	8 000
	2011	811 000	1 509 000	2 348 000	600	3 000	7 000
	2012	898 000	1 822 000	3 100 000	600	4 000	9 000
	2013	1 174 000	1 891 000	2 771 000	500	4 000	9 000
	2014	1 102 000	1 537 000	2 021 000	500	2 900	5 000
	2015	966 000	1 297 000	1 680 000	400	2 600	5 000
	2016	1 214 000	1 631 000	2 109 000	400	3 000	6 000
Total	2010	217 700 000	237 400 000	278 100 000	532 000	591 000	650 000
	2011	207 000 000	225 400 000	267 000 000	480 000	529 000	577 000
	2012	198 800 000	216 800 000	261 800 000	443 000	487 000	531 000
	2013	191 200 000	210 300 000	256 000 000	423 000	465 000	509 000
	2014	191 100 000	210 100 000	255 700 000	416 000	459 000	500 000
	2015	191 500 000	210 800 000	257 000 000	403 000	446 000	487 000
	2016	196 400 000	215 900 000	262 600 000	402 000	445 000	486 000

Annex 3 - F.b. Population at risk for estimates of malaria cases and deaths, 2010–2016

WHO region Country/area	2010	2011	2012	2013	2014	2015	2016
AFRICAN							
Algeria	1 060 685	1 081 299	1 103 215	1 125 907	1 148 660	1 170 927	1 192 498
Angola	23 369 124	24 218 571	25 096 151	25 998 342	26 920 475	27 859 303	28 813 475
Benin	9 199 254	9 460 802	9 729 160	10 004 442	10 286 715	10 575 962	10 872 305
Botswana	710 347	723 206	736 593	750 414	764 536	778 859	793 336
Burkina Faso	15 605 211	16 081 903	16 571 207	17 072 731	17 585 973	18 110 616	18 646 436
Burundi	8 766 936	9 043 497	9 319 702	9 600 189	9 891 791	10 199 267	10 524 125
Cabo Verde	65 310	66 049	66 818	67 616	68 437	69 278	70 143
Cameroon	17 074 779	17 544 981	18 025 432	18 515 636	19 015 120	19 523 522	20 040 511
Central African Republic	4 448 521	4 476 145	4 490 417	4 499 658	4 515 392	4 546 103	4 594 618
Chad	9 881 854	10 215 578	10 561 789	10 917 971	11 280 292	11 646 047	12 014 422
Comoros	508 928	521 385	534 139	547 157	560 353	573 670	587 077
Congo	4 386 700	4 512 720	4 633 368	4 751 394	4 871 102	4 995 644	5 125 827
Côte d'Ivoire	20 401 332	20 895 315	21 418 603	21 966 307	22 531 354	23 108 477	23 695 923
Democratic Republic of the Congo	63 555 414	65 712 893	67 944 000	70 246 289	72 617 014	75 053 666	77 555 120
Equatorial Guinea	951 102	994 285	1 038 591	1 083 738	1 129 421	1 175 380	1 221 495
Eritrea	3 754 167	3 825 864	3 899 633	3 976 600	4 057 871	4 144 173	4 236 220
Ethiopia	41 746 474	42 862 255	44 003 429	45 166 559	46 346 580	47 539 561	48 743 923
Gabon	1 640 213	1 697 096	1 756 817	1 817 273	1 875 717	1 930 178	1 979 787
Gambia	1 692 147	1 746 369	1 802 122	1 859 331	1 917 851	1 977 584	2 038 507
Ghana	24 512 093	25 121 786	25 733 048	26 346 250	26 962 572	27 582 820	28 206 727
Guinea	10 794 176	11 035 170	11 281 464	11 536 622	11 805 512	12 091 534	12 395 916
Guinea-Bissau	1 555 869	1 596 156	1 638 140	1 681 489	1 725 743	1 770 528	1 815 702
Kenya	35 187 929	36 155 213	37 142 170	38 146 505	39 165 461	40 196 859	41 239 555
Liberia	3 948 136	4 070 173	4 181 557	4 286 293	4 390 744	4 499 620	4 613 828
Madagascar	19 858 048	20 414 134	20 979 907	21 556 889	22 147 093	22 751 972	23 372 043
Malawi	15 167 096	15 627 611	16 097 313	16 577 150	17 068 838	17 573 606	18 091 580
Mali	14 408 152	14 853 449	15 298 522	15 748 831	16 212 409	16 695 124	17 198 735
Mauritania	2 968 271	3 057 185	3 149 758	3 245 093	3 341 930	3 439 304	3 536 902
Mayotte	27 588	28 390	29 191	29 991	30 789	31 589	32 389
Mozambique	24 221 406	24 939 008	25 676 608	26 434 367	27 212 381	28 010 695	28 829 471
Namibia	1 364 053	1 390 695	1 421 026	1 454 029	1 488 220	1 522 469	1 556 461
Niger	16 425 582	17 064 637	17 731 634	18 426 368	19 148 225	19 896 963	20 672 980
Nigeria	139 848 502	143 639 582	147 537 723	151 534 460	155 618 665	159 782 280	164 022 315
Rwanda	10 246 837	10 516 067	10 788 851	11 065 156	11 345 347	11 629 546	11 917 511
Sao Tome and Principe	174 770	178 802	182 893	187 050	191 273	195 549	199 909
Senegal	12 878 992	13 262 559	13 664 012	14 079 619	14 504 178	14 933 812	15 367 182
Sierra Leone	6 458 719	6 611 686	6 766 101	6 922 079	7 079 168	7 237 028	7 396 182
South Africa	3 610 927	3 658 446	3 709 875	3 763 718	3 817 770	3 870 386	3 921 083
South Sudan[1]	10 067 196	10 448 856	10 818 259	11 177 483	11 530 974	11 882 127	12 230 730
Swaziland	168 398	171 536	174 742	178 005	181 314	184 662	188 034
Togo	6 502 946	6 679 278	6 859 485	7 042 947	7 228 905	7 416 806	7 606 369
Uganda	33 915 138	35 093 648	36 306 795	37 553 731	38 833 341	40 144 867	41 487 969
United Republic of Tanzania	39 485 974	40 761 393	42 078 538	43 434 640	44 826 567	46 251 913	47 709 484
Zambia	13 850 036	14 264 756	14 699 937	15 153 206	15 620 967	16 100 579	16 591 381
Zimbabwe	7 561 448	7 722 659	7 896 672	8 081 161	8 272 885	8 469 232	8 669 407
AMERICAS							
Argentina	103 060	104 142	105 242	106 350	107 454	108 544	109 619
Belize	110 954	113 571	116 164	118 745	121 335	123 954	126 599
Bolivia (Plurinational State of)	2 373 709	2 412 025	2 450 475	2 489 069	2 527 816	2 566 716	2 605 769
Brazil	22 237 979	22 451 595	22 663 391	22 872 175	23 076 084	23 273 719	23 464 773
Colombia	7 389 854	7 468 478	7 544 894	7 619 167	7 691 414	7 761 711	7 830 064
Costa Rica	818 150	828 085	837 742	847 152	856 364	865 412	874 309
Dominican Republic	2 796 010	2 832 485	2 868 602	2 904 291	2 939 475	2 974 094	3 008 101
Ecuador	285 880	290 525	295 163	299 793	304 417	309 035	313 643
El Salvador	625 710	628 545	631 456	634 453	637 540	640 717	643 989
French Guiana	75 467	77 571	79 786	82 080	84 399	86 703	86 525
Guatemala	6 520 420	6 662 367	6 805 936	6 950 847	7 096 741	7 243 308	7 390 398

WHO region Country/area	2010	2011	2012	2013	2014	2015	2016
AMERICAS							
Guyana	414 019	415 425	417 642	420 406	423 353	426 194	428 850
Haiti	5 678 817	5 761 421	5 843 287	5 924 248	6 004 146	6 082 860	6 160 247
Honduras	4 755 756	4 846 763	4 936 162	5 024 455	5 112 334	5 200 320	5 288 556
Mexico	1 302 182	1 321 840	1 341 134	1 360 088	1 378 798	1 397 327	1 415 635
Nicaragua	1 498 474	1 516 782	1 534 877	1 552 802	1 570 629	1 588 395	1 606 128
Panama	1 839 046	1 871 634	1 904 527	1 937 600	1 970 679	2 003 620	2 036 369
Paraguay	111 778	113 288	114 826	116 383	117 946	119 504	121 055
Peru	6 503 588	6 589 129	6 677 466	6 767 524	6 857 780	6 947 079	7 035 014
Suriname	50 022	50 544	51 067	51 586	52 098	52 600	53 090
Venezuela (Bolivarian Republic of)	6 185 398	6 278 140	6 369 720	6 460 233	6 549 839	6 638 645	6 726 659
EASTERN MEDITERRANEAN							
Afghanistan	15 022 161	15 494 388	16 009 860	16 549 522	17 084 798	17 595 117	18 074 695
Djibouti	212 787	216 487	220 297	224 173	228 044	231 854	235 586
Iran (Islamic Republic of)	380 816	385 535	390 448	395 463	400 445	405 294	409 977
Iraq	1 999 576	2 062 259	2 130 477	2 202 404	2 275 395	2 347 517	2 418 168
Pakistan	108 499 981	110 805 406	113 176 460	115 594 468	118 033 214	120 472 326	122 904 269
Saudi Arabia	1 098 481	1 131 017	1 164 996	1 199 366	1 232 700	1 263 958	1 292 738
Somalia	9 094 000	9 359 197	9 630 097	9 908 182	10 195 462	10 493 493	10 802 729
Sudan	32 133 681	32 863 852	33 632 833	34 436 247	35 266 076	36 116 370	36 986 413
Yemen	12 151 726	12 483 956	12 822 546	13 165 556	13 510 442	13 855 264	14 199 123
EUROPEAN							
Armenia	0	0	0	0	0	0	0
Azerbaijan	103 873	105 183	106 547	107 931	109 293	110 601	111 842
Georgia	21 158	20 856	20 539	20 230	19 962	19 758	19 627
Kyrgyzstan	2 158	2 192	2 226	2 262	2 298	2 334	2 370
Tajikistan	1 406 059	1 438 134	1 471 092	1 504 717	1 538 745	1 572 951	1 607 231
Turkey	8 209	8 332	8 464	8 602	8 743	8 884	9 025
Turkmenistan	0	0	0	0	0	0	0
Uzbekistan	28 606	29 068	29 541	30 020	30 500	30 976	31 447
SOUTH-EAST ASIA							
Bangladesh	9 140 814	9 246 720	9 355 770	9 466 568	9 576 750	9 684 627	9 789 803
Bhutan	316 526	322 126	327 539	332 758	337 756	342 513	347 023
Democratic People's Republic of Korea	5 491 969	5 521 158	5 550 577	5 580 040	5 609 163	5 637 648	5 665 498
India	649 780 540	658 361 024	666 716 887	674 896 732	682 971 394	690 992 000	698 971 796
Indonesia	129 015 921	130 709 390	132 398 787	134 073 982	135 722 480	137 334 887	138 905 980
Myanmar	18 890 792	19 040 373	19 203 634	19 377 523	19 556 799	19 737 400	19 918 767
Nepal	4 628 293	4 680 362	4 735 645	4 793 086	4 850 962	4 908 005	4 963 923
Sri Lanka	2 322 811	2 336 228	2 348 823	2 360 632	2 371 711	2 382 115	2 391 826
Thailand	7 120 773	7 154 817	7 188 069	7 219 758	7 248 757	7 274 272	7 296 090
Timor-Leste	132 565	135 186	138 201	141 499	144 898	148 263	151 571
WESTERN PACIFIC							
Cambodia	8 502 630	8 638 798	8 780 809	8 926 879	9 074 309	9 220 985	9 366 419
China	286 014 749	287 641 792	289 267 542	290 867 782	292 410 712	293 871 090	295 239 160
Lao People's Democratic Republic	3 250 162	3 295 540	3 338 043	3 379 352	3 421 931	3 467 506	3 516 615
Malaysia	983 931	1 002 230	1 020 966	1 039 735	1 057 981	1 075 310	1 091 554
Papua New Guinea	6 895 001	7 051 273	7 207 906	7 365 077	7 523 104	7 682 231	7 842 443
Philippines	30 409 133	30 912 451	31 427 896	31 951 677	32 477 672	33 001 366	33 521 730
Republic of Korea	1 734 350	1 741 063	1 748 328	1 755 924	1 763 495	1 770 778	1 777 717
Solomon Islands	522 518	534 210	546 019	557 877	569 754	581 601	593 432
Vanuatu	220 861	226 058	231 302	236 598	241 926	247 304	252 727
Viet Nam	35 608 591	35 996 640	36 405 254	36 826 187	37 247 663	37 660 872	38 062 347

[1] South Sudan became an independent 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 contemporary South Sudan) and low-transmission areas (15 northern states which correspond to contemporary Sudan) are reported separately.

Annex 3 - G. Population at risk and reported malaria cases by place of care, 2016

WHO region Country/area	Population			
	UN population	At risk (low + high)	At risk (high)	Number of people living in active foci
AFRICAN				
Angola	28 813 475	28 813 475	28 813 475	-
Benin	10 872 305	10 872 305	10 872 305	-
Botswana	2 250 256	1 491 882	94 790	-
Burkina Faso	18 646 436	18 646 436	18 646 436	-
Burundi	10 524 125	10 524 125	10 524 125	-
Cabo Verde	539 559	-	-	170 786
Cameroon	23 439 194	23 439 194	16 641 828	-
Central African Republic	4 594 618	4 594 618	4 594 618	-
Chad	14 452 545	14 294 354	9 734 495	-
Comoros	795 603	795 603	378 551	-
Congo	5 125 827	5 125 827	5 125 827	-
Côte d'Ivoire	23 695 923	23 695 923	23 695 923	-
Democratic Republic of the Congo	78 736 162	78 736 162	76 374 077	-
Equatorial Guinea	1 221 495	1 221 495	1 221 495	-
Eritrea	4 954 643	4 954 643	3 517 797	-
Ethiopia	102 403 200	69 634 175	27 853 670	-
Gabon	1 979 787	1 979 787	1 979 787	-
Gambia	2 038 507	2 038 507	2 038 507	-
Ghana	28 206 727	28 206 727	28 206 727	-
Guinea	12 395 916	12 395 916	12 395 916	-
Guinea-Bissau	1 815 702	1 815 702	1 815 702	-
Kenya	48 461 564	48 461 564	34 017 550	-
Liberia	4 613 828	4 613 828	4 613 828	-
Madagascar	24 894 543	24 894 543	21 849 543	-
Malawi	18 091 580	18 091 580	18 091 580	-
Mali	17 994 835	17 994 835	16 402 634	-
Mauritania	4 301 022	4 301 022	2 772 783	-
Mayotte	239 917	-	-	-
Mozambique	28 829 471	28 829 471	28 829 471	-
Namibia	2 479 711	1 968 260	1 144 661	-
Niger	20 672 980	20 672 980	20 672 980	-
Nigeria	185 989 645	185 989 645	142 054 940	-
Rwanda	11 917 511	11 917 511	11 917 511	-
Sao Tome and Principe	199 909	199 909	199 909	-
Senegal	15 411 614	15 411 614	15 322 751	-
Sierra Leone	7 396 182	7 396 182	7 396 182	-
South Africa	56 015 475	5 601 548	2 240 619	-
South Sudan[1]	12 230 730	12 230 730	12 230 730	-
Swaziland	1 343 098	376 067	0	-
Togo	7 606 369	7 606 369	7 606 369	-
Uganda	41 487 969	41 487 969	41 487 969	-
United Republic of Tanzania	55 155 473	55 155 473	54 551 284	-
Mainland	53 594 890	53 594 890	53 594 890	-
Zanzibar	1 560 583	1 560 583	956 394	-
Zambia	16 591 381	16 591 381	16 591 381	-
Zimbabwe	16 150 357	12 717 224	4 621 593	-
AMERICAS				
Belize	366 954	-	-	30 856
Bolivia (Plurinational State of)	10 887 879	4 939 515	272 023	-
Brazil	207 652 860	42 153 531	4 776 016	-
Colombia	48 653 432	10 771 432	4 888 697	-
Costa Rica	4 857 274	-	-	44 715
Dominican Republic	10 648 787	5 865 522	150 680	-
Ecuador	16 385 070	-	-	284 640
El Salvador	6 344 720	-	-	9 586
French Guiana	268 054	148 309	24 741	-
Guatemala	16 582 465	12 518 434	2 262 362	-
Guyana	773 302	773 302	84 397	-

Public sector		Private sector		Community level	
Presumed	Confirmed	Presumed	Confirmed	Presumed	Confirmed
506 893	3 794 253	–	–	–	–
50 153	1 324 576	199 975	215 172	6 062	71 042
2	716	0	7	–	–
6 668	9 779 154	–	–	13 739	257
109 327	8 274 062	–	–	–	519 114
–	75	–	–	–	–
115 627	1 675 264	–	–	23 970	18 738
367 762	1 032 764	73 552	206 553	–	–
107 447	1 294 768	–	–	–	–
267	1 066	19	324	0	77
202 405	171 847	–	–	–	–
0	3 471 024	0	109 423	0	174 057
66 876	15 330 841	–	–	0	1 490 289
0	147 714	–	–	–	–
22 804	24 251	–	–	33 395	0
244 492	1 718 504	–	–	–	–
137 593	23 915	–	–	–	–
1 682	153 774	0	2 742	0	6 223
5 913 100	4 535 167	1 209 430	893 812	109 249	0
0	992 146	0	17 445	6 507	130 677
0	150 903	0	4 067	52	1 501
5 538 654	2 783 846	59 164	133 390	43 622	147 560
1 152 273	1 191 137	–	–	–	–
0	475 333	151 027	30 544	530 053	180 147
338 013	4 827 373	–	–	452 086	513 303
154 816	2 156 282	–	–	0	154 816
130 069	29 156	–	–	–	–
0	27	–	–	–	–
0	8 520 376	–	–	682 468	1 170 497
0	25 198	–	–	–	–
908 226	4 148 167	0	0	0	109 943
7 318 051	9 378 257	595 702	1 304 462	2 852 214	3 059 433
0	3 380 568	–	–	–	1 345 009
0	2 238	–	–	–	–
6 732	349 540	–	–	2 161	75 750
70 421	1 775 306	10 026	18 928	102 196	526 342
0	4 323	–	–	–	–
–	7 619	–	–	185 168	136
137	350	0	249	–	–
0	1 183 265	–	–	0	562 969
6 732 294	9 385 132	229 699	350 717	–	–
861 592	5 193 520	36 719	568 495	–	–
861 592	5 188 505	36 719	567 164	–	–
0	5 015	0	1 331	–	–
1 124 873	4 851 319	–	–	0	85 348
865	279 988	–	–	69 161	34 015
0	5	0	0	–	–
0	5 553	–	–	–	–
0	129 251	–	–	–	–
0	63 170	–	–	–	–
0	13	0	2	–	–
0	755	0	80	–	–
0	1 191	–	–	–	–
0	14	0	0	0	0
0	258	–	–	–	–
0	4 854	–	–	–	–
0	12 367	0	161	0	102

Annex 3 - G. Population at risk and reported malaria cases by place of care, 2016

WHO region Country/area	Population			
	UN population	At risk (low + high)	At risk (high)	Number of people living in active foci
AMERICAS				
Haiti	10 847 338	9 691 229	2 629 265	-
Honduras	9 112 865	8 254 451	2 322 660	-
Mexico	127 540 430	-	-	293 619
Nicaragua	6 149 929	2 684 438	527 818	-
Panama	4 034 124	3 902 741	169 998	-
Peru	31 773 838	12 479 556	1 590 471	-
Suriname	558 360	82 470	23 710	-
Venezuela (Bolivarian Republic of)	31 568 183	10 774 694	2 678 623	-
EASTERN MEDITERRANEAN				
Afghanistan	34 656 027	26 713 178	9 436 212	-
Djibouti	942 344	471 172	0	-
Iran (Islamic Republic of)	80 277 430	-	-	456 340
Pakistan	193 203 481	189 940 043	55 868 505	-
Saudi Arabia	32 275 689	-	-	48 183
Somalia	14 317 989	14 317 989	7 287 472	-
Sudan	39 578 826	39 578 826	34 393 999	-
Yemen	27 584 209	21 485 364	6 912 881	-
SOUTH-EAST ASIA				
Bangladesh	162 951 549	17 521 528	2 058 078	-
Bhutan	797 753	-	-	31 516
Democratic People's Republic of Korea	25 368 619	-	-	9 499 488
India	1 324 171 357	1 237 304 392	160 639 200	-
Indonesia	261 115 454	261 115 454	16 696 505	-
Myanmar	52 885 215	31 476 064	8 361 470	-
Nepal	28 982 772	8 413 061	1 514 785	-
Thailand	68 863 519	13 067 679	1 524 501	-
Timor-Leste	1 268 667	215 332	87 810	-
WESTERN PACIFIC				
Cambodia	15 762 371	11 147 062	7 585 781	-
China	1 411 415 363	-	-	2 565
Lao People's Democratic Republic	6 758 354	3 516 617	3 516 615	-
Malaysia	31 187 264	-	-	12 565
Papua New Guinea	8 084 993	8 084 993	7 599 893	-
Philippines	103 320 224	60 002 187	7 041 273	-
Republic of Korea	50 791 925	-	-	-
Solomon Islands	599 426	593 432	593 432	-
Vanuatu	270 405	270 405	235 049	-
Viet Nam	94 569 066	69 696 341	6 428 340	-
REGIONAL SUMMARY				
African	975 577 169	885 786 562	749 142 318	170 786
Americas	545 005 864	125 039 625	22 401 461	663 416
Eastern Mediterranean	422 835 995	292 506 571	113 899 071	504 523
South-East Asia	1 926 404 905	1 569 113 510	190 882 348	9 531 004
Western Pacific	1 722 759 391	153 311 037	33 000 383	15 130
Total	**5 592 583 324**	**3 025 757 305**	**1 109 325 581**	**10 884 859**

[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)

Public sector		Private sector		Community level	
Presumed	Confirmed	Presumed	Confirmed	Presumed	Confirmed
0	21 998	0	203	0	261
0	4 338	0	134	–	–
0	596	0	6	–	–
0	6 284	–	–	–	–
0	811	0	5	–	–
0	56 623	–	–	–	–
0	327	–	–	–	–
0	242 561	–	–	–	–
111 255	139 087	–	–	91 135	51 074
0	13 804	–	–	–	–
0	705	–	–	–	–
1 797 492	318 449	–	–	–	–
0	5 382	–	–	–	–
22 393	35 628	–	–	–	–
322 179	575 015	–	–	–	–
45 927	98 701	553	999	–	–
0	4 787	0	276	0	22 674
0	74	0	14	–	–
80	5 033	–	–	–	–
0	1 090 724	–	–	–	–
0	218 450	–	–	–	–
0	36 742	0	3 030	0	70 374
9 678	1 009	–	–	–	–
0	11 522	0	4 349	0	1 929
1	94	–	–	0	12
0	23 492	0	14 847	0	5 041
14	3 129	–	–	–	–
530	11 223	0	576	0	4 742
0	2 302	0	47	–	–
250 301	478 497	–	–	21 337	56 322
10	6 680	–	–	–	–
0	673	0	673	–	–
30 082	54 431	–	–	–	–
279	1 868	–	–	0	384
6 285	4 161	–	–	–	–
32 190 114	113 845 104	2 565 313	3 856 330	5 112 103	10 377 243
20 057	550 969	0	591	2	363
2 299 246	1 186 771	553	999	91 135	51 074
9 759	1 368 435	0	7 669	0	94 989
287 501	586 456	0	16 143	21 337	66 489
34 806 677	**117 537 735**	**2 565 866**	**3 881 732**	**5 224 577**	**10 590 158**

Annex 3 - H. Reported malaria cases by method of confirmation, 2010–2016

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
AFRICAN								
Algeria	Presumed and confirmed	408	191	887	603	266	747	432
	Microscopy examined	12 224	11 974	15 790	12 762	8 690	8 000	6 628
	Confirmed with microscopy	408	191	887	603	266	747	432
	RDT examined	-	-	-	-	-	0	-
	Confirmed with RDT	-	-	-	-	-	0	-
	Imported cases	396	187	828	587	260	727	420
Angola	Presumed and confirmed	3 687 574	3 501 953	3 031 546	3 144 100	3 180 021	3 254 270	4 301 146
	Microscopy examined	1 947 349	1 765 933	2 245 223	3 025 258	3 398 029	3 345 693	4 183 727
	Confirmed with microscopy	1 324 264	1 147 473	1 056 563	1 462 941	1 431 313	1 396 773	2 058 128
	RDT examined	639 476	833 753	1 069 483	1 103 815	1 855 400	3 009 305	2 959 282
	Confirmed with RDT	358 606	484 809	440 271	536 927	867 666	1 372 532	1 736 125
	Imported cases	-	-	-	-	-	-	-
Benin	Presumed and confirmed	1 432 095	1 424 335	1 513 212	1 670 273	1 509 221	1 495 375	1 374 729
	Microscopy examined	-	88 134	243 008	291 479	155 205	296 264	267 405
	Confirmed with microscopy	-	68 745	-	99 368	108 714	108 061	104 601
	RDT examined	-	475 986	825 005	1 158 526	1 335 582	1 486 667	1 500 047
	Confirmed with RDT	-	354 223	705 839	979 466	935 521	1 160 286	1 219 975
	Imported cases	-	-	-	-	-	-	-
Botswana	Presumed and confirmed	12 196	1 141	308	506	1 485	340	718
	Microscopy examined	-	-	-	-	-	-	5 178
	Confirmed with microscopy	1 046	432	-	-	-	-	-
	RDT examined	-	-	-	-	-	1 284	7 806
	Confirmed with RDT	-	-	193	456	1 346	326	716
	Imported cases	-	-	-	30	30	48	64
Burkina Faso	Presumed and confirmed	5 723 481	5 024 697	6 970 700	7 146 026	8 278 408	8 286 453	9 785 822
	Microscopy examined	177 879	400 005	223 372	183 971	198 947	222 190	191 208
	Confirmed with microscopy	88 540	83 857	90 089	82 875	83 259	92 589	80 077
	RDT examined	940 985	450 281	4 516 273	4 296 350	6 224 055	8 290 188	11 794 810
	Confirmed with RDT	715 999	344 256	3 767 957	3 686 176	5 345 396	6 922 857	9 699 077
	Imported cases	-	-	-	-	-	-	-
Burundi	Presumed and confirmed	4 255 301	3 298 979	2 570 754	4 469 007	4 831 758	5 243 410	8 383 389
	Microscopy examined	2 825 558	2 859 720	2 659 372	4 123 012	4 471 998	3 254 670	3 941 251
	Confirmed with microscopy	1 599 908	1 485 332	1 484 676	2 366 134	2 718 391	1 964 862	2 520 622
	RDT examined	273 324	181 489	1 148 965	2 933 869	2 903 679	5 076 107	8 307 007
	Confirmed with RDT	163 539	86 542	666 400	1 775 253	1 866 882	3 194 844	5 753 440
	Imported cases	-	-	-	-	-	-	-
Cabo Verde	Presumed and confirmed	47	36	36	46	46	28	75
	Microscopy examined	-	-	8 715	10 621	6 894	3 117	8 393
	Confirmed with microscopy	47	-	36	46	46	28	75
	RDT examined	-	26 508	-	-	-	6 620	8 906
	Confirmed with RDT	-	36	-	-	46	28	75
	Imported cases	-	29	35	24	20	21	27
Cameroon	Presumed and confirmed	1 845 691	1 829 266	1 589 317	1 824 633	1 369 518	2 321 933	1 790 891
	Microscopy examined	-	1 110 308	1 182 610	1 236 306	1 086 095	1 024 306	1 373 802
	Confirmed with microscopy	-	-	-	-	-	592 351	810 367
	RDT examined	-	120 466	93 392	591 670	1 254 293	1 128 818	1 740 375
	Confirmed with RDT	-	-	-	-	-	570 433	864 897
	Imported cases	-	-	-	-	-	-	-
Central African Republic	Presumed and confirmed	66 484	221 980	459 999	407 131	495 238	953 535	1 400 526
	Microscopy examined	-	-	-	63 695	55 943	139 241	189 481
	Confirmed with microscopy	-	-	-	36 943	41 436	106 524	144 924
	RDT examined	-	-	55 746	136 548	369 208	724 303	1 249 963
	Confirmed with RDT	-	-	46 759	79 357	253 652	492 309	887 840
	Imported cases	-	-	-	-	-	-	-

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
AFRICAN								
Chad	Presumed and confirmed	544 243	528 454	660 575	1 272 841	1 513 772	1 490 556	1 402 215
	Microscopy examined	89 749	–	69 789	–	–	–	1 063 293
	Confirmed with microscopy	75 342	86 348	–	206 082	160 260	149 574	720 765
	RDT examined	309 927	114 122	–	621 469	1 137 455	937 775	861 561
	Confirmed with RDT	125 106	94 778	–	548 483	753 772	637 472	574 003
	Imported cases	–	–	–	–	–	–	–
Comoros	Presumed and confirmed	103 670	76 661	65 139	62 565	2 465	1 517	1 333
	Microscopy examined	87 595	63 217	125 030	154 824	93 444	89 634	71 902
	Confirmed with microscopy	35 199	22 278	45 507	46 130	1 987	963	559
	RDT examined	5 249	20 226	27 714	21 546	9 839	11 479	22 219
	Confirmed with RDT	1 339	2 578	4 333	7 026	216	337	507
	Imported cases	–	–	–	–	–	–	–
Congo	Presumed and confirmed	446 656	277 263	120 319	183 026	248 159	264 574	374 252
	Microscopy examined	–	–	–	69 375	88 764	87 547	202 922
	Confirmed with microscopy	–	37 744	120 319	43 232	54 523	51 529	134 612
	RDT examined	–	–	–	0	19 746	0	60 927
	Confirmed with RDT	–	–	–	0	11 800	0	37 235
	Imported cases	–	–	–	–	–	–	–
Côte d'Ivoire	Presumed and confirmed	1 721 461	2 588 004	2 795 919	4 708 425	4 658 774	3 606 725	3 471 024
	Microscopy examined	–	49 828	195 546	395 914	568 562	811 426	975 507
	Confirmed with microscopy	62 726	29 976	107 563	215 104	306 926	478 870	579 566
	RDT examined	–	–	1 572 785	3 384 765	4 904 066	4 174 097	4 202 868
	Confirmed with RDT	–	–	1 033 064	2 291 849	3 405 905	2 897 034	2 891 458
	Imported cases	–	–	–	–	–	–	–
Democratic Republic of the Congo	Presumed and confirmed	9 252 959	9 442 144	9 128 398	11 363 817	9 968 983	11 627 473	15 397 717
	Microscopy examined	3 678 849	4 226 533	4 329 318	4 126 129	3 533 165	2 877 585	2 810 067
	Confirmed with microscopy	2 374 930	2 700 818	2 656 864	2 611 478	2 126 554	1 902 640	1 847 143
	RDT examined	54 728	2 912 088	3 327 071	6 096 993	11 114 215	13 574 891	18 630 636
	Confirmed with RDT	42 850	1 861 163	2 134 734	4 103 745	7 842 429	9 724 833	13 483 698
	Imported cases	–	–	–	–	–	–	–
Equatorial Guinea	Presumed and confirmed	78 095	37 267	20 890	25 162	20 417	15 142	147 714
	Microscopy examined	42 585	23 004	33 245	27 039	47 322	21 831	239 938
	Confirmed with microscopy	39 636	20 601	13 196	11 235	17 685	8 564	125 623
	RDT examined	16 772	2 899	6 826	5 489	9 807	46 227	78 841
	Confirmed with RDT	14 177	1 865	1 973	1 894	2 732	6 578	22 091
	Imported cases	–	–	–	–	–	–	–
Eritrea	Presumed and confirmed	53 750	39 567	42 178	34 678	35 725	24 310	47 055
	Microscopy examined	79 024	67 190	84 861	81 541	63 766	59 268	83 599
	Confirmed with microscopy	13 894	15 308	11 557	10 890	10 993	8 332	24 251
	RDT examined	–	25 570	33 758	39 281	53 032	47 744	–
	Confirmed with RDT	22 088	19 540	10 258	10 427	19 775	11 040	–
	Imported cases	–	–	–	–	–	–	–
Ethiopia	Presumed and confirmed	4 068 764	3 549 559	3 876 745	3 316 013	2 513 863	2 174 707	1 962 996
	Microscopy examined	2 509 543	3 418 719	3 778 479	8 573 335	7 062 717	5 679 932	6 367 309
	Confirmed with microscopy	1 158 197	1 480 306	1 692 578	2 645 454	2 118 815	1 867 059	1 718 504
	RDT examined	–	–	–	–	–	–	–
	Confirmed with RDT	–	–	–	–	–	–	–
	Imported cases	–	–	–	–	–	–	–
Gabon	Presumed and confirmed	185 105	178 822	188 089	185 196	185 996	217 287	161 508
	Microscopy examined	54 714	–	66 018	90 185	90 275	79 308	62 658
	Confirmed with microscopy	12 816	–	18 694	26 432	27 687	20 390	22 419
	RDT examined	7 887	–	4 129	10 132	11 812	12 761	2 738
	Confirmed with RDT	1 120	–	1 059	2 550	4 213	3 477	1 496
	Imported cases	–	–	–	–	–	–	–

Annex 3 - H. Reported malaria cases by method of confirmation, 2010–2016

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
AFRICAN								
Gambia	Presumed and confirmed	194 009	261 967	300 363	279 829	166 229	249 437	155 456
	Microscopy examined	290 842	172 241	156 580	236 329	286 111	272 604	165 793
	Confirmed with microscopy	52 245	71 588	29 325	65 666	66 253	49 649	26 397
	RDT examined	123 564	–	705 862	614 128	317 313	609 852	677 346
	Confirmed with RDT	64 108	190 379	271 038	175 126	99 976	190 733	127 377
	Imported cases	–	–	–	–	–	–	–
Ghana	Presumed and confirmed	3 849 536	4 154 261	10 676 731	7 200 797	8 453 557	10 186 510	10 448 267
	Microscopy examined	2 031 674	1 172 838	4 219 097	1 394 249	1 987 959	2 023 581	2 594 918
	Confirmed with microscopy	1 029 384	624 756	2 971 699	721 898	970 448	934 304	1 189 012
	RDT examined	247 278	781 892	1 438 284	1 488 822	3 610 453	5 478 585	5 532 416
	Confirmed with RDT	42 253	416 504	783 467	917 553	2 445 464	3 385 615	3 346 155
	Imported cases	–	–	–	–	–	–	–
Guinea	Presumed and confirmed	1 092 554	1 189 016	1 220 574	775 341	1 595 828	895 016	992 146
	Microscopy examined	–	43 549	–	–	116 767	78 377	79 233
	Confirmed with microscopy	20 936	5 450	191 421	63 353	82 818	52 211	53 805
	RDT examined	–	139 066	–	–	–	1 092 523	1 423 802
	Confirmed with RDT	–	90 124	125 779	147 904	577 389	758 768	938 341
	Imported cases	–	–	–	–	–	–	–
Guinea-Bissau	Presumed and confirmed	140 143	174 986	129 684	132 176	98 952	142 309	150 903
	Microscopy examined	48 799	57 698	61 048	58 909	106 882	123 810	146 708
	Confirmed with microscopy	30 239	21 320	23 547	17 733	35 546	45 789	53 014
	RDT examined	56 455	139 531	97 047	102 079	197 536	261 868	234 488
	Confirmed with RDT	20 152	50 662	26 834	36 851	57 885	96 520	97 889
	Imported cases	–	–	–	–	–	–	–
Kenya	Presumed and confirmed	6 071 583	11 120 812	9 335 951	9 750 953	9 655 905	7 676 980	8 322 500
	Microscopy examined	2 384 402	3 009 051	4 836 617	6 606 885	7 444 865	7 772 329	6 167 609
	Confirmed with microscopy	898 531	1 002 805	1 426 719	2 060 608	2 415 950	1 025 508	1 569 045
	RDT examined	–	–	164 424	655 285	850 884	1 965 661	3 588 676
	Confirmed with RDT	–	–	26 752	274 678	392 981	473 519	1 214 801
	Imported cases	–	–	–	–	–	–	–
Liberia	Presumed and confirmed	2 675 816	2 480 748	1 800 372	1 483 676	1 066 107	1 781 092	2 343 410
	Microscopy examined	335 973	728 443	772 362	818 352	1 318 801	509 062	649 096
	Confirmed with microscopy	212 927	577 641	507 967	496 269	302 708	305 981	381 781
	RDT examined	998 043	1 593 676	1 276 521	1 144 405	912 382	947 048	1 304 021
	Confirmed with RDT	709 246	1 338 121	899 488	747 951	561 496	625 105	809 356
	Imported cases	–	–	–	–	–	–	–
Madagascar	Presumed and confirmed	293 910	255 814	395 149	385 598	433 101	752 176	475 333
	Microscopy examined	24 393	34 813	38 453	42 573	37 362	39 604	33 085
	Confirmed with microscopy	2 173	3 447	3 667	4 947	3 853	4 748	3 734
	RDT examined	604 114	739 572	906 080	1 026 110	926 998	1 488 667	1 496 990
	Confirmed with RDT	200 277	221 051	355 753	380 651	374 110	739 355	471 599
	Imported cases	–	–	–	–	712	1 167	1 212
Malawi	Presumed and confirmed	6 851 108	5 338 701	4 922 596	3 906 838	5 065 703	4 933 416	5 165 386
	Microscopy examined	–	119 996	406 907	132 475	198 534	216 643	240 212
	Confirmed with microscopy	–	50 526	283 138	44 501	77 635	75 923	96 538
	RDT examined	–	580 708	2 763 986	3 029 020	5 344 724	7 030 084	8 661 237
	Confirmed with RDT	–	253 973	1 281 846	1 236 391	2 827 675	3 585 315	4 730 835
	Imported cases	–	–	–	–	–	–	–
Mali	Presumed and confirmed	2 171 542	1 961 070	2 171 739	2 327 385	2 590 643	3 317 001	2 311 098
	Microscopy examined	–	–	–	–	–	–	–
	Confirmed with microscopy	–	–	97 995	190 337	219 637	243 151	235 212
	RDT examined	1 380 178	974 558	–	1 889 286	–	3 389 449	3 408 254
	Confirmed with RDT	227 482	307 035	788 487	1 176 881	1 820 216	2 052 460	1 921 070
	Imported cases	–	–	–	–	–	–	–

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
AFRICAN								
Mauritania	Presumed and confirmed	244 319	154 003	169 104	128 486	172 326	181 562	159 225
	Microscopy examined	5 449	3 752	1 865	5 510	–	–	–
	Confirmed with microscopy	909	1 130	255	957	–	–	–
	RDT examined	2 299	7 991	3 293	3 576	47 500	60 253	50 788
	Confirmed with RDT	1 085	1 796	1 633	630	15 835	22 631	29 156
	Imported cases	–	–	–	–	–	–	–
Mayotte	Presumed and confirmed	396	92	72	82	15	–	27
	Microscopy examined	2 023	1 214	1 463	–	–	–	–
	Confirmed with microscopy	396	92	72	82	15	–	27
	RDT examined	–	–	–	–	–	–	–
	Confirmed with RDT	–	–	–	–	–	–	–
	Imported cases	236	51	47	71	14	–	10
Mozambique	Presumed and confirmed	3 381 371	3 344 413	3 203 338	3 924 832	7 117 648	7 718 782	8 520 376
	Microscopy examined	1 950 933	2 504 720	2 546 213	2 058 998	2 295 823	2 313 129	1 886 154
	Confirmed with microscopy	644 568	1 093 742	886 143	774 891	1 009 496	735 750	674 697
	RDT examined	2 287 536	2 966 853	2 234 994	5 215 893	9 944 222	11 928 263	13 567 501
	Confirmed with RDT	878 009	663 132	927 841	2 223 983	6 108 152	6 983 032	7 845 679
	Imported cases	–	–	–	–	–	–	–
Namibia	Presumed and confirmed	25 889	14 406	3 163	4 911	15 914	12 168	25 198
	Microscopy examined	14 522	13 262	7 875	1 507	1 894	1 471	1 778
	Confirmed with microscopy	556	335	194	136	222	118	329
	RDT examined	–	48 599	–	32 495	185 078	207 612	308 414
	Confirmed with RDT	–	1 525	–	4 775	15 692	12 050	24 869
	Imported cases	–	–	–	–	–	2 888	3 980
Niger	Presumed and confirmed	3 643 803	3 157 482	4 592 519	4 288 425	3 222 613	3 817 634	5 056 393
	Microscopy examined	165 514	130 658	1 781 505	1 799 299	2 872 710	295 229	3 198 194
	Confirmed with microscopy	49 285	68 529	1 119 929	1 176 711	0	206 660	2 120 515
	RDT examined	7 426 774	1 130 514	1 781 505	1 799 299	2 872 710	2 657 057	3 066 101
	Confirmed with RDT	570 773	712 347	1 119 929	1 176 711	1 953 309	2 065 340	2 027 652
	Imported cases	–	–	–	–	–	–	–
Nigeria	Presumed and confirmed	3 873 463	4 306 945	6 938 519	12 830 911	16 512 127	14 732 621	16 696 308
	Microscopy examined	–	672 185	1 953 399	1 633 960	1 681 469	851 183	929 728
	Confirmed with microscopy	523 513	–	–	–	1 233 654	569 036	636 599
	RDT examined	45 924	242 526	2 898 052	7 194 960	9 188 933	8 655 024	11 908 534
	Confirmed with RDT	27 674	–	–	–	6 593 300	6 281 746	8 741 658
	Imported cases	–	–	–	–	–	–	–
Rwanda	Presumed and confirmed	638 669	208 858	483 470	962 618	1 610 812	2 505 794	3 380 568
	Microscopy examined	2 708 973	1 602 271	2 904 793	2 862 877	4 010 202	5 811 267	6 603 261
	Confirmed with microscopy	638 669	208 858	422 224	879 316	1 528 825	2 354 400	2 916 902
	RDT examined	–	–	190 593	201 708	168 004	281 847	898 913
	Confirmed with RDT	–	–	61 246	83 302	81 987	151 394	463 666
	Imported cases	–	–	–	–	–	–	–
Sao Tome and Principe	Presumed and confirmed	3 346	8 442	12 550	9 243	1 754	2 058	2 238
	Microscopy examined	48 366	83 355	103 773	73 866	33 355	11 941	3 658
	Confirmed with microscopy	2 233	6 373	10 706	6 352	569	140	35
	RDT examined	9 989	33 924	23 124	34 768	58 090	72 407	117 676
	Confirmed with RDT	507	2 069	1 844	2 891	1 185	1 918	2 203
	Imported cases	–	–	–	–	–	2	4
Senegal	Presumed and confirmed	707 772	604 290	634 106	772 222	628 642	502 084	356 272
	Microscopy examined	27 793	18 325	19 946	24 205	19 343	26 556	38 748
	Confirmed with microscopy	17 750	14 142	15 612	20 801	12 636	17 846	9 918
	RDT examined	651 737	555 614	524 971	668 562	697 175	1 384 834	1 513 574
	Confirmed with RDT	325 920	263 184	265 468	325 088	252 988	474 407	339 622
	Imported cases	–	–	–	–	–	352	1 905

Annex 3 - H. Reported malaria cases by method of confirmation, 2010–2016

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
AFRICAN								
Sierra Leone	Presumed and confirmed	934 028	856 332	1 945 859	1 715 851	1 898 852	1 569 606	1 845 727
	Microscopy examined	718 473	46 280	194 787	185 403	66 277	75 025	120 917
	Confirmed with microscopy	218 473	25 511	104 533	76 077	39 414	37 820	60 458
	RDT examined	1 609 455	886 994	1 975 972	2 377 254	2 056 722	2 176 042	2 805 621
	Confirmed with RDT	715 555	613 348	1 432 789	1 625 881	1 335 062	1 445 556	1 714 848
	Imported cases	-	-	-	-	-	-	-
South Africa	Presumed and confirmed	8 060	9 866	6 846	8 851	13 988	8 976	4 323
	Microscopy examined	-	178 387	121 291	364 021	300 291	13 917	20 653
	Confirmed with microscopy	3 787	5 986	1 632	2 572	4 101	785	1 219
	RDT examined	276 669	204 047	30 053	239 705	240 622	17 446	42 624
	Confirmed with RDT	4 273	3 880	3 997	6 073	7 604	3 572	3 104
	Imported cases	-	-	-	-	-	3 568	3 075
South Sudan[1]	Presumed and confirmed	900 283	795 784	1 125 039	1 855 501	2 433 991	3 789 475	7 619
	Microscopy examined	-	-	-	-	27 321	22 721	6 954
	Confirmed with microscopy	900 283	112 024	225 371	262 520	18 344	11 272	2 357
	RDT examined	-	-	-	-	102 538	26 507	10 751
	Confirmed with RDT	-	-	-	-	53 033	13 099	5 262
	Imported cases	-	-	-	-	-	-	-
Swaziland	Presumed and confirmed	1 722	797	626	962	711	651	487
	Microscopy examined	-	-	-	-	-	-	1 249
	Confirmed with microscopy	87	130	345	488	711	43	141
	RDT examined	-	-	-	-	-	-	-
	Confirmed with RDT	181	419	217	474	-	152	209
	Imported cases	-	170	153	234	322	282	221
Togo	Presumed and confirmed	983 430	519 450	768 287	882 430	1 130 251	1 113 928	1 183 265
	Microscopy examined	478 354	502 977	579 507	560 096	621 119	621 119	435 164
	Confirmed with microscopy	224 087	237 305	260 535	272 855	310 207	305 727	231 819
	RDT examined	575 245	390 611	660 627	882 475	1 135 581	1 135 581	1 410 290
	Confirmed with RDT	393 014	282 145	436 839	609 575	820 044	808 200	951 446
	Imported cases	-	-	-	-	-	-	-
Uganda	Presumed and confirmed	13 208 169	12 173 358	13 591 932	16 541 563	13 724 345	13 421 804	16 117 426
	Microscopy examined	3 705 284	385 928	3 466 571	3 718 588	2 048 185	3 684 722	4 492 090
	Confirmed with microscopy	1 581 160	134 726	1 413 149	1 502 362	578 289	1 248 576	1 542 091
	RDT examined	-	194 819	2 449 526	7 387 826	7 060 545	12 126 996	17 473 299
	Confirmed with RDT	-	97 147	1 249 109	-	3 053 650	5 889 086	7 843 041
	Imported cases	-	-	-	-	-	-	-
United Republic of Tanzania	Presumed and confirmed	12 893 535	10 164 967	8 477 435	8 585 482	7 403 562	7 746 258	6 055 112
	Microscopy examined	3 637 659	5 656 907	6 931 025	6 804 085	-	-	-
	Confirmed with microscopy	1 277 024	1 813 179	1 772 062	1 481 275	-	-	-
	RDT examined	136 123	1 628 092	1 091 615	813 103	-	-	-
	Confirmed with RDT	1 974	337 582	214 893	71 169	-	-	-
	Imported cases	-	-	-	719	1 583	2 550	-
Mainland	Presumed and confirmed	12 819 192	10 160 478	8 474 278	8 582 934	7 399 316	7 741 816	6 050 097
	Microscopy examined	3 573 710	5 513 619	6 784 639	6 720 141	592 320	532 118	1 285 720
	Confirmed with microscopy	1 276 660	1 812 704	1 771 388	1 480 791	571 598	411 741	1 261 650
	RDT examined	-	1 315 662	701 477	369 444	17 566 750	16 416 675	15 379 517
	Confirmed with RDT	-	333 568	212 636	69 459	106 609	3 827 749	3 926 855
	Imported cases	-	-	-	-	-	-	-
Zanzibar	Presumed and confirmed	74 343	4 489	3 157	2 548	4 246	4 442	5 015
	Microscopy examined	63 949	143 288	146 386	83 944	134 810	141 105	100 669
	Confirmed with microscopy	364	475	674	484	691	961	1 029
	RDT examined	136 123	312 430	390 138	443 659	173 457	203 624	159 192
	Confirmed with RDT	1 974	4 014	2 257	1 710	1 119	2 281	3 986
	Imported cases	-	-	-	719	1 583	2 550	-

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
AFRICAN								
Zambia	Presumed and confirmed	4 229 839	4 607 908	4 695 400	5 465 122	5 972 933	5 094 123	5 976 192
	Microscopy examined	–	–	–	–	–	–	–
	Confirmed with microscopy	–	–	–	–	–	–	–
	RDT examined	–	–	–	–	5 964 354	7 207 500	8 502 989
	Confirmed with RDT	–	–	–	–	4 077 547	4 184 661	4 851 319
	Imported cases	–	–	–	–	–	–	–
Zimbabwe	Presumed and confirmed	648 965	319 935	276 963	422 633	535 983	391 651	280 853
	Microscopy examined	–	10 004	–	–	–	–	–
	Confirmed with microscopy	–	–	–	–	–	–	–
	RDT examined	513 032	470 007	727 174	1 115 005	1 420 894	1 384 893	1 223 509
	Confirmed with RDT	249 379	319 935	276 963	422 633	535 931	391 651	279 988
	Imported cases	–	–	–	–	–	180	358
AMERICAS								
Argentina	Presumed and confirmed	72	18	4	4	4	1	1
	Microscopy examined	2 547	7 872	7 027	4 913	5 691	3 005	2 277
	Confirmed with microscopy	72	18	4	4	4	1	1
	RDT examined	–	–	–	0	0	0	0
	Confirmed with RDT	–	–	–	0	0	0	0
	Imported cases	46	18	4	4	4	1	1
Belize	Presumed and confirmed	150	79	37	26	19	13	5
	Microscopy examined	27 366	22 996	20 789	25 351	24 122	26 367	20 936
	Confirmed with microscopy	150	79	37	26	19	13	5
	RDT examined	–	–	–	–	–	–	–
	Confirmed with RDT	–	–	–	–	–	–	–
	Imported cases	–	7	4	4	0	4	1
Bolivia (Plurinational State of)	Presumed and confirmed	13 769	7 143	7 415	7 342	7 401	6 907	5 553
	Microscopy examined	133 463	143 272	121 944	133 260	124 900	159 167	155 407
	Confirmed with microscopy	12 252	6 108	6 293	6 272	7 401	6 907	5 553
	RDT examined	7 394	7 390	10 960	10 789	–	–	–
	Confirmed with RDT	1 517	1 035	1 122	1 070	–	–	–
	Imported cases	–	–	–	–	–	33	11
Brazil	Presumed and confirmed	334 668	267 146	242 758	178 546	144 130	143 161	129 251
	Microscopy examined	2 711 432	2 476 335	2 325 775	1 873 518	1 744 640	1 573 542	1 341 669
	Confirmed with microscopy	334 667	266 713	237 978	174 048	142 746	139 843	124 217
	RDT examined	–	1 486	23 566	19 500	11 820	16 865	23 273
	Confirmed with RDT	–	433	4 780	3 719	1 384	3 318	5 034
	Imported cases	–	–	–	8 905	4 847	4 935	5 070
Colombia	Presumed and confirmed	117 650	64 436	60 179	51 722	40 768	55 866	83 227
	Microscopy examined	521 342	396 861	346 599	284 332	325 713	316 451	242 973
	Confirmed with microscopy	117 637	60 121	50 938	44 293	36 166	48 059	57 515
	RDT examined	–	21 171	70 168	42 723	77 819	11 983	53 118
	Confirmed with RDT	13	4 188	9 241	7 403	4 602	3 535	5 655
	Imported cases	–	–	–	–	–	532	618
Costa Rica	Presumed and confirmed	114	17	8	6	6	8	13
	Microscopy examined	15 599	10 690	7 485	16 774	4 420	7 373	5 160
	Confirmed with microscopy	114	17	8	6	6	8	13
	RDT examined	–	–	–	0	0	0	0
	Confirmed with RDT	–	–	–	0	0	0	0
	Imported cases	4	6	1	4	5	8	9
Dominican Republic	Presumed and confirmed	3 414	1 616	952	579	496	661	755
	Microscopy examined	469 052	421 405	415 808	431 683	362 304	316 947	280 124
	Confirmed with microscopy	2 482	1 616	952	579	496	661	755
	RDT examined	26 585	56 150	90 775	71 000	54 425	50 220	92 650
	Confirmed with RDT	932	–	–	–	–	–	–
	Imported cases	–	–	–	105	37	30	65

Annex 3 - H. Reported malaria cases by method of confirmation, 2010–2016

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
AMERICAS								
Ecuador	Presumed and confirmed	1 888	1 233	558	378	242	686	1 191
	Microscopy examined	481 030	460 785	459 157	397 628	370 825	261 824	311 920
	Confirmed with microscopy	1 888	1 233	558	378	242	686	1 191
	RDT examined	7 800	-	-	-	-	-	-
	Confirmed with RDT	-	-	-	-	-	-	-
	Imported cases	-	14	14	10	-	68	56
El Salvador	Presumed and confirmed	24	16	19	7	8	9	14
	Microscopy examined	115 256	100 883	124 885	103 748	106 915	89 267	81 904
	Confirmed with microscopy	24	15	19	7	8	9	14
	RDT examined	-	1	-	-	0	0	0
	Confirmed with RDT	-	1	-	-	0	0	0
	Imported cases	7	6	6	1	2	6	1
French Guiana	Presumed and confirmed	1 632	1 209	900	875	448	434	258
	Microscopy examined	14 373	14 429	13 638	22 327	14 651	11 558	9 430
	Confirmed with microscopy	688	505	401	324	242	297	173
	RDT examined	-	-	-	-	-	-	-
	Confirmed with RDT	944	704	499	551	206	137	85
	Imported cases	-	-	-	-	-	60	41
Guatemala	Presumed and confirmed	7 384	6 817	5 346	6 214	5 685	6 836	4 854
	Microscopy examined	235 075	195 080	186 645	153 731	250 964	295 246	333 535
	Confirmed with microscopy	7 384	6 817	5 346	6 214	4 931	5 538	4 854
	RDT examined	2 000	-	0	0	50 025	6 500	74 859
	Confirmed with RDT	0	-	0	0	754	1 298	-
	Imported cases	-	-	-	-	1	2	1
Guyana	Presumed and confirmed	22 935	29 506	31 656	31 479	12 354	9 984	12 367
	Microscopy examined	212 863	201 693	196 622	205 903	142 843	132 941	110 891
	Confirmed with microscopy	22 935	29 471	31 601	31 479	12 354	9 984	10 906
	RDT examined	-	35	-	0	0	0	5 409
	Confirmed with RDT	-	35	55	0	0	0	1 461
	Imported cases	-	-	-	-	-	-	411
Haiti	Presumed and confirmed	84 153	32 969	25 423	26 543	17 696	17 583	21 998
	Microscopy examined	270 427	184 934	167 726	165 823	134 766	69 659	61 210
	Confirmed with microscopy	84 153	32 969	25 423	20 957	10 893	5 224	4 339
	RDT examined	-	-	46	5 586	126 637	233 081	240 834
	Confirmed with RDT	-	-	-	-	6 803	12 359	17 659
	Imported cases	-	-	-	-	-	-	-
Honduras	Presumed and confirmed	9 685	7 618	6 449	5 428	3 482	3 575	4 338
	Microscopy examined	152 961	152 451	155 165	144 436	151 420	150 854	167 836
	Confirmed with microscopy	9 685	7 465	6 439	5 364	3 380	3 555	4 097
	RDT examined	4 000	4 000	4 000	237	1 427	3 052	14 930
	Confirmed with RDT	-	45	10	64	102	20	241
	Imported cases	-	-	-	-	2	0	3
Mexico	Presumed and confirmed	1 226	1 130	842	499	666	551	596
	Microscopy examined	1 192 081	1 035 424	1 025 659	1 017 508	900 578	867 853	798 568
	Confirmed with microscopy	1 226	1 130	842	499	664	551	596
	RDT examined	-	-	-	0	0	0	0
	Confirmed with RDT	-	-	-	0	0	0	0
	Imported cases	7	6	9	4	10	34	45
Nicaragua	Presumed and confirmed	692	925	1 235	1 196	1 163	2 307	6 284
	Microscopy examined	535 914	521 904	536 278	519 993	605 357	604 418	553 615
	Confirmed with microscopy	692	925	1 235	1 196	1 163	2 307	6 284
	RDT examined	18 500	14 201	16 444	19 029	0	-	800
	Confirmed with RDT	0	-	0	-	0	-	-
	Imported cases	-	-	-	34	21	29	12

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
AMERICAS								
Panama	Presumed and confirmed	418	354	844	705	874	562	811
	Microscopy examined	141 038	116 588	107 711	93 624	80 701	64 511	50 772
	Confirmed with microscopy	418	354	844	705	874	562	811
	RDT examined	–	0	0	0	0	0	0
	Confirmed with RDT	–	0	0	0	0	0	0
	Imported cases	–	–	–	9	10	16	42
Paraguay	Presumed and confirmed	27	10	15	11	8	8	11
	Microscopy examined	62 178	48 611	31 499	24 806	24 832	9 157	3 191
	Confirmed with microscopy	27	10	15	11	8	8	10
	RDT examined	–	–	–	–	–	0	1
	Confirmed with RDT	–	–	–	–	–	0	1
	Imported cases	9	9	15	11	8	8	10
Peru	Presumed and confirmed	31 546	25 039	31 436	48 719	65 252	63 865	56 623
	Microscopy examined	744 627	702 894	758 723	863 790	864 413	865 980	566 230
	Confirmed with microscopy	31 545	25 005	31 436	48 719	65 252	61 865	56 623
	RDT examined	23	58	562	858	1 634	0	–
	Confirmed with RDT	1	34	–	–	–	–	–
	Imported cases	–	–	–	–	0	0	0
Suriname	Presumed and confirmed	1 771	795	569	729	729	376	327
	Microscopy examined	16 533	15 135	17 464	13 693	17 608	15 083	14 946
	Confirmed with microscopy	1 574	751	306	530	98	345	315
	RDT examined	541	1 025	4 008	6 043	15 489	153	8 498
	Confirmed with RDT	138	20	50	199	303	31	12
	Imported cases	–	–	–	204	–	274	251
Venezuela (Bolivarian Republic of)	Presumed and confirmed	45 155	45 824	52 803	78 643	91 918	137 996	242 561
	Microscopy examined	400 495	382 303	410 663	476 764	522 617	625 174	852 556
	Confirmed with microscopy	45 155	45 824	52 803	78 643	91 918	137 996	242 561
	RDT examined	–	–	–	–	–	–	80 000
	Confirmed with RDT	–	–	–	–	–	–	–
	Imported cases	–	–	–	1 677	1 210	1 594	1 948
EASTERN MEDITERRANEAN								
Afghanistan	Presumed and confirmed	392 463	482 748	391 365	319 742	290 079	350 044	392 551
	Microscopy examined	524 523	531 053	511 408	507 145	514 466	538 789	598 556
	Confirmed with microscopy	69 397	77 549	54 840	39 263	61 362	86 895	100 456
	RDT examined	–	0	0	0	–	–	94 975
	Confirmed with RDT	–	0	0	0	–	–	38 631
	Imported cases	–	–	–	–	–	–	–
Djibouti	Presumed and confirmed	1 010	230	27	1 684	9 439	9 557	13 804
	Microscopy examined	–	124	1 410	7 189	39 284	10 502	19 492
	Confirmed with microscopy	1 010	–	22	1 684	9 439	1 764	2 280
	RDT examined	–	–	–	–	–	–	–
	Confirmed with RDT	–	–	3	–	–	7 709	11 524
	Imported cases	–	–	–	–	–	–	–
Iran (Islamic Republic of)	Presumed and confirmed	3 031	3 239	1 629	1 373	1 243	799	705
	Microscopy examined	614 817	530 470	479 655	385 172	468 513	610 337	418 125
	Confirmed with microscopy	3 031	3 239	1 629	1 373	1 243	799	705
	RDT examined	–	–	0	–	–	–	–
	Confirmed with RDT	–	–	0	–	–	–	–
	Imported cases	1 184	1 529	842	853	867	632	612
Pakistan	Presumed and confirmed	4 281 356	4 065 802	4 285 449	3 472 727	3 666 257	3 776 244	2 115 941
	Microscopy examined	4 281 346	4 168 648	4 497 330	3 933 321	4 343 418	4 619 980	4 982 935
	Confirmed with microscopy	220 870	287 592	250 526	196 078	193 952	137 401	152 611
	RDT examined	279 724	518 709	410 949	628 504	779 815	691 245	1 223 880
	Confirmed with RDT	19 721	46 997	40 255	85 677	81 197	64 612	165 838
	Imported cases	–	–	–	–	–	–	–

Annex 3 - H. Reported malaria cases by method of confirmation, 2010–2016

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
EASTERN MEDITERRANEAN								
Saudi Arabia	Presumed and confirmed	1 941	2 788	3 406	2 513	2 305	2 620	5 382
	Microscopy examined	944 723	1 062 827	1 186 179	1 309 783	1 249 752	1 306 700	1 267 933
	Confirmed with microscopy	1 941	2 788	3 406	2 513	2 305	2 620	5 382
	RDT examined	-	-	0	-	-	-	-
	Confirmed with RDT	-	-	0	-	-	-	-
	Imported cases	1 912	2 719	3 324	2 479	2 254	2 537	5 110
Somalia	Presumed and confirmed	24 553	41 167	23 202	9 135	26 174	39 169	58 021
	Microscopy examined	20 593	26 351	-	-	-	-	-
	Confirmed with microscopy	5 629	1 627	-	-	-	-	-
	RDT examined	200 105	35 236	37 273	67 464	64 480	100 792	183 360
	Confirmed with RDT	18 924	1 724	6 817	7 407	11 001	20 953	35 628
	Imported cases	-	-	-	-	-	-	-
Sudan	Presumed and confirmed	1 465 496	1 214 004	964 698	989 946	1 207 771	1 102 186	897 194
	Microscopy examined	-	-	-	-	-	-	3 236 118
	Confirmed with microscopy	625 365	506 806	526 931	592 383	579 038	586 827	387 308
	RDT examined	1 653 300	2 222 380	2 000 700	1 800 000	788 281	-	632 443
	Confirmed with RDT	95 192	-	-	-	489 468	-	187 707
	Imported cases	-	-	-	-	-	-	-
Yemen	Presumed and confirmed	198 963	142 147	165 678	149 451	122 812	104 831	144 628
	Microscopy examined	645 463	645 093	685 406	723 691	643 994	561 644	960 860
	Confirmed with microscopy	78 269	60 207	68 849	63 484	51 768	42 052	45 886
	RDT examined	97 289	108 110	150 218	157 457	141 519	121 464	174 699
	Confirmed with RDT	28 428	30 203	41 059	39 294	34 939	34 207	52 815
	Imported cases	-	-	-	-	-	-	-
EUROPEAN								
Armenia[3]	Presumed and confirmed	1	0	4	0	1	1	1
	Microscopy examined	31 026	-	-	-	-	-	-
	Confirmed with microscopy	1	0	4	0	1	1	1
	RDT examined	0	0	0	0	0	0	0
	Confirmed with RDT	0	0	0	0	0	0	0
	Imported cases	1	0	4	0	1	1	1
Azerbaijan[2]	Presumed and confirmed	52	8	4	4	2	1	0
	Microscopy examined	456 652	449 168	497 040	432 810	399 925	-	-
	Confirmed with microscopy	52	8	4	4	2	1	1
	RDT examined	0	0	0	0	0	0	0
	Confirmed with RDT	0	0	0	0	0	0	0
	Imported cases	2	4	1	4	2	1	1
Georgia[2]	Presumed and confirmed	0	6	5	7	6	5	7
	Microscopy examined	2 368	2 032	1 046	192	440	-	-
	Confirmed with microscopy	0	6	5	7	5	5	7
	RDT examined	-	-	-	-	-	-	-
	Confirmed with RDT	-	-	-	-	-	-	-
	Imported cases	0	5	4	7	5	5	7
Kyrgyzstan[3]	Presumed and confirmed	6	5	3	4	0	0	0
	Microscopy examined	30 190	27 850	18 268	54 249	35 600	-	-
	Confirmed with microscopy	6	5	3	4	0	0	-
	RDT examined	-	-	-	-	-	-	-
	Confirmed with RDT	-	-	-	-	-	-	-
	Imported cases	3	5	3	4	0	0	-
Tajikistan[2]	Presumed and confirmed	112	78	33	14	7	5	1
	Microscopy examined	173 523	173 367	209 239	213 916	200 241	188 341	210 361
	Confirmed with microscopy	112	78	33	14	7	5	1
	RDT examined	-	-	-	-	-	42 056	34 570
	Confirmed with RDT	-	-	-	-	-	0	0
	Imported cases	1	25	15	11	5	5	1

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
EUROPEAN								
Turkey[2]	Presumed and confirmed	90	132	376	285	249	221	209
	Microscopy examined	507 841	421 295	337 830	255 125	189 854	–	–
	Confirmed with microscopy	90	132	376	285	249	221	209
	RDT examined	–	–	–	–	–	–	–
	Confirmed with RDT	–	–	–	–	–	–	–
	Imported cases	81	128	376	251	249	221	209
Turkmenistan[3]	Presumed and confirmed	0	0	0	0	0	0	0
	Microscopy examined	81 784	–	–	–	–	–	–
	Confirmed with microscopy	0	0	0	0	0	0	0
	RDT examined	–	–	–	–	–	–	–
	Confirmed with RDT	–	–	–	–	–	–	–
	Imported cases	0	0	0	0	0	0	0
Uzbekistan[2]	Presumed and confirmed	5	1	1	3	1	0	0
	Microscopy examined	921 364	886 243	805 761	908 301	812 347	–	–
	Confirmed with microscopy	5	1	1	3	1	0	–
	RDT examined	–	–	–	–	–	–	–
	Confirmed with RDT	–	–	–	–	–	–	–
	Imported cases	2	1	1	3	1	0	0
SOUTH-EAST ASIA								
Bangladesh	Presumed and confirmed	91 227	51 773	29 518	3 864	10 216	6 608	4 787
	Microscopy examined	308 326	270 253	253 887	74 755	78 719	69 093	65 845
	Confirmed with microscopy	20 519	20 232	4 016	1 866	3 249	1 612	1 022
	RDT examined	152 936	119 849	35 675	19 171	46 482	53 713	73 128
	Confirmed with RDT	35 354	31 541	5 885	1 998	6 967	4 996	3 765
	Imported cases	–	–	–	–	–	129	109
Bhutan	Presumed and confirmed	487	207	82	45	48	104	74
	Microscopy examined	54 709	44 481	42 512	31 632	33 586	26 149	23 442
	Confirmed with microscopy	436	194	82	45	48	84	59
	RDT examined	–	–	–	–	–	47 938	95 399
	Confirmed with RDT	–	–	–	–	–	20	15
	Imported cases	–	–	0	23	0	70	56
Democratic People's Republic of Korea	Presumed and confirmed	13 520	16 760	23 537	15 673	11 212	7 409	5 113
	Microscopy examined	25 147	26 513	39 238	71 453	38 201	29 272	22 747
	Confirmed with microscopy	13 520	16 760	21 850	14 407	10 535	7 010	4 890
	RDT examined	–	–	0	0	0	61 348	182 980
	Confirmed with RDT	–	–	0	0	0	12	143
	Imported cases	–	–	0	0	0	205	0
India	Presumed and confirmed	1 599 986	1 310 656	1 067 824	881 730	1 102 205	1 169 261	1 090 724
	Microscopy examined	108 679 429	108 969 660	109 033 790	113 109 094	124 066 331	121 141 970	124 920 962
	Confirmed with microscopy	1 599 986	1 310 656	1 067 824	881 730	1 102 205	1 169 261	1 090 724
	RDT examined	10 600 000	10 500 384	13 125 480	14 782 104	14 562 000	19 699 260	19 606 260
	Confirmed with RDT	–	–	–	–	–	–	–
	Imported cases	–	–	–	–	–	–	–
Indonesia	Presumed and confirmed	465 764	422 447	417 819	343 527	252 027	217 025	218 450
	Microscopy examined	1 335 445	962 090	1 429 139	1 447 980	1 300 835	1 224 504	1 092 093
	Confirmed with microscopy	465 764	422 447	417 819	343 527	252 027	217 025	218 450
	RDT examined	255 734	250 709	471 586	260 181	249 461	342 946	365 765
	Confirmed with RDT	–	–	–	–	–	–	–
	Imported cases	–	–	–	–	–	–	–
Myanmar	Presumed and confirmed	693 124	567 452	480 586	333 871	205 658	182 768	110 146
	Microscopy examined	275 374	312 689	265 135	138 473	151 258	99 025	122 078
	Confirmed with microscopy	103 285	91 752	75 192	26 509	12 010	6 782	6 717
	RDT examined	729 878	795 618	1 158 420	1 162 083	1 415 837	2 564 707	3 063 167
	Confirmed with RDT	317 523	373 542	405 394	307 362	193 648	175 986	103 429
	Imported cases	–	–	–	–	–	345	–

Annex 3 - H. Reported malaria cases by method of confirmation, 2010–2016

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
SOUTH-EAST ASIA								
Nepal	Presumed and confirmed	96 383	71 752	70 272	38 113	26 526	20 621	10 687
	Microscopy examined	102 977	95 011	152 780	100 336	127 130	63 946	84 595
	Confirmed with microscopy	3 115	1 910	1 659	1 197	1 469	1 112	1 009
	RDT examined	17 887	25 353	22 472	32 989	48 444	49 649	52 432
	Confirmed with RDT	779	1 504	433	777	-	725	-
	Imported cases	-	1 069	592	-	667	521	502
Sri Lanka[3]	Presumed and confirmed	736	175	93	95	49	36	41
	Microscopy examined	1 001 107	985 060	948 250	1 236 580	1 069 817	1 142 466	1 072 396
	Confirmed with microscopy	736	175	93	95	49	21	23
	RDT examined	-	-	-	-	-	13 671	18 347
	Confirmed with RDT	-	-	-	-	-	1	1
	Imported cases	52	51	70	95	49	36	41
Thailand	Presumed and confirmed	32 480	24 897	32 569	33 302	37 921	14 135	11 522
	Microscopy examined	1 695 980	1 354 215	1 130 757	1 830 090	1 756 528	1 358 953	1 302 834
	Confirmed with microscopy	22 969	14 478	32 569	33 302	37 921	14 135	11 301
	RDT examined	81 997	96 670	-	-	-	10 888	158 173
	Confirmed with RDT	9 511	10 419	-	-	-	0	221
	Imported cases	-	-	-	-	-	9 890	5 724
Timor-Leste	Presumed and confirmed	119 072	36 064	6 148	1 042	342	80	95
	Microscopy examined	109 806	82 175	64 318	56 192	30 515	30 275	35 947
	Confirmed with microscopy	40 250	19 739	5 211	1 025	342	80	94
	RDT examined	85 643	127 272	117 599	121 991	86 592	90 835	114 385
	Confirmed with RDT	7 887	-	-	-	0	0	0
	Imported cases	-	-	-	-	-	-	0
WESTERN PACIFIC								
Cambodia	Presumed and confirmed	49 356	57 423	45 553	24 130	26 278	33 930	23 492
	Microscopy examined	90 175	86 526	80 212	54 716	48 591	49 357	42 802
	Confirmed with microscopy	14 277	13 792	10 124	4 598	5 288	7 423	3 695
	RDT examined	103 035	130 186	108 974	94 600	92 525	114 323	123 893
	Confirmed with RDT	35 079	43 631	30 352	16 711	19 864	26 507	19 797
	Imported cases	-	-	-	-	-	-	-
China	Presumed and confirmed	7 855	4 498	2 716	4 127	2 921	3 116	3 143
	Microscopy examined	7 115 784	9 189 270	6 918 657	5 554 960	4 403 633	4 052 588	3 194 915
	Confirmed with microscopy	4 990	3 367	2 603	4 086	2 921	3 088	3 129
	RDT examined	-	-	-	-	-	-	-
	Confirmed with RDT	-	-	-	-	-	-	-
	Imported cases	-	-	2 399	4 007	2 864	3 055	3 125
Lao People's Democratic Republic	Presumed and confirmed	23 047	17 904	46 819	41 385	48 071	36 056	11 753
	Microscopy examined	150 512	213 578	223 934	202 422	133 916	110 084	89 998
	Confirmed with microscopy	4 524	6 226	13 232	10 036	8 018	4 167	1 597
	RDT examined	127 790	77 825	145 425	133 337	160 626	173 919	133 464
	Confirmed with RDT	16 276	11 306	32 970	28 095	40 053	31 889	9 626
	Imported cases	-	-	-	-	-	0	-
Malaysia	Presumed and confirmed	6 650	5 306	4 725	3 850	3 923	2 311	2 302
	Microscopy examined	1 619 074	1 600 439	1 566 872	1 576 012	1 443 958	1 066 470	1 153 108
	Confirmed with microscopy	6 650	5 306	4 725	3 850	3 923	2 311	2 302
	RDT examined	-	-	-	-	-	-	0
	Confirmed with RDT	-	-	-	-	-	-	0
	Imported cases	831	1 142	924	865	766	435	428
Papua New Guinea	Presumed and confirmed	1 379 787	1 151 343	878 371	1 125 808	644 688	553 103	728 798
	Microscopy examined	198 742	184 466	156 495	139 972	83 257	112 864	146 242
	Confirmed with microscopy	75 985	70 603	67 202	70 658	68 114	64 719	80 472
	RDT examined	20 820	27 391	228 857	468 380	475 654	541 760	772 254
	Confirmed with RDT	17 971	13 457	82 993	209 336	213 068	233 068	398 025
	Imported cases	-	-	-	-	-	-	-

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
WESTERN PACIFIC								
Philippines	Presumed and confirmed	19 106	9 617	8 154	7 720	4 972	8 301	6 690
	Microscopy examined	301 031	327 060	332 063	317 360	287 725	224 843	255 302
	Confirmed with microscopy	18 560	9 552	7 133	5 826	3 618	5 694	2 860
	RDT examined	-	-	-	1 523	28 598	35 799	66 536
	Confirmed with RDT	-	-	-	688	1 285	2 572	3 820
	Imported cases	-	-	-	-	-	18	55
Republic of Korea	Presumed and confirmed	1 772	838	555	443	638	699	673
	Microscopy examined	-	-	-	-	-	-	-
	Confirmed with microscopy	1 772	838	555	443	638	699	673
	RDT examined	-	-	-	-	-	-	-
	Confirmed with RDT	-	-	-	-	-	-	-
	Imported cases	56	64	47	50	78	65	72
Solomon Islands	Presumed and confirmed	95 006	80 859	57 296	53 270	51 649	50 916	84 513
	Microscopy examined	212 329	182 847	202 620	191 137	173 900	124 376	152 690
	Confirmed with microscopy	35 373	23 202	21 904	21 540	13 865	14 793	26 187
	RDT examined	17 300	17 457	13 987	26 216	26 658	40 750	92 109
	Confirmed with RDT	4 331	3 455	2 479	4 069	4 539	9 205	28 244
	Imported cases	-	-	-	-	-	-	-
Vanuatu	Presumed and confirmed	16 831	5 764	3 435	2 381	982	697	2 147
	Microscopy examined	29 180	19 183	16 981	15 219	18 135	4 870	6 704
	Confirmed with microscopy	4 013	2 077	733	767	190	15	225
	RDT examined	10 246	12 529	16 292	13 724	17 435	9 794	14 501
	Confirmed with RDT	4 156	2 743	2 702	1 614	792	408	1 643
	Imported cases	-	-	-	-	-	0	0
Viet Nam	Presumed and confirmed	54 297	45 588	43 717	35 406	27 868	19 252	10 446
	Microscopy examined	2 760 119	2 791 917	2 897 730	2 684 996	2 357 536	2 204 409	2 082 986
	Confirmed with microscopy	17 515	16 612	19 638	17 128	15 752	9 331	4 161
	RDT examined	7 017	491 373	514 725	412 530	416 483	459 332	408 055
	Confirmed with RDT	-	-	-	-	-	-	-
	Imported cases	-	-	-	-	-	-	-

	2010	2011	2012	2013	2014	2015	2016
REGIONAL SUMMARY (presumed and confirmed malaria cases)							
African	103 145 240	100 205 022	110 913 398	124 456 766	130 336 607	133 521 494	146 035 650
Americas	678 373	493 900	469 448	439 651	393 349	451 389	571 038
Eastern Mediterranean	6 370 339	5 954 143	5 838 125	4 948 628	5 327 910	5 387 087	3 629 687
European	266	230	422	317	266	233	218
South-East Asia	3 112 779	2 502 183	2 128 448	1 651 262	1 646 204	1 618 047	1 451 639
Western Pacific	1 653 707	1 379 140	1 091 341	1 298 520	811 990	708 381	873 957
Total	**1 653 707**	**1 379 140**	**1 091 341**	**1 298 520**	**811 990**	**708 381**	**873 957**

RDT, rapid diagnostic test

* The table indicates cases reported at health facilities and excludes cases at community level

[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)

[2] There is no local transmission

[3] Certified malaria free countries are included in this listing for historical purposes

Annex 3 - I. Reported malaria cases by species, 2010–2016

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
AFRICAN								
Algeria	Suspected	12 224	11 974	15 790	12 762	8 690	8 000	6 628
	No *Pf*	7	4	48	14	5	0	0
	No *Pv*	4	0	11	2	0	0	0
	No Other	1	0	-	23	13	0	0
Angola	Suspected	4 591 529	4 469 357	4 849 418	5 273 305	6 134 471	6 839 963	7 649 902
	No *Pf*	-	-	-	-	-	-	-
	No *Pv*	-	-	-	-	-	-	-
	No Other	-	-	-	-	-	-	-
Benin	Suspected	1 432 095	1 565 487	1 875 386	2 041 444	1 955 773	2 009 959	1 817 605
	No *Pf*	-	68 745	0	-	1 044 235	1 268 347	1 324 576
	No *Pv*	-	0	0	-	0	0	0
	No Other	-	0	0	-	-	-	-
Botswana	Suspected	12 196	1 141	308	506	1 485	1 298	12 986
	No *Pf*	1 046	432	193	456	1 346	326	715
	No *Pv*	0	0	0	0	0	0	0
	No Other	-	-	-	-	-	-	-
Burkina Faso	Suspected	6 037 806	5 446 870	7 852 299	7 857 296	9 272 755	9 783 385	11 992 686
	No *Pf*	-	-	-	-	-	-	-
	No *Pv*	-	-	-	-	-	-	-
	No Other	-	-	-	-	-	-	-
Burundi	Suspected	5 590 736	4 768 314	4 228 015	7 384 501	7 622 162	8 414 481	12 357 585
	No *Pf*	-	-	-	-	-	-	-
	No *Pv*	-	-	-	-	-	-	-
	No Other	-	-	-	-	-	-	-
Cabo Verde	Suspected	47	26 508	8 715	10 621	6 894	3 117	8 393
	No *Pf*	47	7	1	22	72	7	48
	No *Pv*	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0
Cameroon	Suspected	1 845 691	3 060 040	2 865 319	3 652 609	3 709 906	3 312 273	3 229 804
	No *Pf*	-	-	-	-	-	592 351	810 367
	No *Pv*	-	-	-	-	-	0	0
	No Other	-	-	-	-	-	-	0
Central African Republic	Suspected	66 484	221 980	468 986	491 074	625 301	1 218 246	1 807 206
	No *Pf*	-	-	-	-	295 088	598 833	1 032 764
	No *Pv*	-	-	-	-	0	0	0
	No Other	-	-	-	-	0	-	-
Chad	Suspected	743 471	528 454	730 364	1 272 841	1 737 195	1 641 285	2 032 301
	No *Pf*	-	-	-	-	-	-	-
	No *Pv*	-	-	-	-	-	-	-
	No Other	-	-	-	-	-	-	-
Comoros	Suspected	159 976	135 248	168 043	185 779	103 545	101 330	94 388
	No *Pf*	33 791	21 387	43 681	46 032	2 203	1 300	1 066
	No *Pv*	528	334	637	72	0	0	0
	No Other	880	557	-	363	0	0	0
Congo	Suspected	446 656	277 263	117 640	209 169	290 346	300 592	466 254
	No *Pf*	-	37 744	120 319	43 232	66 323	51 529	171 847
	No *Pv*	-	0	0	0	0	0	0
	No Other	-	-	-	0	0	0	0
Côte d'Ivoire	Suspected	1 721 461	2 607 856	3 423 623	5 982 151	6 418 571	5 216 344	5 178 375
	No *Pf*	-	-	-	2 506 953	3 712 831	3 375 904	3 471 024
	No *Pv*	-	-	-	0	0	0	0
	No Other	-	-	-	0	0	0	0
Democratic Republic of the Congo	Suspected	10 568 756	12 018 784	11 993 189	14 871 716	14 647 380	16 452 476	21 507 579
	No *Pf*	0	0	0	0	-	-	-
	No *Pv*	0	0	0	0	-	-	-
	No Other	0	0	0	0	-	-	-

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
AFRICAN								
Equatorial Guinea	Suspected	83 639	40 704	45 792	44 561	57 129	68 058	318 779
	No *Pf*	53 813	22 466	15 169	13 129	17 452	–	–
	No *Pv*	0	0	0	0	0	–	–
	No Other	–	–	–	–	–	–	–
Eritrea	Suspected	96 792	97 479	138 982	134 183	121 755	111 950	106 403
	No *Pf*	9 848	10 357	12 467	13 873	23 953	14 580	21 247
	No *Pv*	3 989	4 932	9 204	7 361	6 780	4 780	2 999
	No Other	57	19	–	83	35	12	5
Ethiopia	Suspected	5 420 110	5 487 972	5 962 646	9 243 894	7 457 765	5 987 580	6 611 801
	No *Pf*	806 577	814 547	946 595	1 687 163	1 250 110	1 188 627	1 142 235
	No *Pv*	390 252	665 813	745 983	958 291	868 705	678 432	576 269
	No Other	0	–	–	–	–	–	–
Gabon	Suspected	233 770	178 822	238 483	256 531	256 183	285 489	202 989
	No *Pf*	2 212	–	–	26 432	26 117	–	23 915
	No *Pv*	720	–	–	0	0	–	0
	No Other	2 015	–	–	0	1 570	–	0
Gambia	Suspected	492 062	261 967	862 442	889 494	603 424	891 511	844 821
	No *Pf*	64 108	190 379	271 038	240 792	99 976	240 382	153 685
	No *Pv*	0	0	0	0	0	0	0
	No Other	–	–	–	–	–	–	–
Ghana	Suspected	5 056 851	5 067 731	12 578 946	8 444 417	10 636 057	13 368 757	14 040 434
	No *Pf*	926 447	593 518	3 755 166	1 629 198	3 415 912	4 319 919	4 505 442
	No *Pv*	0	0	0	0	0	0	0
	No Other	102 937	31 238	0	0	0	0	29 725
Guinea	Suspected	1 092 554	1 276 057	1 220 574	775 341	1 595 828	1 254 937	1 503 035
	No *Pf*	20 936	5 450	191 421	63 353	660 207	810 979	992 146
	No *Pv*	0	0	0	0	0	0	0
	No Other	–	–	–	0	–	–	–
Guinea-Bissau	Suspected	195 006	300 233	237 398	238 580	309 939	385 678	381 196
	No *Pf*	–	–	–	–	–	–	–
	No *Pv*	–	–	–	–	–	–	–
	No Other	–	–	–	–	–	–	–
Kenya	Suspected	7 557 454	13 127 058	12 883 521	14 677 837	15 142 723	15 915 943	15 294 939
	No *Pf*	898 531	1 002 805	1 453 471	2 335 286	2 808 931	1 499 027	2 783 846
	No *Pv*	0	0	0	0	0	0	0
	No Other	–	–	–	–	–	–	–
Liberia	Suspected	3 087 659	2 887 105	2 441 800	2 202 213	2 433 086	2 306 116	3 105 390
	No *Pf*	212 927	577 641	1 407 455	1 244 220	864 204	2 086 600	1 191 137
	No *Pv*	0	0	0	0	0	0	0
	No Other	0	–	–	0	0	0	0
Madagascar	Suspected	719 967	805 701	980 262	1 068 683	1 019 498	1 536 344	1 530 075
	No *Pf*	–	–	–	–	–	–	–
	No *Pv*	–	–	–	–	–	–	–
	No Other	–	–	–	–	–	–	–
Malawi	Suspected	6 851 108	5 734 906	6 528 505	5 787 441	7 703 651	8 518 905	9 239 462
	No *Pf*	–	–	1 564 984	1 280 892	2 905 310	3 585 315	4 730 835
	No *Pv*	–	–	0	0	0	0	0
	No Other	–	–	–	–	–	–	–
Mali	Suspected	3 324 238	2 628 593	2 171 739	2 849 453	2 590 643	4 410 839	3 563 070
	No *Pf*	–	–	–	–	–	–	–
	No *Pv*	–	–	–	–	–	–	–
	No Other	–	–	–	–	–	–	–
Mauritania	Suspected	250 073	162 820	172 374	135 985	203 991	219 184	180 857
	No *Pf*	–	–	–	–	–	–	–
	No *Pv*	–	–	–	–	–	–	–
	No Other	–	–	–	–	–	–	–

Annex 3 - I. Reported malaria cases by species, 2010–2016

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
AFRICAN								
Mayotte	Suspected	2 023	1 214	1 463	-	15	-	12
	No *Pf*	169	38	25	9	1	-	12
	No *Pv*	3	2	2	0	0	-	-
	No Other	19	0	-	-	0	-	-
Mozambique	Suspected	6 097 263	7 059 112	6 170 561	8 200 849	12 240 045	14 241 392	15 453 655
	No *Pf*	878 009	663 132	927 841	2 998 874	7 117 648	7 718 782	8 520 376
	No *Pv*	0	0	0	0	0	0	0
	No Other	-	-	-	-	-	-	-
Namibia	Suspected	39 855	74 407	10 844	34 002	186 972	209 083	310 192
	No *Pf*	556	335	194	136	15 914	12 050	329
	No *Pv*	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	-
Niger	Suspected	10 616 033	3 637 778	5 915 671	5 533 601	7 014 724	4 497 920	7 172 521
	No *Pf*	618 578	778 819	2 207 459	2 352 422	3 906 588	2 267 867	3 961 178
	No *Pv*	0	0	0	0	0	0	0
	No Other	-	-	-	-	-	4 133	186 989
Nigeria	Suspected	3 873 463	5 221 656	11 789 970	21 659 831	19 555 575	17 388 046	20 156 313
	No *Pf*	523 513	-	-	-	-	-	-
	No *Pv*	0	-	-	-	-	-	-
	No Other	-	-	-	-	-	-	-
Rwanda	Suspected	2 708 973	1 602 271	3 095 386	3 064 585	4 178 206	6 093 114	7 502 174
	No *Pf*	638 669	208 858	483 470	962 618	1 623 176	-	-
	No *Pv*	0	0	0	0	0	-	-
	No Other	-	-	0	0	0	-	-
Sao Tome and Principe	Suspected	58 961	117 279	126 897	108 634	91 445	84 348	121 334
	No *Pf*	2 219	6 363	10 700	9 242	1 754	2 055	2 234
	No *Pv*	14	4	1	1	0	0	0
	No Other	0	6	-	0	0	1	0
Senegal	Suspected	1 043 632	900 903	897 943	1 119 100	1 079 536	1 421 221	1 559 054
	No *Pf*	343 670	277 326	281 080	345 889	265 624	491 901	347 635
	No *Pv*	0	0	0	0	0	0	0
	No Other	-	-	-	0	0	0	0
Sierra Leone	Suspected	2 327 928	1 150 747	2 579 296	2 576 550	2 647 375	2 337 297	2 996 959
	No *Pf*	218 473	25 511	1 537 322	1 701 958	1 374 476	1 483 376	1 775 306
	No *Pv*	0	0	0	0	0	0	0
	No Other	-	-	-	-	0	0	0
South Africa	Suspected	276 669	382 434	152 561	603 932	543 196	35 982	63 277
	No *Pf*	2 193	6 906	4 565	8 645	11 563	555	3 104
	No *Pv*	0	14	5	0	0	0	0
	No Other	5	15	-	0	0	0	0
South Sudan[1]	Suspected	900 283	795 784	1 125 039	1 855 501	2 492 473	3 814 332	17 705
	No *Pf*	-	112 024	-	-	0	0	0
	No *Pv*	-	0	-	-	0	0	0
	No Other	-	-	-	-	-	-	-
Swaziland	Suspected	1 722	797	626	669	711	651	1 386
	No *Pf*	87	189	192	253	389	157	209
	No *Pv*	0	0	0	0	0	0	0
	No Other	0	0	0	1	0	0	0
Togo	Suspected	1 419 928	893 588	1 311 047	1 442 571	1 756 700	1 756 701	1 845 454
	No *Pf*	224 080	237 282	260 526	272 855	1 130 234	1 113 910	1 174 116
	No *Pv*	0	0	0	0	0	0	0
	No Other	7	23	-	8	17	17	9 149
Uganda	Suspected	15 332 293	12 522 232	16 845 771	26 145 615	19 201 136	22 095 860	28 697 683
	No *Pf*	1 612 783	231 873	2 662 258	1 502 362	3 631 939	7 137 662	9 385 132
	No *Pv*	15 812	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
AFRICAN								
United Republic of Tanzania	Suspected	15 388 319	15 299 205	14 513 120	14 650 226	25 190 882	20 797 048	17 786 690
	No *Pf*	2 338	4 489	2 931	1 710	1 119	412 433	-
	No *Pv*	0	0	0	0	0	0	-
	No Other	-	-	-	0	0	0	0
Mainland	Suspected	15 116 242	14 843 487	13 976 370	14 122 269	24 880 179	20 451 119	17 526 829
	No *Pf*	-	-	212 636	69 459	106 609	411 741	-
	No *Pv*	-	-	0	0	0	0	-
	No Other	-	-	-	-	-	-	-
Zanzibar	Suspected	272 077	455 718	536 750	527 957	310 703	345 929	259 861
	No *Pf*	2 338	4 489	2 931	1 725	2 390	2 049	5 104
	No *Pv*	0	0	0	0	0	0	0
	No Other	0	0	0	0	-	0	0
Zambia	Suspected	4 229 839	4 607 908	4 695 400	5 465 122	7 859 740	8 116 962	9 627 862
	No *Pf*	-	-	-	-	4 077 547	4 184 661	4 851 319
	No *Pv*	-	-	-	-	0	0	0
	No Other	-	-	-	-	-	-	-
Zimbabwe	Suspected	912 618	480 011	727 174	1 115 005	1 420 946	1 384 893	1 224 374
	No *Pf*	249 379	319 935	276 963	422 633	535 931	391 651	279 988
	No *Pv*	0	0	0	0	0	0	0
	No Other	-	0	-	-	-	-	-
AMERICAS								
Argentina	Suspected	2 547	7 872	7 027	4 913	5 691	3 005	2 277
	No *Pf*	0	0	0	0	0	0	0
	No *Pv*	26	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0
Belize	Suspected	27 366	22 996	20 789	25 351	24 122	26 367	20 936
	No *Pf*	1	0	0	0	0	0	0
	No *Pv*	149	72	33	20	19	9	4
	No Other	0	0	0	0	0	0	0
Bolivia (Plurinational State of)	Suspected	140 857	150 662	132 904	144 049	124 900	159 167	155 407
	No *Pf*	1 592	543	396	996	341	89	7
	No *Pv*	13 694	7 635	8 141	6 346	7 060	6 785	5 535
	No Other	0	0	0	0	0	0	0
Brazil	Suspected	2 711 433	2 477 821	2 349 341	1 893 797	1 756 460	1 590 407	1 364 942
	No *Pf*	51 048	35 706	40 159	30 943	22 234	15 445	13 829
	No *Pv*	283 435	231 368	203 018	137 887	117 009	122 743	110 343
	No Other	183	143	105	32	28	38	8
Colombia	Suspected	521 342	418 159	416 767	327 081	403 532	332 706	316 148
	No *Pf*	34 334	15 404	17 778	18 340	20 634	26 061	49 974
	No *Pv*	83 255	44 701	51 467	33 345	20 129	21 987	32 635
	No Other	48	16	9	11	5	0	0
Costa Rica	Suspected	15 599	10 690	7 485	16 774	4 420	7 373	5 160
	No *Pf*	0	0	1	0	0	0	0
	No *Pv*	110	11	4	0	0	0	4
	No Other	0	0	2	0	0	0	0
Dominican Republic	Suspected	495 637	477 555	506 583	502 683	416 729	367 167	372 774
	No *Pf*	2 480	1 614	950	474	459	631	690
	No *Pv*	2	2	2	0	0	0	0
	No Other	0	0	0	0	0	0	0
Ecuador	Suspected	488 830	460 785	459 157	397 628	370 825	261 824	311 920
	No *Pf*	258	290	78	160	40	184	403
	No *Pv*	1 630	929	466	208	202	434	788
	No Other	0	0	0	0	0	0	0

Annex 3 - I. Reported malaria cases by species, 2010–2016

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
AMERICAS								
El Salvador	Suspected	115 256	100 884	124 885	103 748	106 915	89 267	81 904
	No *Pf*	0	1	0	0	0	0	0
	No *Pv*	17	8	15	6	6	3	13
	No Other	0	0	0	0	0	0	0
French Guiana	Suspected	14 373	14 429	13 638	22 327	14 651	11 558	9 430
	No *Pf*	1 548	1 080	763	652	318	35	32
	No *Pv*	476	339	257	220	129	203	99
	No Other	5	5	2	-	1	0	0
Guatemala	Suspected	237 075	195 080	186 645	153 731	300 989	301 746	408 394
	No *Pf*	35	67	68	152	91	51	4
	No *Pv*	7 163	6 707	5 278	6 062	5 593	5 487	4 849
	No Other	-	-	0	0	0	0	0
Guyana	Suspected	212 863	201 728	196 622	205 903	142 843	132 941	116 300
	No *Pf*	14 401	20 309	20 329	17 425	5 140	3 950	4 976
	No *Pv*	8 402	9 066	11 244	13 953	7 173	6 002	6 923
	No Other	132	96	83	101	41	32	57
Haiti	Suspected	270 427	184 934	167 772	176 995	261 403	302 740	302 044
	No *Pf*	84 153	32 969	25 423	20 957	17 696	17 583	21 998
	No *Pv*	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0
Honduras	Suspected	156 961	156 559	159 165	144 673	152 847	153 906	182 766
	No *Pf*	986	619	584	1 159	599	933	1 350
	No *Pv*	8 759	7 044	5 865	4 269	2 881	2 642	2 744
	No Other	0	0	0	0	0	0	0
Mexico	Suspected	1 192 081	1 035 424	1 025 659	1 017 508	900 580	867 853	798 568
	No *Pf*	0	0	0	0	0	0	0
	No *Pv*	1 226	1 124	833	495	656	517	551
	No Other	0	0	0	0	0	0	0
Nicaragua	Suspected	554 414	536 105	552 722	539 022	605 357	604 418	554 415
	No *Pf*	154	150	236	208	157	342	1 307
	No *Pv*	538	775	999	954	985	1 937	4 965
	No Other	0	0	0	0	0	0	0
Panama	Suspected	141 038	116 588	107 711	93 624	80 701	64 511	50 772
	No *Pf*	20	1	1	0	0	6	21
	No *Pv*	398	353	843	696	864	556	748
	No Other	0	0	0	0	0	0	0
Paraguay	Suspected	62 178	48 611	31 499	24 806	24 832	9 157	3 192
	No *Pf*	0	0	0	0	0	0	1
	No *Pv*	18	1	0	0	0	0	0
	No Other	0	0	0	1	0	0	0
Peru	Suspected	744 650	702 952	759 285	864 648	866 047	867 980	566 230
	No *Pf*	2 374	3 018	3 501	8 103	10 416	12 569	15 319
	No *Pv*	29 169	21 984	28 030	40 829	54 819	49 287	41 287
	No Other	3	3	7	11	17	9	17
Suriname	Suspected	17 133	16 184	21 685	19 736	33 425	15 236	23 444
	No *Pf*	721	331	126	407	323	20	7
	No *Pv*	817	382	167	322	78	61	69
	No Other	36	17	2	0	0	0	0
Venezuela (Bolivarian Republic of)	Suspected	400 495	382 303	410 663	476 764	522 617	625 174	932 556
	No *Pf*	10 915	10 633	13 302	27 659	27 843	35 509	61 034
	No *Pv*	32 710	34 651	39 478	50 938	62 850	100 880	179 554
	No Other	60	6	23	46	15	13	25

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
EASTERN MEDITERRANEAN								
Afghanistan	Suspected	847 589	936 252	847 933	787 624	743 183	801 938	-
	No *Pf*	6 142	5 581	1 231	1 877	3 000	4 004	5 980
	No *Pv*	63 255	71 968	53 609	43 369	58 362	82 891	132 237
	No Other	0	0	0	0	-	-	-
Djibouti	Suspected	1 010	354	1 412	7 189	39 284	10 586	19 492
	No *Pf*	1 010	-	20	0	-	-	11 781
	No *Pv*	0	-	0	0	-	-	2 041
	No Other	0	-	0	0	-	-	0
Iran (Islamic Republic of)	Suspected	614 817	530 470	479 655	385 172	468 513	630 886	418 125
	No *Pf*	191	208	44	94	25	9	2
	No *Pv*	1 656	1 502	711	426	351	157	79
	No Other	0	0	0	1	-	0	0
Pakistan	Suspected	8 601 835	8 418 570	8 902 947	7 752 797	8 514 341	8 885 456	8 004 307
	No *Pf*	73 857	73 925	97 996	56 573	42 817	38 141	68 170
	No *Pv*	143 136	205 879	228 215	283 661	232 332	163 872	250 279
	No Other	-	-	-	-	-	0	0
Saudi Arabia	Suspected	944 723	1 062 827	1 186 179	1 309 783	1 249 752	1 306 700	1 267 933
	No *Pf*	29	69	82	34	51	83	270
	No *Pv*	0	0	0	0	0	0	2
	No Other	0	0	-	6	0	0	0
Somalia	Suspected	220 698	99 403	53 658	69 192	79 653	119 008	241 381
	No *Pf*	5 629	189	-	-	-	-	-
	No *Pv*	0	-	-	-	-	-	-
	No Other	-	-	-	-	-	-	-
Sudan	Suspected	2 398 239	2 929 578	2 438 467	2 197 563	1 207 771	1 102 186	4 190 740
	No *Pf*	-	-	-	-	-	-	365 566
	No *Pv*	-	-	-	-	-	-	82 175
	No Other	-	-	-	-	-	-	24 105
Yemen	Suspected	835 018	804 940	891 394	927 821	821 618	711 680	1 181 486
	No *Pf*	77 301	59 696	109 504	102 369	86 440	75 925	45 539
	No *Pv*	966	478	398	408	267	334	347
	No Other	2	33	-	0	0	-	-
EUROPEAN								
Armenia[3]	Suspected	31 026	-	-	-	-	-	-
	No *Pf*	0	0	0	0	0	0	0
	No *Pv*	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0
Azerbaijan[2]	Suspected	456 652	449 168	497 040	432 810	399 925		-
	No *Pf*	0	0	0	0	0	0	0
	No *Pv*	50	4	3	0	0	0	0
	No Other	0	0	0	0	0	0	0
Georgia[2]	Suspected	2 368	2 032	1 046	192	440	-	-
	No *Pf*	0	0	0	0	0	0	0
	No *Pv*	0	1	1	0	0	0	0
	No Other	0	0	0	0	0	0	0
Kyrgyzstan[3]	Suspected	30 190	27 850	18 268	54 249	35 600	-	-
	No *Pf*	0	0	0	0	0	0	0
	No *Pv*	3	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0
Tajikistan[2]	Suspected	173 523	173 367	209 239	213 916	200 241	188 341	210 361
	No *Pf*	0	0	0	0	0	0	0
	No *Pv*	111	65	18	7	2	0	0
	No Other	0	0	0	0	0	0	0

Annex 3 - I. Reported malaria cases by species, 2010–2016

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
EUROPEAN								
Turkey[2]	Suspected	507 841	421 295	337 830	255 125	189 854		-
	No *Pf*	0	0	0	0	0	0	0
	No *Pv*	9	0	219	34	5	0	0
	No Other	0	0	0	0	0	0	0
Turkmenistan[3]	Suspected	81 784	-	-	-	-	-	-
	No *Pf*	0	0	0	0	0	0	0
	No *Pv*	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0
Uzbekistan[2]	Suspected	921 364	886 243	805 761	908 301	812 347	-	-
	No *Pf*	0	0	0	0	0	0	0
	No *Pv*	3	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0
SOUTH-EAST ASIA								
Bangladesh	Suspected	496 616	390 102	309 179	93 926	125 201	122 806	138 973
	No *Pf*	52 049	49 194	9 464	3 602	9 727	6 002	4 260
	No *Pv*	3 824	2 579	396	262	489	477	418
	No Other	0	0	0	0	-	0	0
Bhutan	Suspected	54 760	44 494	42 512	31 632	33 586	74 087	118 841
	No *Pf*	175	102	33	14	17	13	2
	No *Pv*	261	92	47	9	31	21	13
	No Other	0	0	0	-	-	0	0
Democratic People's Republic of Korea	Suspected	25 147	26 513	40 925	72 719	38 878	91 007	205 807
	No *Pf*	0	0	0	0	0	0	0
	No *Pv*	13 520	16 760	21 850	14 407	10 535	6 817	5 033
	No Other	0	0	0	0	0	-	-
India	Suspected	119 279 429	119 470 044	122 159 270	127 891 198	138 628 331	140 841 230	144 527 222
	No *Pf*	834 364	665 004	524 370	463 846	722 546	778 821	721 505
	No *Pv*	765 622	645 652	534 129	417 884	379 659	390 440	374 511
	No Other	-	-	-	-	-	0	0
Indonesia	Suspected	1 591 179	1 212 799	1 900 725	1 708 161	1 550 296	1 567 450	1 457 858
	No *Pf*	242 041	232 197	229 255	191 200	142 807	116 420	135 595
	No *Pv*	187 583	187 989	187 583	150 985	107 260	94 267	81 748
	No Other	2 547	2 261	981	1 342	1 960	1 387	1 106
Myanmar	Suspected	1 277 568	1 210 465	1 423 555	1 300 556	1 567 095	2 663 732	3 185 245
	No *Pf*	72 995	62 624	345 069	235 558	143 822	117 171	66 393
	No *Pv*	29 944	28 966	135 386	99 037	61 830	65 590	43 748
	No Other	346	-	-	-	-	7	-
Nepal	Suspected	213 353	188 702	243 432	169 464	200 631	132 379	146 705
	No *Pf*	766	30	108	295	139	87	74
	No *Pv*	2 349	908	1 480	1 659	693	504	433
	No Other	0	0	0	0	-	0	0
Sri Lanka[3]	Suspected	1 001 107	985 060	948 250	1 236 580	1 069 817	1 156 151	1 090 760
	No *Pf*	11	5	4	0	0	0	0
	No *Pv*	668	119	19	0	0	0	0
	No Other	-	-	-	0	0	0	0
Thailand	Suspected	1 777 977	1 450 885	1 130 757	1 830 090	1 756 528	1 369 841	1 461 007
	No *Pf*	9 548	5 857	11 553	14 645	14 331	3 348	1 883
	No *Pv*	13 401	8 608	17 506	15 573	20 513	4 655	2 671
	No Other	20	13	-	3 084	3 077	19	1 244
Timor-Leste	Suspected	266 384	225 772	182 854	178 200	117 107	121 110	150 333
	No *Pf*	28 818	15 981	1 962	513	203	56	84
	No *Pv*	11 432	3 758	2 288	512	139	24	10
	No Other	0	0	0	0	0	0	0

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016
WESTERN PACIFIC								
Cambodia	Suspected	193 210	216 712	194 263	152 137	142 242	163 680	166 695
	No *Pf*	9 483	8 637	19 867	9 510	14 796	20 784	13 676
	No *Pv*	4 794	5 155	19 575	11 267	10 356	13 146	9 816
	No Other	0	0	-	0	0	-	-
China	Suspected	7 118 649	9 190 401	6 918 770	5 555 001	4 403 633	4 052 616	3 194 929
	No *Pf*	1 295	1 410	16	127	6	1	0
	No *Pv*	3 675	1 907	179	71	50	26	3
	No Other	20	50	-	0	0	6	0
Lao People's Democratic Republic	Suspected	280 549	291 775	369 976	339 013	294 542	284 003	223 992
	No *Pf*	4 401	5 770	38 461	25 494	25 445	15 252	4 428
	No *Pv*	122	442	7 634	12 537	22 625	20 804	6 795
	No Other	1	14	-	1	1	0	0
Malaysia	Suspected	1 619 074	1 600 439	1 566 872	1 576 012	1 443 958	1 066 470	1 153 108
	No *Pf*	1 489	754	651	464	210	132	76
	No *Pv*	3 387	1 750	915	385	241	84	178
	No Other	943	1 660	-	194	120	26	12
Papua New Guinea	Suspected	1 505 393	1 279 140	1 113 528	1 454 166	922 417	909 940	1 168 797
	No *Pf*	60 824	60 317	58 747	120 748	200 215	233 609	381 397
	No *Pv*	13 171	9 654	7 108	7 579	78 846	62 228	95 328
	No Other	1 990	632	-	1 279	2 125	1 950	1 772
Philippines	Suspected	301 577	327 125	333 084	320 089	316 323	280 222	321 838
	No *Pf*	12 038	7 043	4 774	5 051	3 760	834	366
	No *Pv*	2 885	2 380	2 189	1 357	5 881	882	1 503
	No Other	175	127	-	67	5 320	826	534
Republic of Korea	Suspected	1 772	838	555	443	638	699	673
	No *Pf*	27	20	36	0	0	0	0
	No *Pv*	1 691	754	473	383	557	627	601
	No Other	0	0	0	0	0	0	0
Solomon Islands	Suspected	284 931	254 506	249 520	245 014	233 803	192 044	274 881
	No *Pf*	23 092	14 537	14 980	13 640	10 559	11 848	21 325
	No *Pv*	12 281	8 665	9 339	11 628	7 845	12 150	33 060
	No Other	-	0	-	0	0	0	46
Vanuatu	Suspected	48 088	32 656	33 273	28 943	35 570	14 938	21 484
	No *Pf*	1 738	851	1 727	1 039	279	150	186
	No *Pv*	2 265	1 224	1 680	1 342	703	273	1 682
	No Other	10	2	0	0	0	0	0
Viet Nam	Suspected	2 803 918	3 312 266	3 436 534	3 115 804	2 786 135	2 673 662	2 497 326
	No *Pf*	12 763	10 101	11 448	9 532	8 532	4 561	2 396
	No *Pv*	4 466	5 602	7 220	6 901	7 220	4 756	1 750
	No Other	0	0	0	0	0	14	15

Pf, *Plasmodium falciparum* + mixed cases; *Pv*, *Plasmodium vivax*

The number of *Pf*, *Pv* and other cases (respectively, No *Pf*, No *Pv* and No other) are indigenous cases.

[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)

[2] There is no local transmission

[3] Certified malaria free countries are included in this listing for historical purposes

Annex 3 - J. Reported malaria deaths, 2010–2016

WHO region Country/area	2010	2011	2012	2013	2014	2015	2016
AFRICAN							
Algeria	*1*	*0*	*0*	*0*	*0*	*0*	*0*
Angola	8 114	6 909	5 736	7 300	5 714	7 832	15 997
Benin	964	1 753	2 261	2 288	1 869	1 416	1 646
Botswana	8	8	3	*7*	22	5	3
Burkina Faso	9 024	7 001	7 963	6 294	5 632	5 379	3 974
Burundi	2 677	2 233	2 263	3 411	2 974	3 799	5 853
Cabo Verde	1	*1*	*0*	*0*	*2*	*0*	*1*
Cameroon	4 536	3 808	3 209	4 349	4 398	3 440	2 639
Central African Republic	526	858	1 442	1 026	635	1 763	2 668
Chad	886	1 220	1 359	1 881	1 720	1 572	1 686
Comoros	53	19	17	15	0	1	0
Congo	–	892	623	2 870	271	435	733
Côte d'Ivoire	1 023	1 389	1 534	3 261	4 069	2 604	3 340
Democratic Republic of the Congo	23 476	23 748	21 601	30 918	25 502	39 054	33 997
Equatorial Guinea	30	52	77	66	–	28	109
Eritrea	27	12	30	6	15	12	21
Ethiopia	1 581	936	1 621	358	213	662	510
Gabon	182	74	134	273	159	309	101
Gambia	151	440	289	262	170	167	79
Ghana	3 859	3 259	2 855	2 506	2 200	2 137	1 264
Guinea	735	743	979	108	1 067	846	867
Guinea-Bissau	296	472	370	418	357	477	191
Kenya	26 017	713	785	360	472	15 061	603
Liberia	1 422	–	1 725	1 191	2 288	1 379	1 259
Madagascar	427	398	552	641	551	841	443
Malawi	8 206	6 674	5 516	3 723	4 490	3 799	4 000
Mali	3 006	2 128	1 894	1 680	2 309	1 544	1 344
Mauritania	211	77	106	25	19	39	317
Mayotte	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Mozambique	3 354	3 086	2 818	2 941	3 245	2 467	1 685
Namibia	63	36	4	21	61	45	*65*
Niger	3 929	2 802	2 825	2 209	2 691	2 778	2 226
Nigeria	4 238	3 353	7 734	7 878	6 082	–	–
Rwanda	670	380	459	409	496	516	715
Sao Tome and Principe	14	19	7	11	0	0	*0*
Senegal	553	472	649	815	500	*0*	*0*
Sierra Leone	8 188	3 573	3 611	4 326	2 848	*1 107*	*1 345*
South Africa	83	54	72	105	174	110	34
South Sudan[1]	1 053	406	1 321	1 311	–	–	–
Swaziland	8	*1*	*3*	*4*	*4*	5	*3*
Togo	1 507	*1 314*	*1 197*	*1 361*	*1 205*	1 205	*847*
Uganda	8 431	5 958	6 585	7 277	5 921	6 100	5 635
United Republic of Tanzania	15 867	11 806	7 820	8 528	5 373	6 313	5 046
Mainland	15 819	11 799	7 812	8 526	5 368	6 311	5 045
Zanzibar	48	7	8	2	5	2	1
Zambia	4 834	4 540	3 705	3 548	3 257	2 389	1 827
Zimbabwe	255	451	351	352	406	200	351
AMERICAS							
Argentina	0	0	0	0	0	0	0
Belize	0	*0*	*0*	*0*	*0*	*0*	*0*
Bolivia (Plurinational State of)	0	0	0	0	1	*0*	*0*
Brazil	76	70	60	40	*36*	*35*	*37*
Colombia	42	23	24	10	17	18	36
Costa Rica	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Dominican Republic	15	10	8	5	*4*	*3*	*1*
Ecuador	*0*	*0*	*0*	*0*	*0*	*0*	*0*
El Salvador	*0*	*0*	*0*	*0*	*0*	*0*	*0*
French Guiana	1	2	2	3	0	*0*	*0*
Guatemala	0	0	0	1	1	1	0
Guyana	24	36	35	14	11	12	13
Haiti	8	5	6	10	9	15	13
Honduras	3	2	1	1	2	0	*0*
Mexico	*0*	*0*	*0*	*0*	*0*	*0*	*0*

WHO region Country/area	2010	2011	2012	2013	2014	2015	2016
AMERICAS							
Nicaragua	1	1	2	0	0	0	2
Panama	1	0	1	0	0	0	0
Paraguay	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Peru	0	1	7	4	4	5	7
Suriname	1	1	0	1	1	*0*	*0*
Venezuela (Bolivarian Republic of)	18	16	10	6	5	8	1
EASTERN MEDITERRANEAN							
Afghanistan	22	40	36	24	32	49	47
Djibouti	0	0	0	17	28	-	-
Iran (Islamic Republic of)	*0*	*0*	*0*	*0*	*0*	*1*	*0*
Pakistan	-	4	260	244	56	34	33
Saudi Arabia	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Somalia	6	5	10	23	14	27	13
Sudan	1 023	612	618	685	823	868	984
Yemen	92	75	72	55	23	14	65
EUROPEAN							
Armenia[3]	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Azerbaijan[2]	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Georgia[2]	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Kyrgyzstan[3]	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Tajikistan[2]	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Turkey[2]	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Turkmenistan[3]	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Uzbekistan[2]	*0*	*0*	*0*	*0*	*0*	*0*	*0*
SOUTH-EAST ASIA							
Bangladesh	37	36	11	15	45	9	17
Bhutan	2	1	*1*	*0*	*0*	*0*	*0*
Democratic People's Republic of Korea	*0*	*0*	*0*	*0*	*0*	*0*	*0*
India	1 018	754	519	440	562	384	331
Indonesia	432	388	252	385	217	157	161
Myanmar	788	581	403	236	92	37	21
Nepal	6	2	0	0	0	0	*0*
Sri Lanka[3]	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Thailand	80	43	37	47	38	33	27
Timor-Leste	58	16	3	3	1	0	*0*
WESTERN PACIFIC							
Cambodia	151	94	45	12	18	10	3
China	19	33	*0*	*0*	*0*	*0*	*0*
Lao People's Democratic Republic	24	17	44	28	4	2	1
Malaysia	*13*	*12*	*12*	*10*	*4*	*4*	*2*
Papua New Guinea	616	523	381	307	203	163	306
Philippines	30	12	16	12	10	20	7
Republic of Korea	*1*	*2*	*0*	*0*	*0*	*0*	*0*
Solomon Islands	34	19	18	18	23	13	20
Vanuatu	1	1	0	*0*	0	*0*	*0*
Viet Nam	21	14	8	6	6	3	*2*
REGIONAL SUMMARY							
African	150 486	104 068	104 105	116 333	99 381	117 836	103 424
Americas	190	167	156	95	91	97	110
Eastern Mediterranean	1 143	736	996	1 048	976	993	1 142
European	0	0	0	0	0	0	0
South-East Asia	2 421	1 821	1 226	1 126	955	620	557
Western Pacific	910	727	524	393	268	215	341
Total	**155 150**	**107 519**	**107 007**	**118 995**	**101 671**	**119 761**	**105 574**

Reported malaria can be presumed and confirmed or only confirmed deaths depending on the country. Indigenous malaria deaths are in italics

[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)

[2] There is no local transmission

[3] Certified malaria free countries are included in this listing for historical purposes

Notes

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