WORLD MALARIA REPORT

2018

World Health Organization

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ISBN 978-92-4-156565-3

Suggested citation. World Malaria Report 2018. Geneva: World Health Organization; 2018. Licence: CC BY-NC-SA 3.0 IGO.

Cataloguing-in-Publication (CIP) data. CIP data are available at http://apps.who.int/iris.

Map production: WHO Global Malaria Programme and WHO Public Health Information and Geographic Systems.

Layout: DesignIsGood.info

Please consult the WHO Global Malaria Programme website for the most up-to-date version of all documents (www.who.int/malaria)

Printed in Switzerland

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Foreword

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Director-General
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Getting the global malaria response back on track

In November 2017, I signalled to the international community that the global response to malaria had stalled and we risked losing some of the precious gains we have made over the past 20 years.

One year on, the data in this year's *World malaria report* reconfirms that we are off course to meet two critical 2020 milestones of the *WHO Global Technical Strategy for Malaria 2016-2030*: reducing case incidence and death rates by at least 40% from 2015 levels.

There are two findings that I find particularly worrying: first, several countries that carry a disproportionate burden of disease have reported increases in malaria cases, setting us back even further; and second, the level of investment in malaria control remains inadequate.

The *World malaria report 2018* estimates that there were 219 million cases of malaria in 2017. The 10 highest burden African countries saw an estimated 3.5 million more malaria cases in 2017 compared with the previous year.

Malaria continues to claim the lives of more than 435 000 people each year, largely in Africa. Children under the age of 5 are especially vulnerable; the fact that every two minutes a child dies from this preventable and curable disease is unacceptable.

The report also reveals insufficient levels of access to and uptake of lifesaving malaria tools and interventions. To truly conquer malaria, we need a comprehensive approach that includes vector control measures and early diagnosis and treatment, especially at the village level. A considerable proportion of people at risk of infection are not being protected, including pregnant women and children in Africa.

Clearly, we need to change course and improve how we combat malaria, particularly in those countries with the highest burden. The status quo will take us further off track and have significant negative socio-economic consequences beyond malaria.

Earlier this year, at the 71st World Health Assembly, I announced an aggressive new approach to drive progress against malaria. This new initiative, called "High burden to high impact," will be led by countries hardest hit by the disease.

Supported by WHO and the RBM Partnership to End Malaria, the approach is based on four pillars: galvanizing political will nationally and globally to reduce malaria deaths; using strategic information to drive impact; implementing best global guidance, policies and strategies suitable for all malaria-endemic countries; and applying a coordinated country response.

Importantly, "High burden to high impact" calls for increased funding, with an emphasis on domestic funding for malaria, and better targeting of resources. The latter is especially pertinent because many people who could have benefited from malaria interventions missed out because of health system inefficiencies.

The *World malaria report 2018* delivers a clear message: the actions we take on malaria over the next 24 months will largely determine whether we can meet the 2025 milestones of WHO's global malaria strategy. It also sets the path for our collective contribution to the achievement of the Sustainable Development Goals.

I am optimistic. The 2018 report highlights pockets of progress. For example, more countries are getting closer to eliminating malaria, and several others including Ethiopia, India, Pakistan and Rwanda recorded substantial declines in cases in 2017.

We need to build on this success. We must double down on malaria and make good on the promise to significantly reduce the global burden of the disease in the next decade. Critically, we must invest in robust health systems that deliver quality services for combating malaria and all diseases.

I know we can defeat malaria. With the continued commitment of all countries, and the support of development partners, I am confident we will win this fight with this centuries-old disease and get back on track toward our common vision: a malaria-free world.

Acknowledgements

We are very grateful to the numerous people who contributed to the production of the *World malaria report 2018*. The following people collected and reviewed data from malaria endemic countries and territories:

Ahmad Mureed Muradi and Mohammad Shoaib Tamim (Afghanistan); Lammali Karima (Algeria); Fernanda Guimaraes (Angola); Laura Brant (Argentina); Lusine Paronyan (Armenia); Suleyman Mammadov (Azerbaijan); Anjan Kumar Saha (Bangladesh); Kim Bautista (Belize); Bella Dos Santos Hounkpe (Benin); Sonam Gyeltshen (Bhutan); Raúl Marcelo Manjón Tellería (Bolivia [Plurinational State of]); Mpho Motlaleng (Botswana); Cássio Roberto Leonel Peterka, Poliana de Brito Ribeiro Reis and Edília Sâmela Freitas Santos (Brazil); Yacouba Savadogo (Burkina Faso); Félicien Ndayizeye (Burundi); António Lima Moreira (Cabo Verde); Tol Bunkea (Cambodia); Jean Fosso (Cameroon); Jean-Charles Tchokote Happy (Central African Republic); Mahamat Idriss Djaskano (Chad); Li Zhang (China); Sandra Lorena Giron Vargas (Colombia); Astafieva Marina (Comoros); Jean-Mermoz Youndouka (Congo); Adriana Alfaro Nájera (Costa Rica); Ehui Anicet Parfait Katche (Côte d'Ivoire); Kim Yun Chol (Democratic People's Republic of Korea); Eric Mukomena Sompwe (Democratic Republic of the Congo); Abdillahi Omar Boulhan and Edie Alain Kemenang (Djibouti); Grey Idalia Benoit Vásquez (Dominican Republic); Silvio Silva and Mauricio Vallejo (Ecuador); Noha Swellam (Egypt); Jaime Enrique Alemán Escobar (El Salvador); Matilde Riloha Rivas (Equatorial Guinea); Selam Mihreteab (Eritrea); Zulisile Zulu (Eswatini); Mebrahtom Haile (Ethiopia); Alice Sanna (French Guiana); Alain Mbongo (Gabon); Momodou Kalleh (Gambia); Merab Iosava (Georgia); Keziah Malm (Ghana); Erica Chávez Vásquez (Guatemala); Nouman Diakité (Guinea); Paulo Djata (Guinea-Bissau); Quacy Grant (Guyana); Darlie Antoine (Haiti); Engels Banegas, Dennis Escobar, Jose Orlinder Nicolas and Paola Paz (Honduras); P.K. Sen (India); Nancy Dian Anggraeni and M. Epid (Indonesia); Ahmad Raeisi and Leila Faraji (Iran [Islamic Republic of]); Muthana Ibrahim Abdul Kareem (Iraq); James Kiarie (Kenya); Jumagul Usubaliyeva (Kyrgyzstan); Bouasy Hongvanthong (Lao People's Democratic Republic); Levi Hinneh (Liberia); Hariniaina David Gaël Rajaonera (Madagascar); Austin Albert Gumbo (Malawi); Jenarun Jelip (Malaysia); Sana Saleem (Maldives); Diakalia Kone (Mali); Sidina Med Ghoulam (Mauritania); Frédéric Pagès (Mayotte); José Cruz Rodríguez Martínez and Héctor Olguín Bernal (Mexico); Guidion Mathe (Mozambique); Aung Thi (Myanmar); Mwalenga Nghipumbwa (Namibia); Bibek Lal (Nepal); Cristhian Toledo (Nicaragua); Hadiza Jackou (Niger); Audu Bala Mohammed (Nigeria); Muhammad Suleman Memon (Pakistan); Elsa Benavides Arauz, Santiago Cherigo and Jose Lasso (Panama); Pauline Mukura (Papua New Guinea); Cynthia Viveros (Paraguay); Karim Pardo Ruiz (Peru); Clarisse Andong (Philippines); Byoung-Hak Jeon (Republic of Korea); Alla Baranova (Russian Federation); Michee Kabera (Rwanda); Jessica da Veiga dos Santos de Sousa Soares (Sao Tome and Principe); Mohammed Hassan Al-Zahrani (Saudi Arabia); Medoune Ndiop (Senegal); Samuel Juana Smith (Sierra Leone); John Leaburi (Solomon Islands); Abdikarim Hussein Hassan, Abdi Abdillahi Ali, Ali Abdirahman Osman and Fahmi Isse Yusuf (Somalia); Bridget Shandukani (South Africa); Lincoln S. Charimari (South Sudan); H.D.B. Herath (Sri Lanka); Lubna Mohammed Yahya Nawai (Sudan); Loretta Hardjopawiro (Suriname); Boturkhon Tagaykulov (Tajikistan); Suravadee Kitchakarn (Thailand); Maria do Rosario de Fatima Mota (Timor-Leste); Tchassama Tchadjobo (Togo); Seher Topluoglu (Turkey); Sachly Nuryeva (Turkmenistan); Mulyazaawo Mathias (Uganda); Anna Mahendeka (United Republic of Tanzania [mainland]); Abdul-wahid H. Al-mafazy (United Republic of Tanzania [Zanzibar]); Inna Tyo and Nina Lebedeva (Uzbekistan); Johnny Nausien (Vanuatu); Eduardo Borges (Venezuela [Bolivarian Republic of]); Nguyen Quy Anh (Viet Nam); Moamer Mohammed Badi (Yemen); Freddie Masaninga (Zambia); and Busisani Dube (Zimbabwe).

We are grateful to Paul Milligan (London School of Hygiene & Tropical Medicine) for his contribution to updating the section on seasonal malaria chemoprevention with the most up-to-date information

on implementation and coverage. Carol D'Souza and Jurate Juskaite (Global Fund to Fight AIDS, Tuberculosis and Malaria [Global Fund]) supplied information on financial disbursements from the Global Fund. Adam Wexler (Kaiser Family Foundation) and Adam Aspden (DFID) provided information on financial contributions for malaria control from the United States of America and the United Kingdom of Great Britain and Northern Ireland (United Kingdom), respectively. Anna Doubell and her team at Policy Cures Research provided helpful comments on the section on financing malaria-related research and development. John Milliner (Milliner Global Associates) provided information on long-lasting insecticidal nets delivered by manufacturers. Dr Samir Bhatt (Imperial College, University of London) and the Malaria Atlas Project (MAP,[1] University of Oxford, led by Professor Peter Gething), with the support of the Bill & Melinda Gates Foundation and the Medical Research Council (United Kingdom), produced estimates of insecticide-treated mosquito net (ITN) coverage for African countries using data from household surveys, ITN deliveries by manufacturers, ITNs distributed by national malaria programmes (NMPs) and ITN coverage indicators. They also produced estimates of *Plasmodium falciparum* parasite prevalence in sub-Saharan Africa. MAP's work was managed and coordinated by Dr Dan Weiss and Mike Thorn. Tom McLean and Jason Richardson (Innovative Vector Control Consortium [IVCC]) provided national indoor residual spraying coverage and implementation data in complement to reported country information. Christen Fornadel (US President's Malaria Initiative) provided insecticide resistance data and Gildas Yahouedo assisted with data compilation from publications. Abraham Mnzava and Melanie Renshaw (African Leaders Malaria Alliance) provided information on the status of national insecticide resistance monitoring and management plans. Colin Mathers (World Health Organization [WHO] Department of Health Statistics and Information Systems) prepared estimates of malaria mortality in children aged under 5 years, on behalf of the Child Health Epidemiology Reference Group. John Painter, Anna Bowen and Julie Gutman (US Centers for Disease Control and Prevention) provided data analysis and interpretation for the section on intermittent preventive treatment in pregnancy.

The following WHO staff in regional and subregional offices assisted in the design of data collection forms; the collection and validation of data; and the review of epidemiological estimates, country profiles, regional profiles and sections:

- Birkinesh Amenshewa, Ebenezer Sheshi Baba, Magaran Bagayoko, Steve Banza Kubenga and Jackson Sillah (WHO Regional Office for Africa [AFRO]);
- Spes Ntabangana (AFRO/Inter-country Support Team [IST] Central Africa);
- Khoti Gausi (AFRO/IST East and Southern Africa);
- Abderrahmane Kharchi Tfeil (AFRO/IST West Africa);
- Maria Paz Ade, Janina Chavez, Rainier Escalada, Blanca Escribano, Ileana Lopez, Roberto Montoya, Eric Ndofor, Prabhjot Singh and Federico Zumaya (WHO Regional Office for the Americas);
- Samira El-Aryani and Ghasem Zamani (WHO Regional Office for the Eastern Mediterranean);
- Elkhan Gasimov and Nathalie Germain Julskov (WHO Regional Office for Europe);
- Risintha Premaratne (WHO Regional Office for South-East Asia); and
- Rabindra Abeyasinghe and James Kelley (WHO Regional Office for the Western Pacific).

The maps for country and regional profiles were produced by MAP's ROAD-MAPII team (led by Mike Thorn); map production was led and coordinated by Jen Rozier, with help from Colin Johnston, Emma Collins and Joe Harris. ROAD-MAPII is supported by the Bill & Melinda Gates Foundation and the Medical Research Council (United Kingdom).

We are also grateful to Fred Binka (INDEPTH Malaria Clinical Trials Alliance), Rose Leke (University of Yaoundé, Cameroon), Kevin Marsh (University of Oxford, United Kingdom) and Arantxa

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

Roca-Feltrer (Malaria Consortium) who graciously reviewed all sections and provided substantial comments for improvement; Egle Granziera and Claudia Nannini (WHO) for legal review; Martha Quiñones (WHO consultant) and Laurent Bergeron (WHO)/Amélie Latour (WHO consultant) for the translation into Spanish and French, respectively, of the foreword and "This year's report at a glance" section; Claude Cardot and the DesignIsGood team for the design and layout of the report; Blossom (Milan, Italy) for the report cover; and Hilary Cadman and the Cadman Editing Services team for technical editing of the report.

On behalf of the WHO Global Malaria Programme (GMP), the publication of the *World malaria report 2018* was coordinated by Abdisalan Noor. Significant contributions were made by John J. Aponte, Maru Aregawi, Amy Barrette, Nelly Biondi, Lucia Fernandez Montoya, Tessa Knox, Peter Olumese, Edith Patouillard, Salim Sadruddin and Ryan Williams, in close collaboration with Yuen Ching Chan (WHO consultant). Laurent Bergeron (WHO GMP) provided programmatic support for overall management of the project. The editorial committee for the report comprised Pedro Alonso, Andrea Bosman, Jan Kolaczinski, Kimberly Lindblade, Leonard Ortega, Pascal Ringwald and David Schellenberg from the WHO GMP. Additional reviews were received from colleagues in the GMP: Jane Cunningham, Charlotte Rasmussen, Alastair Robb, Silvia Schwarte, Erin Shutes and Saira Stewart. Report layout, design and production were coordinated by Laurent Bergeron.

Funding for the production of this report was gratefully received from the Bill & Melinda Gates Foundation; Luxembourg's Ministry of Foreign and European Affairs – Directorate for Development Cooperation and Humanitarian Affairs; the Spanish Agency for International Development Cooperation; and the United States Agency for International Development.

Abbreviations

ACT	artemisinin-based combination therapy
AIDS	acquired immunodeficiency syndrome
AIM	*Action and investment to defeat malaria 2016–2030*
AL	artemether-lumefantrine
AMFm	Affordable Medicines Facility–malaria
ANC	antenatal care
AQ	amodiaquine
AS	artesunate
ASAQ	artesunate-amodiaquine
ASMQ	artesunate-mefloquine
ASPY	artesunate-pyronaridine
CHW	community health worker
CI	confidence interval
CQ	chloroquine
CRS	creditor reporting system
DAC	Development Assistance Committee
DFID	Department for International Development (United Kingdom)
DHA	dihydroartemisinin
DHIS2	District Health Information Software2
DHS	demographic and health survey
E-2020	eliminating countries for 2020
G6PD	glucose-6-phosphate dehydrogenase
GF	Global Fund to Fight AIDS, Tuberculosis and Malaria
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GMP	Global Malaria Programme
GMS	Greater Mekong subregion
GPW13	WHO's 13th General Programme of Work
GTS	*Global technical strategy for malaria 2016–2030*
Hb	haemoglobin
HIV	human immunodeficiency virus
IPTi	intermittent preventive treatment in infants
IPTp	intermittent preventive treatment in pregnancy
IQR	interquartile range
IRS	indoor residual spraying
IST	Inter-country Support Team
ITN	insecticide-treated mosquito net
LLIN	long-lasting insecticidal net
MEOC	Malaria Elimination Oversight Committee
MIS	malaria indicator survey
NMP	national malaria programme
OECD	Organisation for Economic Co-operation and Development
P.	*Plasmodium*
PPQ	piperaquine
PQ	primaquine
R&D	research and development
RBM	Roll Back Malaria Partnership to End Malaria
RDT	rapid diagnostic test
SDG	Sustainable Development Goal
SMC	seasonal malaria chemoprevention
SP	sulfadoxine-pyrimethamine
UHC	universal health coverage
UNICEF	United Nations Children's Fund
United Kingdom	United Kingdom of Great Britain and Northern Ireland
USA	United States of America
WHO	World Health Organization

This year's report at a glance

GLOBAL AND REGIONAL MALARIA BURDEN, IN NUMBERS

Malaria cases

- In 2017, an estimated 219 million cases of malaria occurred worldwide (95% confidence interval [CI]: 203–262 million), compared with 239 million cases in 2010 (95% CI: 219–285 million) and 217 million cases in 2016 (95% CI: 200–259 million).
- Although there were an estimated 20 million fewer malaria cases in 2017 than in 2010, data for the period 2015–2017 highlight that no significant progress in reducing global malaria cases was made in this timeframe.
- Most malaria cases in 2017 were in the WHO African Region (200 million or 92%), followed by the WHO South-East Asia Region with 5% of the cases and the WHO Eastern Mediterranean Region with 2%.
- Fifteen countries in sub-Saharan Africa and India carried almost 80% of the global malaria burden. Five countries accounted for nearly half of all malaria cases worldwide: Nigeria (25%), Democratic Republic of the Congo (11%), Mozambique (5%), India (4%) and Uganda (4%).
- The 10 highest burden countries in Africa reported increases in cases of malaria in 2017 compared with 2016. Of these, Nigeria, Madagascar and the Democratic Republic of the Congo had the highest estimated increases, all greater than half a million cases. In contrast, India reported 3 million fewer cases in the same period, a 24% decrease compared with 2016.
- Rwanda has noted a reduction in its malaria burden, with 430 000 fewer cases in 2017 than in 2016, and Ethiopia and Pakistan marked decreases of over 240 000 cases over the same period.
- The incidence rate of malaria declined globally between 2010 and 2017, from 72 to 59 cases per 1000 population at risk. Although this represents an 18% reduction over the period, the number of cases per 1000 population at risk has stood at 59 for the past 3 years.
- The WHO South-East Asia Region continued to see its incidence rate fall – from 17 cases of the disease per 1000 population at risk in 2010 to 7 in 2017 (a 59% decrease). All other WHO regions recorded either little progress or an increase in incidence rate. The WHO Region of the Americas recorded a rise, largely due to increases in malaria transmission in Brazil, Nicaragua and Venezuela (Bolivarian Republic of). In the WHO African Region, the malaria incidence rate remained at 219 cases per 1000 population at risk for the second year in a row.
- *Plasmodium falciparum* is the most prevalent malaria parasite in the WHO African Region, accounting for 99.7% of estimated malaria cases in 2017, as well as in the WHO regions of South-East Asia (62.8%), the Eastern Mediterranean (69%) and the Western Pacific (71.9%). *P. vivax* is the predominant parasite in the WHO Region of the Americas, representing 74.1% of malaria cases.

Malaria deaths

- In 2017, there were an estimated 435 000 deaths from malaria globally, compared with 451 000 estimated deaths in 2016, and 607 000 in 2010.
- Children aged under 5 years are the most vulnerable group affected by malaria. In 2017, they accounted for 61% (266 000) of all malaria deaths worldwide.
- The WHO African Region accounted for 93% of all malaria deaths in 2017. Although the WHO African Region was home to the highest number of malaria deaths in 2017, it also accounted for 88% of the 172 000 fewer global malaria deaths reported in 2017 compared with 2010.
- Nearly 80% of global malaria deaths in 2017 were concentrated in 17 countries in the WHO African Region and India; seven of these countries accounted for 53% of all global malaria deaths: Nigeria (19%), Democratic Republic of the Congo (11%), Burkina Faso (6%), United Republic of Tanzania (5%), Sierra Leone (4%), Niger (4%) and India (4%).
- All WHO regions except the WHO Region of the Americas recorded reductions in mortality in 2017 compared with 2010. The largest declines occurred in the WHO regions of South-East Asia (54%), Africa (40%) and the Eastern Mediterranean (10%). Despite these gains, the malaria mortality reduction rate has also slowed since 2015, reflecting the estimated trends in malaria case incidence.

Malaria-related anaemia

- This year's report includes a section on malaria-related anaemia, a condition that, left untreated, can result in death, especially among vulnerable populations such as pregnant women and children aged under 5 years.
- Anaemia was once a key indicator of progress in malaria control, and its prevalence was used to evaluate the efficacy of interventions. Recent years have seen a decline in awareness of the burden of malaria-associated anaemia.
- Despite its importance as a direct and indirect consequence of malaria, the prevalence of anaemia among populations vulnerable to the disease has not been reported consistently as a metric of malaria transmission and burden.
- Data from household surveys conducted in 16 high-burden African countries between 2015 and 2017 show that, among children aged under 5 years, the prevalence of any anaemia was 61%, mild anaemia 25%, moderate anaemia 33% and severe anaemia 3%. Of children who tested positive for malaria, the prevalence of any anaemia was 79%, mild anaemia 21%, moderate anaemia 50% and severe anaemia 8%.

INVESTMENTS IN MALARIA PROGRAMMES AND RESEARCH

Malaria control and elimination investments

- In 2017, an estimated US$ 3.1 billion was invested in malaria control and elimination efforts globally by governments of malaria endemic countries and international partners – an amount slighter higher than the figure reported for 2016.
- Nearly three quarters (US$ 2.2 billion) of investments in 2017 were spent in the WHO African Region, followed by the WHO regions of South-East Asia (US$ 300 million), the Americas (US$ 200 million), and the Eastern Mediterranean and the Western Pacific (US$ 100 million each).
- In 2017, US$ 1.4 billion was invested in low-income countries, US$ 1.2 billion in lower-middle-income countries and US$ 300 million in upper-middle-income countries. International funding represented the major source of funding in low-income and lower-middle-income countries, at 87% and 70%, respectively.
- Governments of endemic countries contributed 28% of total funding (US$ 900 million) in 2017, a figure unchanged from 2016. Two thirds of domestically sourced funds were invested in malaria control activities carried out by national malaria programmes (NMPs), with the remaining share estimated as the cost of patient care.
- As in previous years, the United States of America (USA) was the largest international source of malaria financing, providing US$ 1.2 billion (39%) in 2017. Country members of the Development Assistance Committee together accounted for US$ 700 million (21%). The United Kingdom of Great Britain and Northern Ireland contributed around US$ 300 million (9%) while the Bill & Melinda Gates Foundation provided US$ 100 million (2%).
- Of the US$ 3.1 billion invested in 2017, US$ 1.3 billion was channelled through the Global Fund to Fight AIDS, Tuberculosis and Malaria.

Investment outlook

- Although funding for malaria has remained relatively stable since 2010, the level of investment in 2017 is far from what is required to reach the first two milestones of the GTS; that is, a reduction of at least 40% in malaria case incidence and mortality rates globally by 2020, compared with 2015 levels.
- To reach the GTS 2030 targets, it is estimated that annual malaria funding will need to increase to at least US$ 6.6 billion per year by 2020.
- Stepping up investments in malaria research and development is key to achieving the GTS targets. In 2016, US$ 588 million was spent in this area, representing 85% of the estimated annual need for research and development.
- Although research and development funding for malaria vaccines and drugs declined in 2016 compared with 2015, investments in vector control products almost doubled, from US$ 33 million to US$ 61 million.

Deliveries of malaria commodities

Insecticide-treated mosquito nets

- Between 2015 and 2017, a total of 624 million insecticide-treated mosquito nets (ITNs), mainly long-lasting insecticidal nets (LLINs), were reported by manufacturers as having been delivered globally. This represents a substantial increase over the previous period 2012–2014, when 465 million ITNs were delivered globally.

- An estimated 552 million ITNs were distributed by NMPs globally, with most (459 million or 83%) being delivered in sub-Saharan Africa over the period 2015–2017.
- Globally, 85% of ITNs were distributed through free mass distribution campaigns, 8% in antenatal care facilities and 4% as part of immunization programmes.

Rapid diagnostic tests

- An estimated 276 million rapid diagnostic tests (RDTs) were sold globally in 2017.
- In 2017, 245 million RDTs were distributed by NMPs. Most RDTs (66%) were tests that detected *P. falciparum* only and were supplied to sub-Saharan Africa.
- In sub-Saharan Africa, RDTs are becoming increasingly the most used method to test for malaria diagnosis among suspected malaria patients in public health facilities. In 2017, an estimated 75% of malaria tests were conducted using RDTs, up from 40% in 2010.

Artemisinin-based combination therapy

- An estimated 2.74 billion treatment courses of artemisinin-based combination therapy (ACT) were procured by countries over the period 2010–2017. An estimated 62% of these procurements were reported to have been made for the public sector.
- During the period 2010–2017, 1.45 billion ACT treatment courses were delivered by NMPs, of which 1.42 billion (98%) were in the WHO African Region.
- With increases in diagnostic testing in recent years, ACT treatment courses are becoming more targeted towards patients who tested positive for malaria. This is demonstrated by a substantially reduced ratio of ACTs to tests (0.8 in 2017 compared with 2.5 in 2010). Nevertheless, this implies that an estimated 30% of patients who received ACTs were not tested for malaria.

PREVENTING MALARIA

Vector control

- Half of people at risk of malaria in Africa are sleeping under an ITN: in 2017, 50% of the population was protected by this intervention, an increase from 29% in 2010. Furthermore, the percentage of the population with access to an ITN increased from 33% in 2010 to 56% in 2017. However, coverage has improved only marginally since 2015 and has been at a standstill since 2016.
- Households with at least one ITN for every two people doubled to 40% between 2010 and 2017. However, this figure represents only a modest increase over the past 3 years, and remains far from the target of universal coverage.
- 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% in 2010 to 3% in 2017, with decreases seen across all WHO regions.
- In the WHO African Region, IRS coverage dropped from 80 million people at risk in 2010, to a low point of 51 million in 2016 before rising to 64 million in 2017. In other WHO regions, the number of people protected with IRS in 2017 was 1.5 million in the Americas, 7.5 million in the Eastern Mediterranean, 41 million in South-East Asia, and 1.5 million in the Western Pacific.
- The declines in IRS coverage are occurring as countries change or rotate insecticides (changing to more expensive chemicals), and as operational strategies change (e.g. decreasing at-risk populations in malaria elimination countries).

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 33 African countries that reported on IPTp coverage levels in 2017, an estimated 22% of eligible pregnant women received the recommended three or more doses of IPTp, compared with 17% in 2015 and 0% in 2010.
- In 2017, 15.7 million children in 12 countries in Africa's Sahel subregion were protected through seasonal malaria chemoprevention (SMC) programmes. However, about 13.6 million children who could have benefited from this intervention were not covered, mainly due to a lack of funding.

DIAGNOSTIC TESTING AND TREATMENT

Accessing care

- Prompt diagnosis and treatment is the most effective way to prevent a mild case of malaria from developing into severe disease and death. Based on national household surveys completed in 19 countries in sub-Saharan Africa between 2015 and 2017, a median of 52% (interquartile range [IQR]: 44–62%) 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 health facilities and community health workers.
- Although more febrile children were brought for care in the public health sector (median: 36%, IQR: 30–46%) than in the formal medical private sector (median: 8%, IQR: 5–10%), a high proportion of febrile children did not receive any medical attention (median: 40%, IQR: 28–45%). Poor access to health care providers or lack of awareness of malaria symptoms among caregivers are among the contributing factors.
- The national surveys reveal disparities in access to health care based on household income and location: the percentage of febrile children brought for care was higher in wealthier households (median: 72%, IQR: 62–75%) compared with poorer households (median: 58%, IQR: 47–67%), and was higher among those living in urban areas (median: 69%, IQR: 59–76%) compared with rural areas (median: 60%, IQR: 51–71%).

Diagnosing malaria

- According to 58 surveys conducted in 30 sub-Saharan African countries between 2010 and 2017, the percentage of children with a fever that received a diagnostic test in the public health sector has increased, hitting a median of 59% (IQR: 34–75%) over the period 2015–2017, up from a median of 33% (IQR:18–44%) for 2010–2012.
- Data collected from 56 surveys carried out in sub-Saharan Africa reveal that the percentage of febrile children attending public health facilities who received a malaria diagnostic test before antimalarial treatment has gone up from a median of 35% (IQR: 27–56%) in 2010–2012 to 74% (IQR: 51–81%) in 2015–2017. A similar increase has been recorded in the formal private health sector, from 41% (IQR: 17–67%) in 2010–2012 to 63% (IQR: 41–83%) in 2015–2017.

Treating malaria

- Based on 19 household surveys conducted in sub-Saharan Africa between 2015 and 2017, the percentage of children aged under 5 years with a fever who received any antimalarial drug was 29% (IQR: 15–48%).
- Children are more likely to be given ACTs – the most effective antimalarial drugs – if medical care is sought in the public sector compared with the private sector. Data from 18 national surveys conducted in sub-Saharan Africa show that for the period 2015–2017, an estimated 88% (IQR: 73–92%) of febrile children brought for treatment for malaria in the public health sector received ACTs, compared with 74% (IQR: 47–88%) in the formal medical 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 2017, of 21 African countries with high malaria burden, 20 had iCCM policies in place, of which 12 had started implementing those policies.

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 of health information by all sectors, whether public or private.
- In 2017, among 52 moderate to high-burden countries, reporting rates of malaria were 60% or more. In the WHO African Region, 36 out of 46 countries indicated that at least 80% of public health facilities had reported data on malaria through their national health information system.

MALARIA ELIMINATION

- Globally, the elimination net is widening, with more countries moving towards zero indigenous cases: in 2017, 46 countries reported fewer than 10 000 such cases, up from 44 countries in 2016 and 37 countries in 2010. The number of countries with less than 100 indigenous cases – a strong indicator that elimination is within reach – increased from 15 countries in 2010 to 24 countries in 2016 and 26 countries in 2017.
- Paraguay was certified by WHO as malaria free in 2018, while Algeria, Argentina and Uzbekistan have made formal requests to WHO for certification. In 2017, China and El Salvador reported zero indigenous cases.
- One of the key GTS milestones for 2020 is elimination of malaria in at least 10 countries that were malaria endemic in 2015. At the current rate of progress, it is likely that this milestone will be reached.
- 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 11 E-2020 countries remain on track to achieve their elimination goals, 10 have reported increases in indigenous malaria cases in 2017 compared with 2016.

CHALLENGES IN GETTING THE MALARIA RESPONSE BACK ON TRACK

- The challenges facing the global malaria response are many, and as highlighted in this year's report, immediate barriers to achieving the fast-approaching GTS milestones for 2020 and 2025 are malaria's continued rise in countries with the highest burden of the disease and inadequate international and domestic funding. At the same time, the continued emergence of parasite resistance to antimalarial medicines and mosquito resistance to insecticides pose threats to progress.

High-burden countries

- In 2017, 11 countries accounted for approximately 70% of estimated malaria cases and deaths globally: 10 in sub-Saharan Africa and India. Among these countries, only India reported progress in reducing its malaria cases in 2017 compared to 2016.
- To get the global malaria response back on track, a new country-driven approach – "High burden to high impact" – will be launched in Mozambique on 19 November 2018, alongside the release of the *World malaria report 2018*.
- Catalyzed by WHO and the RBM Partnership to End Malaria, the approach is founded upon four pillars: galvanize national and global political attention to reduce malaria deaths; drive impact in country through the strategic use of information; establish best global guidance, policies and strategies suitable for all malaria endemic countries; and implement a coordinated country response.

Funding

- In 24 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 declined in 2015–2017 compared to 2012–2014. This ranged from a 95% reduction in the Congo (highest) to a 1% decrease in Uganda (lowest) over the time points compared.
- In the countries that experienced a 20% or more decrease in total funding per person at risk, international financing declined, at times combined with lower domestic investments.
- Among the 41 high-burden countries, overall, funding per person at risk of malaria stood at US$ 2.32.

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.
- Most studies conducted between 2010 and 2017 show that ACTs remain effective, with overall efficacy rates greater than 95% outside the Greater Mekong subregion (GMS). In Africa, artemisinin (partial) resistance has not been reported to date.
- Although multidrug resistance, including artemisinin (partial) resistance and partner drug resistance, has been reported in four GMS countries, there has been a massive reduction in malaria cases and deaths in this subregion. Monitoring the efficacy of antimalarial drugs has resulted in prompt updating of malaria treatment policies in most GMS countries.

Insecticide resistance

- The recently released WHO *Global report on insecticide resistance in malaria vectors: 2010–2016* showed that resistance to the four commonly used insecticide classes – pyrethroids, organochlorines, carbamates and organophosphates – is widespread in all major malaria vectors across the WHO regions of Africa, the Americas, South-East Asia, the Eastern Mediterranean and the Western Pacific.
- Of the 80 malaria endemic countries that provided data for 2010–2017, resistance to at least one of the four insecticide classes in one malaria vector from one collection site was detected in 68 countries, an increase over 2016 due to improved reporting and three new countries reporting on resistance for the first time. In 57 countries, resistance to two or more insecticide classes was reported.
- Resistance to pyrethroids – the only insecticide class currently used in ITNs – is widespread and was detected in at least one malaria vector in more than two thirds of the sites tested and was highest in the WHO regions of Africa and the Eastern Mediterranean.
- Resistance to organochlorines was detected for at least one malaria vector in almost two thirds of the sites and was highest in the WHO South-East Asia Region. Resistance to carbamates and organophosphates was less prevalent and was detected in 33% and 27% of the tested sites, respectively. Prevalence was highest for carbamates in the WHO South-East Asia Region and for organophosphates in the WHO Western Pacific Region.
- In view of the current situation, resistance monitoring and management plans are essential, in line with the WHO *Global plan for insecticide resistance management in malaria vectors*. To date, 40 countries have completed these plans.
- 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 across study locations in five countries.

Avant-propos

Dr Tedros Adhanom Ghebreyesus
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Remettre la lutte mondiale contre le paludisme sur la bonne voie

En novembre 2017, j'indiquais à la communauté internationale que les progrès antipaludiques avaient cessé et que nous risquions de compromettre les acquis de ces vingt dernières années.

Un an après, les données du *Rapport sur le paludisme dans le monde 2018* confirment que nous ne sommes pas en bonne voie pour atteindre deux objectifs intermédiaires essentiels de la *Stratégie technique de lutte contre le paludisme 2016-2030* (GTS), à savoir réduire de 40 % l'incidence du paludisme et la mortalité associée par rapport aux niveaux de 2015.

Deux résultats sont particulièrement inquiétants : premièrement, certains des pays les plus durement touchés par le paludisme ont rapporté une hausse des cas, rendant plus lointain l'espoir de concrétiser nos efforts et, deuxièmement, le niveau d'investissement dans la lutte contre le paludisme reste inadéquat.

Selon le *Rapport sur le paludisme dans le monde 2018*, le nombre de cas de paludisme a été estimé à 219 millions dans le monde en 2017. Au total, les dix pays d'Afrique les plus durement touchés par la maladie auraient enregistré 3,5 millions de cas de paludisme supplémentaires par rapport à 2016.

Le paludisme reste responsable de plus de 435 000 décès chaque année, majoritairement en Afrique. Les enfants de moins de 5 ans sont particulièrement vulnérables, et le fait que l'un deux meurt toutes les deux minutes de cette maladie évitable et guérissable est inacceptable.

Ce rapport montre aussi que l'accès et l'utilisation des interventions et outils antipaludiques essentiels sont insuffisants. Vaincre le paludisme requiert une stratégie globale comprenant mesures de lutte antivectorielle, et diagnostic et traitement rapides, en particulier au niveau des villages. Une partie importante de la population à risque n'est pas protégée, notamment les femmes enceintes et les enfants en Afrique.

Il est clair que nous devons changer de cap et améliorer notre approche de la lutte contre le paludisme, notamment dans les pays où la maladie pèse le plus lourdement. Ne rien changer à notre façon de faire nous ferait faire fausse route et aurait des répercussions socioéconomiques négatives au-delà du paludisme.

Lors de la 71e Assemblée mondiale de la Santé qui s'est tenue plus tôt cette année, j'ai annoncé la mise en œuvre d'une nouvelle approche agressive pour progresser en matière de lutte contre le paludisme. Cette nouvelle initiative, appelée « *High burden to high impact* » (« Réduire le paludisme là où il pèse le plus ») sera menée par les pays qui paient le plus lourd tribut à la maladie.

Appuyée par l'OMS et le RBM Partnership to End Malaria (Partenariat RBM pour mettre fin au paludisme), cette approche repose sur quatre piliers : galvaniser la volonté politique nationale et internationale de réduire la mortalité liée au paludisme ; dynamiser l'impact par une utilisation stratégique des informations ; déployer les stratégies, politiques et directives internationales les plus efficaces et les plus adaptées aux pays d'endémie palustre ; et mettre en œuvre une réponse nationale coordonnée.

Il est important de souligner que « *High burden to high impact* » appelle à des financements plus élevés pour lutter contre le paludisme, notamment au niveau national, et à une meilleure utilisation des ressources. Ce dernier aspect est particulièrement pertinent, car une part importante de la population qui aurait pu avoir accès aux interventions antipaludiques n'a pu en bénéficier en raison de l'inefficacité des systèmes de santé.

Le *Rapport sur le paludisme dans le monde 2018* livre un message clair : les actions entreprises ces deux prochaines années seront décisives par rapport à l'atteinte (ou pas) des objectifs intermédiaires définis pour 2025 par la stratégie technique mondiale de lutte contre le paludisme de l'OMS. Ces actions détermineront également notre contribution collective à l'atteinte des Objectifs de développement durable.

Je suis optimiste. Ce rapport 2018 fait état de progrès ici et là : par exemple, de plus en plus de pays se rapprochent de l'objectif d'élimination du paludisme et d'autres, tels que l'Ethiopie, l'Inde, le Pakistan et le Rwanda, ont rapporté une baisse significative des cas de paludisme en 2017.

Nous devons nous appuyer sur ces résultats positifs, redoubler d'efforts et tenir notre promesse de réduire considérablement le fardeau mondial du paludisme au cours de la prochaine décennie. Il est aussi essentiel d'investir dans des systèmes de santé robustes, capables de dispenser des services de qualité pour lutter contre le paludisme et toutes les autres maladies.

Je sais que nous pouvons venir à bout du paludisme. Avec l'engagement sans relâche de tous les pays et l'appui des partenaires de développement, je suis sûr que nous gagnerons cette bataille face à une maladie vieille de plusieurs siècles et saurons nous remettre sur la voie de notre vision commune : un monde sans paludisme.

Le rapport de cette année en un clin d'œil

POIDS DU PALUDISME AU NIVEAU MONDIAL ET RÉGIONAL : QUELQUES CHIFFRES

Cas de paludisme

- Au niveau mondial, le nombre de cas de paludisme est estimé à 219 millions en 2017 (intervalle de confiance [IC] de 95 % : 203-262 millions), contre 239 millions en 2010 (IC de 95 % : 219-285 millions) et 217 millions en 2016 (IC de 95 % : 200-259 millions).
- Même si les estimations du nombre de cas de paludisme pour 2017 sont en baisse de 20 millions par rapport à 2010, les données pour la période 2015-2017 mettent en évidence l'absence de progrès significatifs par rapport à cet indicateur durant ce laps de temps.
- La plupart des cas (200 millions ou 92 %) ont été enregistrés dans la région Afrique de l'OMS, loin devant la région Asie du Sud-Est (5 %) et la région Méditerranée orientale (2 %).
- Quinze pays d'Afrique subsaharienne et l'Inde ont concentré quasiment 80 % du nombre total de cas de paludisme dans le monde, parmi lesquels cinq, à eux seuls, ont enregistré près de la moitié des cas : le Nigéria (25 %), la République démocratique du Congo (11 %), le Mozambique (5 %), l'Inde (4 %) et l'Ouganda (4 %).
- Les 10 pays où le paludisme sévit le plus en Afrique ont rapporté une hausse du nombre de cas en 2017 par rapport à 2016. Parmi ces pays, le Nigéria, Madagascar et la République démocratique du Congo auraient enregistré les plus fortes augmentations, toutes estimées à plus d'un demi-million de cas. À l'inverse, l'Inde a déclaré 3 millions de cas en moins durant la même période, soit une baisse de 24 % par rapport à 2016.
- En 2017, 430 000 cas de paludisme en moins ont été rapportés au Rwanda par rapport à l'année précédente. Parallèlement, l'Éthiopie et le Pakistan ont chacun enregistré une baisse de plus de 240 000 cas sur la même période.
- Au niveau mondial, l'incidence du paludisme a reculé entre 2010 et 2017, passant de 72 cas pour 1 000 habitants exposés au risque de paludisme à 59 pour 1 000. Même si ces chiffres représentent une baisse de 18 % sur la période, le nombre de cas pour 1 000 habitants exposés au risque de paludisme a stagné à 59 ces trois dernières années.
- À l'exception de la région Asie du Sud-Est de l'OMS, où l'incidence du paludisme continue à baisser (17 cas pour 1 000 habitants exposés au risque de paludisme en 2010 contre 7 pour 1 000 en 2017, soit une baisse de 59 %), toutes les régions de l'OMS ont enregistré des progrès très modestes, voire une hausse de l'incidence. Dans la région Amériques de l'OMS, l'incidence du paludisme a augmenté, principalement à cause d'une transmission accrue au Brésil, au Nicaragua et au Venezuela (République bolivarienne du). Dans la région Afrique de l'OMS, elle est restée à 219 cas pour 1 000 habitants exposés au risque de paludisme pour la deuxième année consécutive.

- *P. falciparum* est le parasite du paludisme le plus prévalent dans la région Afrique de l'OMS ; il est en effet à l'origine de 99,7 % des cas de paludisme estimés en 2017, tout comme dans les régions Asie du Sud-Est (62,8 %), Méditerranée orientale (69 %) et Pacifique occidental (71,9 %). *P. vivax* prédomine dans la région Amériques de l'OMS, représentant 74,1 % des cas de paludisme.

Mortalité associée

- Au niveau mondial, le nombre de décès dus au paludisme a été estimé à 435 000, contre 451 000 en 2016 et 607 000 en 2010.
- Les enfants de moins de 5 ans sont les plus vulnérables face au paludisme. En 2017, ils ont représenté 61 % (266 000) des décès associés au paludisme dans le monde.
- À elle seule, la région Afrique de l'OMS a enregistré 93 % des décès liés au paludisme au niveau mondial en 2017 ; elle a cependant représenté 88 % des 172 000 décès en moins dus à la maladie par rapport à 2010.
- Près de 80 % des décès dus au paludisme dans le monde en 2017 ont été concentrés dans 17 pays de la région Afrique de l'OMS et en Inde. Sept de ces pays représentent 53 % des décès associés : le Nigéria (19 %), la République démocratique du Congo (11 %), le Burkina Faso (6 %), la République-Unie de Tanzanie (5 %), la Sierra Leone (4 %), le Niger (4 %) et l'Inde (4 %).
- Par rapport à 2010, la mortalité liée au paludisme a diminué dans toutes les régions de l'OMS en 2017 à l'exception des Amériques. Les baisses les plus prononcées ont été observées en Asie du Sud-Est (54 %), Afrique (40 %) et Méditerranée orientale (10 %). Malgré ces progrès, la baisse de la mortalité liée au paludisme a ralenti depuis 2015, ce qui reflète les tendances estimées en matière d'incidence de la maladie.

Anémie liée au paludisme

- Le rapport de cette année comporte une section sur l'anémie liée au paludisme, un état qui, faute de traitement, peut entraîner la mort, surtout parmi les populations vulnérables, comme les femmes enceintes et les enfants de moins de 5 ans.
- L'anémie était à l'origine un indicateur essentiel de progrès en matière de lutte contre le paludisme et sa prévalence servait à évaluer l'efficacité des interventions. Ces dernières années, la sensibilisation au fardeau de l'anémie associée au paludisme a diminué.
- Malgré son importance comme conséquence directe et indirecte du paludisme, la prévalence de l'anémie parmi les populations vulnérables n'a pas été rapportée de manière systématique pour évaluer la transmission et le poids du paludisme.
- Les données issues des enquêtes réalisées auprès des ménages entre 2015 et 2017 dans 16 pays d'Afrique où le poids du paludisme est lourd montrent que, parmi les enfants de moins de 5 ans, la prévalence de l'anémie atteignait 61 %, l'anémie légère 25 %, l'anémie modérée 33 % et l'anémie grave 3 %. Sur tous les enfants présentant un résultat positif à un test de dépistage du paludisme, la prévalence de l'anémie s'élevait à 79 %, l'anémie légère à 21 %, l'anémie modérée à 50 % et l'anémie grave à 8 %.

INVESTISSEMENTS DANS LES PROGRAMMES ET LA RECHERCHE ANTIPALUDIQUES

Investissements dans le contrôle et l'élimination du paludisme

- En 2017, US$ 3,1 milliards ont été investis au total par les gouvernements des pays d'endémie et les partenaires internationaux pour le contrôle et l'élimination du paludisme, soit un peu plus qu'en 2016.
- Près des trois quarts (US$ 2,2 milliards) des investissements réalisés en 2017 ont été dirigés vers la région Afrique de l'OMS, suivie par les régions Asie du Sud-Est (US$ 300 millions), Amériques (US$ 200 millions), Méditerranée orientale et Pacifique occidental (US$ 100 millions chacune).
- En 2017, US$ 1,4 milliard ont été dirigés vers des pays à faible revenu, US$ 1,2 milliard vers des pays à revenu intermédiaire de la tranche inférieure et US$ 300 millions vers des pays à revenu intermédiaire de la tranche supérieure. Les fonds internationaux ont représenté la principale source de financement dans les pays à faible revenu et à revenu intermédiaire de la tranche inférieure (respectivement 87 % et 70 %).
- En 2017, les gouvernements des pays d'endémie ont contribué à hauteur de 28 % du financement total (US$ 900 millions), un chiffre inchangé par rapport à 2016. Deux tiers des financements nationaux ont été investis dans des activités de contrôle menées par les programmes nationaux de lutte contre le paludisme, le tiers restant étant estimé correspondre aux coûts des soins dispensés aux patients.
- Comme les années précédentes, les États-Unis ont été le premier bailleur de fonds international pour les programmes de lutte contre le paludisme, avec US$ 1,2 milliard investis en 2017 (39 % du total). Les pays membres du Comité d'aide au développement ont investi au total US$ 700 millions (21 %). Le Royaume-Uni de Grande-Bretagne et d'Irlande du Nord a contribué à hauteur d'environ US$ 300 millions (9 %) et la Fondation Bill & Melinda Gates a investi US$ 100 millions (2 %).
- Sur les US$ 3,1 milliards investis en 2017, US$ 1,3 milliard ont transité par le Fonds mondial de lutte contre le sida, la tuberculose et le paludisme.

Perspectives d'investissement

- Même si le financement de la lutte contre le paludisme est relativement stable depuis 2010, les investissements consentis en 2017 sont loin d'atteindre le niveau requis pour atteindre les deux premiers objectifs intermédiaires de la *Stratégie technique de lutte contre le paludisme 2016-2030* ([le] 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 les objectifs du GTS d'ici 2030, le financement pour lutter contre le paludisme devrait s'élever à au moins US$ 6,6 milliards par an d'ici 2020.
- Il est essentiel d'augmenter les investissements dans la recherche et le développement sur le paludisme pour réaliser les objectifs du GTS. En 2016, US$ 588 millions ont été dépensés dans ce domaine, soit 85 % des besoins annuels estimés.
- Alors que le financement de la recherche et du développement sur les vaccins et les médicaments contre le paludisme a diminué en 2016 par rapport à 2015, les investissements dans les produits de lutte antivectorielle ont pratiquement doublé, passant de US$ 33 millions à US$ 61 millions.

Livraison de produits antipaludiques

Moustiquaires imprégnées d'insecticide

- Les fabricants de moustiquaires imprégnées d'insecticide (MII) ont indiqué en avoir livré 624 millions dans le monde entre 2015 et 2017, principalement des moustiquaires imprégnées

d'insecticide longue durée (MILD). Ce chiffre traduit une augmentation considérable par rapport à la période 2012-2014, durant laquelle 465 millions de MII avaient été livrées.

- Au niveau mondial, le nombre de MII distribuées par les programmes nationaux de lutte contre le paludisme a été estimé à 552 millions, la majorité (459 millions, soit 83 %) en Afrique subsaharienne entre 2015 et 2017.
- Au niveau mondial, 85 % des MII ont été distribuées gratuitement par le biais de campagnes de distribution de masse, 8 % dans des établissements de soins prénataux et 4 % dans le cadre de programmes de vaccination.

Tests de diagnostic rapide

- En 2017, 276 millions de tests de diagnostic rapide (TDR) ont été vendus dans le monde.
- En 2017, 245 millions de TDR ont été distribués par les PNLP. La plupart de ces TDR (66 %) étaient des tests livrés en Afrique subsaharienne et pouvant uniquement détecter le parasite *P. falciparum*.
- En Afrique, les TDR deviennent peu à peu le moyen de dépister le paludisme le plus utilisé dans les établissements de santé publics. En 2017, il a été estimé que 75 % des tests de diagnostic du paludisme avaient été réalisés par TDR, bien plus que les 40 % de 2010.

Combinaisons thérapeutiques à base d'artémisinine

- Entre 2010 et 2017, les pays ont acheté 2,74 milliards de traitements par combinaison thérapeutique à base d'artémisinine (ACT). Au total, 62 % de ces achats auraient été effectués pour le secteur public de la santé.
- Durant cette même période, 1,45 milliard de traitements par ACT ont été distribués par les PNLP, dont 1,42 milliard (98 %) dans la région Afrique de l'OMS.
- Le dépistage du paludisme ayant augmenté ces dernières années, les traitements par ACT sont désormais plus ciblés sur les patients ayant présenté un résultat de test positif. Cette tendance est démontrée par une baisse substantielle du ratio ACT-tests (0,8 en 2017 contre 2,5 en 2010), lequel suggère néanmoins qu'encore 30 % des patients ayant reçu un traitement par ACT n'ont préalablement pas été soumis à un test de dépistage.

PRÉVENTION DU PALUDISME

Lutte antivectorielle

- En Afrique, la moitié de la population à risque dort sous MII : en 2017, 50 % de la population a donc été protégée par cette intervention, contre 29 % en 2010. Par ailleurs, la part de la population ayant accès à une MII est passée de 33 % en 2010 à 56 % en 2017. Le taux de couverture n'a cependant que très peu augmenté et il se stabilise même depuis 2016.
- Le nombre de ménages disposant d'au moins une MII pour deux membres du foyer a doublé entre 2010 et 2017 pour atteindre 40 %. Ce pourcentage représente pourtant une augmentation très modeste au cours des trois dernières années et reste bien loin de l'objectif de couverture universelle.
- 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 % en 2010 à 3 % en 2017, et cette tendance est observée dans toutes les régions de l'OMS.
- Dans la région Afrique de l'OMS, la population à risque protégée par PID est passée de 80 millions en 2010 à 51 millions en 2016, avant de remonter à 64 millions en 2017. Ailleurs, la population protégée par PID en 2017 a atteint 1,5 million dans la région Amériques, 7,5 millions dans la région Méditerranée orientale, 41 millions dans la région Asie du Sud-Est et 1,5 million dans la région Pacifique occidental.

- La couverture en PID diminue dès lors que les pays changent de classe d'insecticides (définitivement ou pour alterner) et au fur et à mesure des changements de stratégies opérationnelles (baisse de la population à risque dans les pays en voie d'élimination du paludisme).

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 33 pays africains ayant communiqué des données de couverture en TPIp en 2017, 22 % des femmes enceintes éligibles avaient reçu au moins trois doses de TPIp (comme recommandé par l'OMS), contre 17 % en 2015 et 0 % en 2010.
- En 2017, 15,7 millions d'enfants vivant dans 12 pays d'Afrique sahélienne ont été protégés par des programmes de chimioprévention du paludisme saisonnier (CPS). Cependant, quelque 13,6 millions d'enfants qui auraient pu bénéficier de cette intervention n'ont pas été couverts, principalement à cause d'un manque de financements.

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 19 pays d'Afrique subsaharienne entre 2015 et 2017, une médiane de 52 % (écart interquartile [ÉI] : 44 %-62 %) des enfants ayant eu de la fièvre ont sollicité des soins auprès d'un prestataire formé, ce qui signifie 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.
- Même si 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 36 %, ÉI : 30 %-46 %) que dans un établissement privé formel (médiane de 8 %, ÉI : 5 %-10 %), une part importante des enfants n'ont pas reçu de soins médicaux (médiane de 40 %, ÉI: 28 %-45 %). Ceci s'explique en partie par un accès limité aux prestataires de santé ou un manque de connaissances de la part du personnel soignant.
- Les enquêtes nationales révèlent des disparités en matière d'accès aux soins en fonction du revenu des ménages et du lieu de résidence : le pourcentage d'enfants ayant eu de la fièvre et ayant sollicité des soins a été plus élevé au sein des ménages les moins pauvres (médiane de 72 %, ÉI : 62 %-75 %) qu'au sein des ménages les plus pauvres (médiane de 58 %, ÉI : 47 %-67 %), et aussi plus élevé au sein des ménages vivant en milieu urbain (médiane de 69 %, ÉI : 59 %-76 %) qu'au sein des ménages des zones rurales (médiane de 60 %, ÉI : 51 %-71 %).

Diagnostic

- Sur 58 enquêtes menées dans 30 pays d'Afrique subsaharienne entre 2010 et 2017, la part des enfants fiévreux soumis à un test de diagnostic dans un établissement public a augmenté, passant d'une médiane de 33 % (ÉI : 18 %-44 %) sur la période 2010-2012 à une médiane de 59 % (ÉI : 34 %-75 %) sur la période 2015-2017.
- Les données collectées à partir de 56 enquêtes menées en Afrique subsaharienne révèlent que la part des enfants fiévreux ayant sollicité des soins dans un établissement public et ayant reçu un test de diagnostic du paludisme avant traitement antipaludique a aussi augmenté, passant d'une médiane de 35 % (ÉI : 27 %-56 %) en 2010-2012 à 74 % (ÉI : 51 %-81 %) en 2015-2017. Une hausse similaire est observée dans les établissements privés formels, d'une médiane de 41 % (ÉI : 17 %-67 %) en 2010-2012 à 63 % (ÉI : 41 %-83 %) en 2015-2017.

Traitement

- Sur les 19 enquêtes nationales réalisées auprès des ménages en Afrique subsaharienne entre 2015 et 2017, le pourcentage d'enfants de moins de 5 ans, fiévreux et ayant reçu un médicament antipaludique, a atteint 29 % (ÉI : 15 %–48 %).
- Les enfants sont plus susceptibles de recevoir un traitement antipaludique par ACT, les médicaments les plus efficaces, s'ils sollicitent des soins auprès d'un établissement public que s'ils s'orientent vers le secteur privé. Entre 2015 et 2017, les données collectées à partir de 18 enquêtes nationales menées en Afrique subsaharienne montrent que 88 % (ÉI : 73 %–92 %) des enfants fiévreux ayant sollicité un traitement antipaludique dans le secteur public ont reçu un traitement par ACT, contre 74 % (ÉI : 47 %–88 %) dans un établissement privé formel.
- 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 2017, 20 des 21 pays africains où le paludisme sévit le plus avaient des politiques de PEC-C en place, et leur mise en œuvre avait commencé dans 12 d'entre eux.

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 la communication de rapports sanitaires exhaustifs, qu'ils émanent du secteur public ou privé.
- En 2017, une estimation basée sur 52 pays où le paludisme sévit modérément ou fortement révèle un taux de déclaration des cas au moins égal à 60 %. Dans la région Afrique de l'OMS, 36 des 46 pays 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.

ÉLIMINATION DU PALUDISME

- Au niveau mondial, l'élimination du paludisme progresse. En effet, de plus en plus de pays tendent vers un nombre de cas de paludisme indigène égal à zéro. En 2017, 46 pays ont rapporté moins de 10 000 cas de paludisme indigène, alors qu'ils n'étaient que 44 en 2016 et 37 en 2010. Le nombre de pays comptant moins de 100 cas de paludisme indigène, un bon indicateur que l'élimination de la maladie est proche, est passé de 15 en 2010 à 24 en 2016, puis à 26 en 2017.
- Le Paraguay a été certifié exempt de paludisme par l'OMS en 2018, alors que l'Algérie, l'Argentine et l'Ouzbékistan ont déposé une demande formelle de certification auprès de l'OMS. En 2017, la Chine et El Salvador ont rapporté zéro cas de paludisme indigène.
- Éliminer le paludisme dans au moins 10 pays où la transmission était encore active en 2010 est l'un des principaux objectifs intermédiaires du GTS pour 2020. Avec le rythme de progression actuel, il est probable que cet objectif sera atteint.
- 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 appelés « E-2020 » pour les aider à atteindre leurs objectifs d'élimination.
- Même si 11 de ces pays restent sur la bonne voie pour atteindre leurs objectifs, 10 ont rapporté une augmentation des cas de paludisme indigène en 2017 par rapport à 2016.

DÉFIS À RELEVER POUR REMETTRE LA LUTTE CONTRE LE PALUDISME SUR LA BONNE VOIE

- Les difficultés auxquelles est confrontée la lutte mondiale contre le paludisme sont nombreuses. Comme le souligne le rapport de cette année, l'augmentation du paludisme dans les pays où il sévit déjà le plus, et des niveaux de financement nationaux et internationaux inadéquats constituent des obstacles immédiats à l'atteinte des objectifs intermédiaires 2020 et 2025 du GTS (tout proches désormais). Parallèlement, l'émergence continue de la résistance du parasite aux médicaments antipaludiques et la résistance du moustique aux insecticides menacent les progrès futurs.

Les pays les plus durement touchés par le paludisme

- Selon les estimations, 11 pays, 10 en Afrique subsaharienne plus l'Inde, ont concentré près de 70 % des cas de paludisme et des décès associés en 2017 dans le monde. Un seul de ces pays, l'Inde, a rapporté une baisse des cas de paludisme en 2017 par rapport à 2016.
- Pour remettre la lutte contre le paludisme sur la bonne voie, une nouvelle approche, menée par les pays et appelée « *High burden to high impact* » (« Réduire le paludisme là où il pèse le plus »), sera lancée le 19 novembre 2018 au Mozambique, en marge de la publication du *Rapport sur le paludisme dans le monde 2018*.
- Initiée par l'OMS et le RBM Partnership to End Malaria (Partenariat RBM pour mettre fin au paludisme), cette approche repose sur quatre piliers : galvaniser la volonté politique nationale et internationale de réduire la mortalité liée au paludisme ; dynamiser l'impact au niveau de chaque pays par une utilisation stratégique des informations ; déployer les stratégies, politiques et directives internationales les plus efficaces et les plus adaptées aux pays d'endémie palustre ; et mettre en œuvre une réponse nationale coordonnée.

Financement

- Dans 24 des 41 pays où le paludisme sévit le plus, lesquels dépendent en grande partie des financements externes pour lutter contre le paludisme, le niveau moyen de financement disponible par personne à risque a diminué sur la période 2015-2017 par rapport à 2012-2014. Sur cette période d'évaluation, la baisse oscille entre 95 % (au Congo, la plus forte) et 1 % (en Ouganda, la plus faible).
- Dans les pays où le niveau de financement total par personne à risque a diminué de 20 % ou plus, les fonds internationaux ont aussi baissé, parfois conjointement avec une réduction des investissements nationaux.
- Dans les 41 pays où le paludisme sévit le plus, le financement total par personne à risque s'élève à US$ 2,32.

Résistance aux antipaludiques

- Les ACT ont un rôle important dans le succès de la lutte contre le paludisme au niveau mondial. Protéger leur efficacité de traitement est donc une priorité mondiale en matière de santé.
- La plupart des études menées entre 2010 et 2017 montrent que les ACT restent efficaces, avec des taux d'efficacité globalement supérieurs à 95 % en dehors de la sous-région du Grand Mékong. En Afrique, aucune résistance (partielle) aux artémisinines n'a été rapportée à ce jour.
- Même si la multirésistance, qui inclut la résistance (partielle) aux artémisinines et aux médicaments partenaires, a été détectée dans quatre 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 plupart des pays de la sous-région.

Résistance aux insecticides

- Le « *Global Report on insecticide resistance in malaria vectors: 2010-2016* » (« Rapport mondial sur la résistance aux insecticides chez les vecteurs du paludisme », disponible uniquement en anglais) publié récemment par l'OMS fait apparaître que la résistance aux quatre classes d'insecticides les plus couramment utilisés (pyréthoïdes, organochlorés, carbamates et organophosphorés) est répandue chez les principaux vecteurs du paludisme dans les régions Afrique, Amériques, Asie du Sud-Est, Méditerranée orientale et Pacifique occidental de l'OMS.
- Sur les 80 pays d'endémie palustre ayant fourni des données pour la période 2010-2017, la résistance à au moins une des quatre classes d'insecticides chez l'un des vecteurs du paludisme sur un site de collecte a été détectée dans 68 pays. Il s'agit là d'une augmentation par rapport à 2016 qui s'explique par l'amélioration des rapports et par trois nouveaux pays ayant communiqué des données de résistance pour la première fois. Dans 57 pays, la résistance a été rapportée à au moins deux classes d'insecticides.
- La résistance aux pyréthoïdes, la seule classe d'insecticides actuellement utilisés dans les MII, est répandue. Elle a été détectée chez au moins un des vecteurs du paludisme sur plus des deux tiers des sites testés et s'est avérée la plus élevée dans les régions Afrique et Méditerranée orientale de l'OMS.
- La résistance aux organochlorés a été détectée chez au moins un des vecteurs du paludisme sur près des deux tiers des sites testés et elle a été la plus élevée dans la région Asie du Sud-Est de l'OMS. La résistance aux carbamates et aux organophosphorés a été moins prévalente, mais a été détectée sur, respectivement 33 % et 26 % des sites testés. La résistance la plus prévalente aux carbamates et aux organophosphorés a été respectivement détectée dans les régions Asie du Sud-Est et Pacifique occidental de l'OMS.
- Au vu de la situation actuelle, des plans nationaux de suivi et de gestion de la résistance sont essentiels, conformément au Plan mondial pour la gestion de la résistance aux insecticides chez les vecteurs du paludisme de l'OMS. À ce jour, 40 pays ont adopté de tels plans.
- 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 entre 2011 et 2016 sur des sites d'essais dans cinq pays.

Prefacio

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Lograr que la respuesta mundial contra la malaria retome su camino

En noviembre de 2017, señalé a la comunidad internacional que la respuesta mundial contra la malaria se había estancado y que estábamos arriesgándonos a perder algunas de los preciosos logros que se han conseguido en los últimos 20 años.

Un año después, los datos del *Informe mundial sobre el paludismo* de este año reconfirman que no estamos en vías de cumplir dos hitos críticos para el 2020 de la *Estrategia Técnica Mundial contra la Malaria 2016-2030* de la OMS: reducir la incidencia de casos y las tasas de mortalidad en al menos un 40% con respecto a los niveles de 2015.

Hay dos hallazgos que encuentro particularmente preocupantes: primero, varios países que llevan una carga desproporcionada de la enfermedad han reportado aumentos en los casos de malaria, lo que retrasa aún más el progreso; y segundo, el nivel de inversión para el control de la malaria sigue siendo inadecuado.

El *Informe Mundial sobre el paludismo 2018* estima que, en 2017, hubo 219 millones de casos de malaria. Los 10 países africanos con mayor carga tuvieron un estimado de 3,5 millones más de casos de malaria en 2017 en comparación con el año anterior. Igualmente preocupante es la tendencia en la incidencia de casos de malaria.

La malaria continúa cobrando la vida de mas de más de 435 000 personas cada año, principalmente en África. Los niños menores de 5 años son especialmente vulnerables; el hecho de que cada dos minutos muera un niño a causa de esta enfermedad prevenible y curable es inaceptable.

El informe también revela niveles insuficientes de acceso y de uso de herramientas e intervenciones contra la malaria que salvan vidas. Para vencer realmente a la malaria necesitamos de un enfoque integral que incluya medidas de control de vectores y diagnóstico y tratamiento temprano, especialmente a nivel local. Una proporción considerable de personas en riesgo de infección no están siendo protegidas, incluidas mujeres embarazadas y niños en África.

Claramente, necesitamos cambiar el rumbo y mejorar la forma en la que combatimos la malaria, particularmente en aquellos países con la mayor carga. Continuar con el status quo nos desviará aún más de los objetivos y tendrá una repercusión socioeconómica negativa más allá de la malaria.

A principios de este año, en la 71ª Asamblea Mundial de la Salud, anuncié un nuevo y agresivo enfoque para impulsar el progreso contra la malaria. Esta nueva iniciativa denominada "De alta carga a alto impacto", estará liderada por los países más afectados por esta enfermedad.

Con el apoyo de la OMS y la Alianza para Hacer Retroceder el Paludismo, el enfoque se basa en 4 pilares: dirigir la voluntad política nacional y mundial para reducir las muertes por malaria; dirigir la atención política nacional y mundial para reducir las muertes por malaria; orientar el impacto en los países a través del uso estratégico de la información; implementar las mejores orientaciones globales, políticas y estrategias adecuadas para todos los países endémicos de malaria; e implementar una respuesta nacional coordinada.

Es importante destacar que "De alta carga a alto impacto" exige un aumento en la financiación, sobre todo un aumento de fondos nacionales para la malaria y una mejor destinación de los recursos. Éste último es especialmente pertinente porque muchas personas que podrían haberse beneficiado de las intervenciones contra la malaria no las recibieron debido a las ineficiencias del sistema de salud.

El Informe Mundial sobre el paludismo de 2018 brinda un mensaje claro: las acciones que tomemos sobre la malaria en los próximos 24 meses determinarán en gran medida si podremos cumplir los hitos de la estrategia mundial contra la malaria de la OMS en 2025. También establece el camino para nuestra contribución colectiva al logro de los Objetivos de Desarrollo Sostenible.

Yo soy optimista. El informe de 2018 destaca algunos casos de progreso. Por ejemplo, más países se están acercando a la eliminación de la malaria, y varios otros, incluyendo a Etiopía, India, Pakistán y Ruanda, registraron disminuciones sustanciales en los casos en 2017.

Necesitamos aprovechar este éxito. Ahora debemos fortalecer nuestro compromiso con la malaria y cumplir con la promesa de reducir significativamente la carga mundial de la enfermedad en la próxima década. Fundamentalmente, debemos invertir en sistemas de salud robustos que ofrezcan servicios de calidad para combatir la malaria y todas las enfermedades.

Sé que podemos vencer la malaria. Con el compromiso constante de todos los países y el apoyo de los socios para el desarrollo, confío en que ganaremos esta lucha contra esta enfermedad centenaria y retomaremos el camino hacia nuestra visión común: un mundo libre de malaria.

El informe de este año de un vistazo

LA CARGA DE MALARIA GLOBAL Y REGIONAL EN NÚMEROS

Casos de malaria

- En 2017, se estima que ocurrieron 219 millones de casos de malaria en todo el mundo (intervalo de confianza del 95% [IC]: 203-262 millones), en comparación con 239 millones de casos en 2010 (IC 95%: 219-285 millones) y 217 millones de casos en 2016 (IC 95%: 200-259 millones).
- Aunque hubo un estimado de 20 millones menos de casos de malaria en 2017 que en 2010, los datos para el período 2015-2017 ponen de manifiesto que no se lograron avances significativos en la reducción de los casos de malaria en este período.
- La mayoría de los casos de malaria en 2017 fueron en la Región de África de la OMS (200 millones o 92%), seguidos por la Región de Asia Sudoriental de la OMS (5%) y la Región del Mediterráneo Oriental de la OMS (2%).
- Quince países del África subsahariana y la India soportaron casi el 80% de la carga mundial de malaria. Cinco países representaron casi la mitad de los casos de malaria en todo el mundo: Nigeria (25%), República Democrática del Congo (11%), Mozambique (5%), India (4%) y Uganda (4%).
- Los 10 países con mayor carga en África informaron aumentos en los casos de malaria en 2017 en comparación con 2016. De estos, Nigeria, Madagascar y la República Democrática del Congo, tuvieron los aumentos estimados más altos, todos con más de medio millón de casos. En contraste, India reportó 3 millones de casos menos en el mismo período, una disminución del 24% en comparación con 2016.
- En Ruanda se ha visto una reducción en su carga de malaria, con 430 000 casos menos en 2017 que en 2016, y Etiopía y Pakistán registraron disminuciones de más de 240 000 casos durante el mismo período.
- La tasa de incidencia de malaria a nivel mundial disminuyó entre 2010 y 2017, de 72 a 59 casos por cada 1000 personas en riesgo. Si bien esto representa una reducción del 18% durante éste período, el número de casos por cada 1000 personas en riesgo se ha mantenido en 59 en los últimos tres años.
- Excepto en la Región de Asia Sudoriental de la OMS, que siguió viendo disminuir su tasa de incidencia de 17 casos de la enfermedad por cada 1000 personas en riesgo en 2010 a 7 en 2017 (una disminución del 59%), todas las regiones de la OMS registraron poco progreso o un aumento en la tasa de incidencia. La Región de las Américas de la OMS observó un aumento, en gran parte debido a los aumentos en la transmisión de la malaria en Brasil, Nicaragua y Venezuela. En la Región de África de la OMS, la tasa de incidencia de malaria se mantuvo en 219 casos por cada 1000 personas en riesgo por segundo año consecutivo.

- *P. falciparum* es el parásito de la malaria más prevalente en la Región de África de la OMS, representando el 99,7% de los casos estimados de malaria en 2017, así como en las Regiones de la OMS del Sudeste Asiático (62.8%), Mediterráneo Oriental (69%) y Pacífico Occidental (71,9%). *P. vivax* es el parásito predominante en la Región de las Américas de la OMS, representando el 74,1% de los casos de malaria.

Muertes por malaria

- En 2017, hubo un estimado de 435 000 muertes por malaria en todo el mundo, en comparación con 451 000 muertes estimadas en 2016 y 607 000 en 2010.
- Los niños menores de 5 años son el grupo más vulnerable afectado por la malaria. En 2017, representaron el 61% (266 000) de todas las muertes por malaria en todo el mundo.
- La Región de África de la OMS representó el 93% de todas las muertes por malaria en 2017. Mientras que la Región de África fue el hogar del mayor número de muertes por malaria en 2017, también representó el 88% de las 172 000 muertes por malaria a nivel mundial reportadas en 2017 en comparación con el 2010.
- Casi el 80% de las muertes por malaria en el mundo en 2017 se concentraron en 17 países de la Región de África de la OMS y la India, siete de estos países representaron el 53% de las muertes por malaria en el mundo: Nigeria (19%), República Democrática del Congo (11%), Burkina Faso (6%), República Unida de Tanzania (5%), Sierra Leona (4%), Níger (4%) e India (4%).
- Todas las regiones, excepto las Américas, registraron reducciones en la mortalidad en 2017 en comparación con 2010. Las mayores disminuciones se produjeron en el Sudeste Asiático (54%), África (40%) y el Mediterráneo Oriental (10%). A pesar de estos avances, la tasa de reducción de la mortalidad por malaria también ha disminuido desde 2015, reflejando las tendencias estimadas en la incidencia de casos de malaria.

Anemia relacionada con la malaria

- El informe de este año incluye una sección sobre la anemia relacionada con la malaria, una condición que, si no se trata, puede causar la muerte, especialmente entre las poblaciones vulnerables, como las mujeres embarazadas y los niños menores de cinco años.
- La anemia fue una vez un indicador clave del progreso en el control de la malaria y su prevalencia se utilizó para evaluar la eficacia de las intervenciones. En los últimos años se ha visto una disminución en el reconocimiento de la carga de anemia asociada a malaria.
- A pesar de su importancia como consecuencia directa e indirecta de la malaria, la prevalencia de anemia entre las poblaciones vulnerables a la enfermedad no se ha notificado sistemáticamente como una medida de la transmisión y la carga de la malaria.
- Los datos de las encuestas de hogares realizadas en 16 países africanos de alta carga entre 2015-2017 muestran que, entre los niños menores de cinco años, la prevalencia de cualquier anemia fue del 61%, la anemia leve del 25%, la anemia moderada del 33% y la anemia grave el 3%. De los niños con resultado positivo de malaria, la prevalencia de anemia fue del 79%, anemia leve 21%, anemia moderada 50% y anemia grave 8%.

INVERSIONES EN PROGRAMAS DE MALARIA E INVESTIGACIÓN

Inversiones en control y eliminación de la malaria.

- En 2017, los gobiernos de los países endémicos de malaria y sus socios internacionales invirtieron aproximadamente US $ 3,1 mil millones para control y eliminación de la malaria, una cifra más alta que la del informe de 2016.
- Casi tres cuartas partes (US $ 2,2 mil millones) de las inversiones en 2017 se gastaron en la Región de África de la OMS, seguidas por las regiones de la OMS del Sudeste Asiático (US $ 300 millones), las Américas (US $ 200 millones) y el Este Mediterráneo y Pacífico Occidental (US $ 100 millones cada uno).
- En 2017, se invirtieron US $ 1,4 mil millones en países de bajos ingresos, US $ 1200 millones en países de ingresos bajos-medianos y US $ 300 millones en países de ingresos medianos-altos. La financiación internacional representó la principal fuente de financiación en los países de ingresos bajos y de ingresos bajos-medianos, con un 87% y un 70% respectivamente.
- Los gobiernos de los países endémicos contribuyeron con el 28% del financiamiento total (US $ 900 millones) en 2017, una cifra que no ha cambiado desde 2016. Dos tercios de los fondos de origen nacional se invirtieron en actividades de control de la malaria realizadas por programas nacionales de control de la malaria (PNCM), con la estimación del coste de la atención por paciente.
- Al igual que en años anteriores, los Estados Unidos de América (EE. UU.) fue la mayor fuente internacional de financiación para la malaria, proporcionando US $ 1.200 millones (39%) en 2017. Los países miembros del Comité de Asistencia para el Desarrollo, juntos sumaron US $ 700 millones (21%). El Reino Unido de Gran Bretaña e Irlanda del Norte aportaron alrededor de US $ 300 millones (9%), mientras que la Fundación Bill y Melinda Gates aportó US $ 100 millones (2%).
- De los US $ 3,1 mil millones invertidos en 2017, US $ 1,3 mil millones se canalizaron a través del Fondo Mundial para Combatir el SIDA, la Tuberculosis y la Malaria.

Perspectiva de inversión

- Aunque el financiamiento para la malaria se ha mantenido relativamente estable desde 2010, el nivel de inversión en 2017 está lejos de lo que se requiere para alcanzar los dos primeros hitos de la ETM, lo que supone una reducción de al menos el 40% en la incidencia de casos de malaria y en las tasas de mortalidad a nivel mundial en comparación con los niveles de 2015.
- Para alcanzar las metas de la ETM a 2030, se estima que la financiación anual para la malaria tendrá que aumentar en al menos US $ 6,6 mil millones por año para 2020.
- El aumento de las inversiones en investigación en malaria y en desarrollo es clave para lograr los objetivos de la ETM. En 2016, se gastaron US $ 588 millones en esta área, lo que representa el 85% de las necesidades anuales estimadas para investigación y desarrollo.
- Si bien los fondos para investigación y desarrollo para vacunas y medicamentos contra la malaria disminuyeron en 2016 en comparación con 2015, las inversiones en productos de control de vectores casi se duplicaron, de US $ 33 millones a US $ 61 millones.

Distribución de productos contra la malaria

Mosquiteros tratados con insecticida

- Entre 2015-2017, un total de 624 millones de mosquiteros tratados con insecticida (MTI), principalmente mosquiteros tratados con insecticida de larga duración (MILD), fueron reportados por los fabricantes como entregados a nivel mundial. Esto representa un aumento sustancial en comparación con el período 2012-2014, cuando se entregaron 465 millones de MTI a nivel mundial.
- Los Programas Nacionales de Malaria (PNM) distribuyeron aproximadamente 552 millones de MTI a nivel mundial, con la mayoría (459 millones o 83%) entregados en el África subsahariana durante el período 2015-2017.
- A nivel mundial, el 85% de los MTI se distribuyeron a través de campañas gratuitas de distribución masiva, el 8% en instalaciones de atención prenatal y el 4% como parte de los programas de inmunización.

Pruebas de diagnostico rápido

- Se estima que 276 millones de pruebas de diagnóstico rápido (PDR) se vendieron a nivel mundial en 2017.
- En 2017, los PNM distribuyeron 245 millones de PDR. La mayoría de los PDR (66%) fueron pruebas para la detección de *P. falciparum* y se suministraron al África subsahariana.
- En el África subsahariana, las PDR se están convirtiendo en el método más utilizado para diagnosticar malaria entre los pacientes con sospecha de malaria en centros de salud pública. En 2017, aproximadamente el 75% de las pruebas de malaria se realizaron con PDR, en comparación con el 40% en 2010.

Terapia combinada basada en la artemisinina

- Un estimado de 2,74 mil millones de tratamientos de terapia combinada basada en la artemisinina (TCA) fueron adquiridos por los países durante el período 2010-2017. Se informó que aproximadamente el 62% de estas adquisiciones se realizaron por el sector público.
- Durante el período 2010-2017, 1.450 millones de tratamientos de TCA fueron entregados por los PNM, de los cuales 1,42 millones (98%) se entregaron en la Región de África de la OMS.
- Con los aumentos en el uso de las pruebas de diagnóstico en los últimos años, los tratamientos de TCA se están usando más específicamente para pacientes con resultados positivos para malaria. Esto se demuestra mediante una proporción sustancialmente reducida de la razón entre TCA usados y pruebas diagnósticas (0,8 en 2017 comparado con 2.5 en 2010). Sin embargo, esto todavía implica que aproximadamente al 30% de los pacientes que recibieron TCA no se les realizó pruebas diagnósticas para malaria.

PREVENIR MALARIA

Control de vectores

- La mitad de las personas en riesgo de malaria en África duermen bajo un MTI: en 2017, el 50% de la población estaba protegida por esta intervención, un aumento con relación al 29% en 2010. Además, el porcentaje de la población con acceso a un MTI aumentó de 33% en 2010 a 56% en 2017. Sin embargo, la cobertura ha mejorado solo marginalmente desde 2015 y ha estado estancada desde 2016.

- Los hogares con al menos un MTI por cada dos personas se duplicaron al 40% entre 2010 y 2017. Sin embargo, esta cifra representa un aumento muy modesto en los últimos 3 años y permanece lejos del objetivo de la cobertura universal.
- Menos personas en riesgo de contraer malaria están siendo protegidas por el rociado residual intradomiciliario (RRI), un método de prevención que consiste en rociar las paredes internas de las viviendas con insecticidas. A nivel mundial, la protección por RRI se redujo de un máximo del 5% en 2010 al 3% en 2017, con disminuciones observadas en todas las regiones de la OMS.
- En la Región de África de la OMS, la cobertura por el RRI se redujo de 80 millones de personas en riesgo en 2010, a un punto mínimo de 51 millones en 2016, antes de aumentar a 64 millones en 2017. En otras regiones de la OMS, el número de personas protegidas con el RRI en 2017 fue de 1,5 millones en las Américas, 7.5 millones en el Mediterráneo oriental, 41 millones en el Sudeste Asiático y 1,5 millones en el Pacífico Occidental.
- Las disminuciones en la cobertura del RRI se están produciendo a medida que los países cambian o rotan los insecticidas a productos químicos más costosos, así como a cambios en las estrategias operativas, como la disminución de las poblaciones en riesgo en los países que están eliminando la malaria.

Terapias preventivas

- Para proteger a las mujeres en áreas de alta y moderada transmisión de malaria en África, la OMS recomienda "tratamiento preventivo intermitente en el embarazo" (TPI) con el medicamento antimalárico sulfadoxina-pirimetamina. Entre los 33 países africanos que informaron sobre los niveles de cobertura de TPI en 2017, aproximadamente el 22% de las mujeres embarazadas elegibles recibieron las tres o más dosis recomendadas de TPI, en comparación con el 17% en 2015 y el 0% en 2010.
- En 2017, 15,7 millones de niños en 12 países de la subregión del Sahel de África se protegieron a través de programas de quimioprevención estacional. Sin embargo, aproximadamente 13,6 millones de niños que podrían haberse beneficiado de esta intervención no lo recibieron, principalmente debido a falta de fondos.

PRUEBAS DE DIAGNÓSTICO Y TRATAMIENTO

Acceso a la atención

- El diagnóstico y tratamiento rápido es el medio más efectivo para prevenir que un caso leve de malaria se convierta en una enfermedad grave y en la muerte. Según las encuestas nacionales de hogares realizadas en 19 países del África subsahariana entre 2015-2017, una mediana del 52% (rango intercuartil [RI]: 44-62%) de los niños con fiebre (febriles) fueron llevados a un proveedor de atención médica capacitado. Esto incluye hospitales y clínicas del sector público, establecimientos de salud formales del sector privado y trabajadores de salud comunitarios.
- Aunque más niños febriles buscaron atención en el sector de salud pública (mediana: 36%, RI: 30-46%) que en el sector médico formal privado (mediana: 8%, RI: 5-10%), una alta proporción de niños febriles no recibieron ninguna atención médica (mediana: 40%, RI: 28-45%). El acceso deficiente a los proveedores de atención médica o la falta de conocimiento de los síntomas de la malaria entre los cuidadores son algunos de los factores que contribuyen.
- Las encuestas nacionales revelan disparidades en el acceso a la atención médica según el ingreso y la ubicación del hogar: el porcentaje de niños febriles que fueron atendidos fue mayor en los hogares más ricos (mediana: 72%, RI: 62-75%) en comparación con los hogares más pobres (mediana: 58%, RI: 47-67%), así como fue mayor entre aquellos que viven en áreas urbanas (mediana: 69%, RI: 59-76%) en comparación con las áreas rurales (mediana: 60%, RI: 51-71%).

Diagnóstico de malaria

- Según 58 encuestas realizadas en 30 países del África subsahariana entre 2010-2017, el porcentaje de niños con fiebre que se sometieron a una prueba de diagnóstico en el sector de la salud pública aumentó, alcanzando una mediana del 59% (RI: 34-75%) durante el período 2015-2017, frente a una mediana del 33% (RI: 18-44%) para 2010-2012.
- Los datos recopilados de 56 encuestas realizadas en el África subsahariana revelan que el porcentaje de niños febriles que asisten a instalaciones de salud pública, y que se sometieron a una prueba diagnóstica de malaria antes del tratamiento antipalúdico aumentó de una mediana del 35% (RI: 27-56%) en 2010-2012 a 74% (RI: 51-81%) en 2015-2017. Se ha registrado un aumento similar en el sector de salud formal privado, del 41% (RI: 17-67%) en 2010-2012 al 63% (RI: 41-83%) en 2015-2017.

Tratamientos antimaláricos

- Con base en 19 encuestas de hogares realizadas en África subsahariana entre 2015 y 2017, el porcentaje de niños menores de 5 años con fiebre que recibieron algún medicamento antimalárico fue del 29% (RI: 15-48%).
- Es más probable que los niños reciban TCA, los medicamentos antipalúdicos más eficaces, si se busca atención médica en el sector público en comparación con el sector privado. Los datos de 18 encuestas nacionales realizadas en el África subsahariana muestran que para el período 2015-2017, aproximadamente el 88% (RI: 73-92%) de los niños febriles que buscaron tratamiento para la malaria en el sector de la salud pública recibieron TCA, frente a 74 % (RI: 47-88%) para el sector médico formal privado.
- Para cerrar la brecha de tratamiento entre los niños, la OMS recomienda la adopción del manejo integrado de casos por la comunidad (MICC). Este enfoque promueve el manejo integrado de condiciones comunes que ponen en peligro la vida en los niños (malaria, neumonía y diarrea) a nivel de puestos de salud y en la comunidad. En 2017, de 21 países africanos con una alta carga de malaria, 20 tenían políticas de MICC, de las cuales 12 habían comenzado a implementar esas políticas.

SISTEMAS DE VIGILANCIA DE MALARIA

- La vigilancia efectiva de los casos y muertes por malaria es esencial para identificar las áreas o grupos de población más afectados por la malaria y para orientar los recursos para lograr el máximo impacto. Un sistema de vigilancia sólido requiere de altos niveles de acceso a la atención y detección de casos, y de la notificación completa de la información de salud de todos los sectores, ya sea público o privado.
- En 2017, entre 52 países de moderada a alta carga, las tasas de malaria reportadas fueron del 60% o más. En la Región de África de la OMS, 36 de 46 países indicaron que al menos el 80% de los centros de salud pública habían reportado datos sobre la malaria a través de su sistema nacional de información de salud.

ELIMINACIÓN DE LA MALARIA

- A nivel mundial, la red de eliminación de la malaria se está ampliando, con más países avanzando hacia cero casos autóctonos: en 2017, 46 países notificaron menos de 10 000 casos, frente a 44 países en 2016 y 37 países en 2010. El número de países con menos

de 100 casos autóctonos, un fuerte indicador de que la eliminación está cerca, aumentó de 15 países en 2010 a 24 países en 2016 y 26 países en 2017.

- Paraguay se certificó por la OMS como libre de malaria en 2018, mientras que Argelia, Argentina y Uzbekistán han realizado solicitudes formales a la OMS para su certificación. En 2017 China y El Salvador reportaron cero casos autóctonos.
- Uno de los hitos clave de la ETM para 2020 es la eliminación de la malaria en al menos 10 países que fueron endémicos de malaria en 2015. Al ritmo actual de progreso, es probable que se alcance este hito.
- En 2016, la OMS identificó 21 países con el potencial de eliminar la malaria para el año 2020. La OMS está trabajando con los gobiernos de estos países, conocidos como "países E-2020", para apoyar sus objetivos de acelerar la eliminación.
- Aunque 11 países del E-2020 siguen encaminados para alcanzar sus objetivos de eliminación, 10 han reportado aumentos en los casos autóctonos de malaria en 2017 en comparación con 2016.

DESAFÍOS PARA ENCAMINAR LA RESPUESTA CONTRA LA MALARIA

- Los desafíos a los que se enfrenta la respuesta mundial contra la malaria son muchos, y como se destaca en el informe de este año, las barreras inmediatas para lograr los hitos de la ETM para 2020 y 2025 son el continuo aumento de la malaria en los países con la mayor carga de la enfermedad y la insuficiencia de fondos internacionales y domésticos. Al mismo tiempo, la continua emergencia de resistencia de los parásitos a los medicamentos antimaláricos y la resistencia de los mosquitos a los insecticidas representan una amenaza para el progreso.

Países de alta carga

- En 2017, en 11 países ocurrieron aproximadamente el 70% de los casos estimados de malaria y muertes de todo el mundo: 10 en África subsahariana y en la India. De estos países, solo India reportó avances en la reducción de sus casos de malaria en 2017 en comparación con 2016.
- Para volver a encaminar la respuesta mundial contra la malaria, el 19 de noviembre se lanzará en Mozambique un nuevo enfoque impulsado por éste país, "De alta carga a alto impacto", junto con la publicación del *Informe Mundial sobre el paludismo 2018*.
- Con el apoyo de la OMS y la Alianza para Hacer Retroceder el Paludismo, el enfoque se basa en 4 pilares: dirigir la atención política nacional y mundial para reducir las muertes por malaria; orientar el impacto en los países a través del uso estratégico de la información; implementar las mejores orientaciones globales, políticas y estrategias adecuadas para todos los países endémicos de malaria; e implementar una respuesta nacional coordinada.

Fondos

- En 24 de los 41 países con alta carga, que dependen principalmente de financiación externa para el programa de malaria, el nivel promedio de financiación disponible por persona en riesgo disminuyó en 2015-2017 en comparación con 2012-2014. Esto varió desde una reducción del 95% en el Congo (el más alto) hasta una disminución del 1% en Uganda (el más bajo) en los tiempos comparados.

- En los países que experimentaron una disminución del 20% o más en la financiación total por persona en riesgo, la financiación internacional disminuyó, en ocasiones combinada con menores inversiones nacionales.
- Entre los 41 países con alta carga, en general, la financiación por persona en riesgo de malaria fue de US $ 2,32.

Resistencia a las drogas

- La TCA ha sido parte integral del éxito reciente del control mundial de la malaria, y la protección de su eficacia para el tratamiento de la malaria es una prioridad de salud mundial.
- La mayoría de los estudios realizados entre 2010 y 2017 muestran que la TCA sigue siendo efectiva, con tasas de eficacia, en general, superiores al 95% fuera de la subregión del Gran Mekong (GM). En África, no se ha notificado hasta la fecha de resistencia a la artemisinina (parcial).
- Aunque en cuatro países de la subregión del GM se ha informado sobre resistencia a múltiples medicamentos, incluida la resistencia a la artemisinina (parcial) y otros, ha habido una reducción masiva de casos de malaria y muertes en esta subregión. El monitoreo de la eficacia de los medicamentos antipalúdicos ha dado como resultado una actualización rápida de las políticas de tratamiento de la malaria en la mayoría de los países del GM.

Resistencia a los insecticidas

- El Informe mundial de la OMS sobre la resistencia a los insecticidas en los vectores de la malaria: 2010-2016, publicado recientemente, mostró que la resistencia a las cuatro clases de insecticidas más utilizadas (piretroides, organoclorados, carbamatos y organofosforados) está muy extendida en todos los principales vectores de malaria en las regiones de la OMS de África, América, Asia Sudoriental, Mediterráneo Oriental y el Pacífico Occidental.
- De los 80 países endémicos de malaria que proporcionaron datos para 2010-2017, 68 notificaron resistencia a al menos una de las cuatro clases de insecticidas en al menos un vector de malaria de un sitio de recolección, un aumento con respecto a 2016 debido a un mejor reporte de datos y tres países que informaron sobre la resistencia por primera vez. En 57 países, se notificó resistencia a dos o más clases de insecticidas.
- La resistencia a los piretroides, la única clase de insecticida utilizada actualmente en los MTI, es generalizada y se detectó en al menos un vector de la malaria en más de dos tercios de los sitios de recolección y fue más alta en las regiones de la OMS de África y el Mediterráneo Oriental.
- Se detectó resistencia a los organoclorados en al menos un vector de malaria en casi dos tercios de los sitios de recolección y esta fue más alta en el Sudeste Asiático. La resistencia a los carbamatos y organofosforados fue menos prevalente y se detectó en el 33% y el 27% de los sitios de recolección respectivamente. La prevalencia fue mayor para los carbamatos en el Sudeste Asiático y para los organofosforados en el Pacífico Occidental.
- En vista de la situación actual, los planes de monitoreo y manejo de la resistencia, en línea con el plan global de la OMS para el manejo de la resistencia a los insecticidas en los vectores de la malaria, son esenciales. Hasta la fecha, 40 países han completado estos planes.
- Los MTI continúan siendo una herramienta eficaz para la prevención de la malaria, incluso en áreas donde los mosquitos han desarrollado resistencia a los piretroides. Esto se evidenció en una gran evaluación multinacional coordinada por la OMS entre 2011 y 2016 llevada a cabo en 5 lugares de estudio en 5 países del mundo.

1 INTRODUCTION

The World Health Organization's (WHO's) 11th world malaria report[1] summarizes global progress in the fight against malaria up to the end of 2017. The *World malaria report 2017* (*1*) showed that progress against malaria has stalled in many countries, and that the world was unlikely to achieve the WHO *Global technical strategy for malaria 2016–2030* (GTS) (*2*) morbidity and mortality targets for 2020 (**Table 1.1**). One year on from that recognition that the global fight against malaria was at a crossroads (*1*, *3*), the *World malaria report 2018* describes progress since then, including efforts to intensify the response in the highest burden countries.

TABLE 1.1.

GTS: global targets for 2030 and milestones for 2020 and 2025 *Source: GTS* (*2*).

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.*

[1] The world malaria report is produced by the WHO Global Malaria Programme (GMP), 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 programmes (NMPs) in the 108 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 (OECD); Policy Cures; the US President's Malaria Initiative; and WHO. A description of data sources and methods is provided in **Annex 1**.

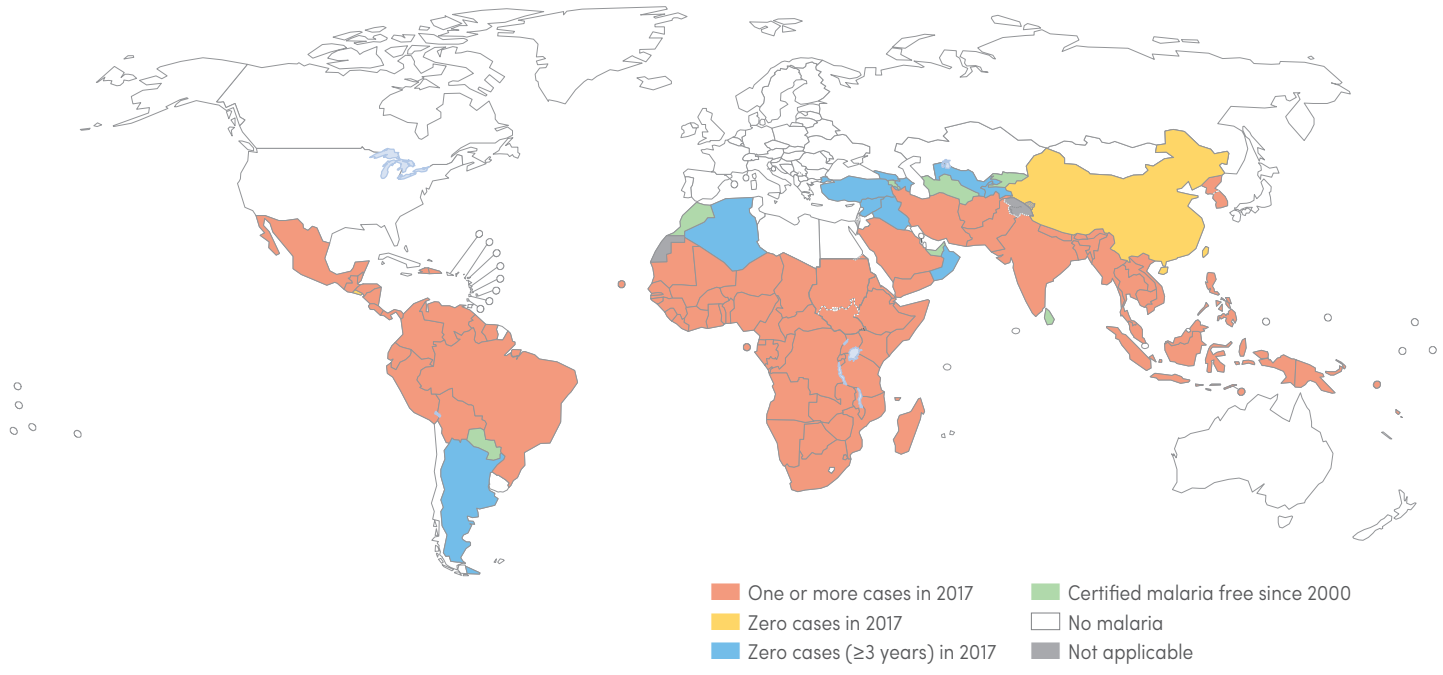
Key indicators are tracked across several countries (**Fig. 1.1**) and WHO regions against the goals outlined in the GTS (*2*); the Roll Back Malaria advocacy plan, *Action and investment to defeat malaria 2016–2030* (AIM) (*4*); the Sustainable Development Goals (SDGs) (*5*) – a set of interconnected global goals seen as a plan of action for people, the planet and prosperity (**Fig. 1.2**); and WHO's 13th General Programme of Work (GPW13)[1] (**Fig. 1.3**), which covers the period 2019–2023, and is designed to achieve measurable impact for people at the country level (*6*).

The GTS and AIM have targets for the years 2020, 2025 and 2030 compared with a baseline of 2015, whereas the GPW13 has targets for 2023. 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. Malaria case incidence is the indicator used to

[1] WHO's GPW for 2019–2023 was adopted by the World Health Assembly in May 2018. The WHO Impact Framework for the GPW13 strategically implements the SDGs. GPW13 is structured around three strategic priorities and associated goals (**Fig. 1.3**). The three strategic priorities are universal health coverage (UHC), addressing health emergencies and promoting healthier populations. The associated goals for 2023 are the so-called "triple billion goals"; that is, that 1 billion more people are benefiting from UHC, 1 billion more people are better protected from health emergencies, and 1 billion more people are enjoying better health and well-being. Global efforts against malaria cut across the three goals by contributing to UHC, responding to health emergencies and averting the burden of disease. The GPW13 malaria target is to halve malaria deaths by 2023, tracked through the number of deaths and the incidence of malaria.

FIG. 1.1.

Countries with indigenous cases in 2000 and their status by 2017 Countries with zero indigenous cases over at least the past 3 consecutive years are considered to be malaria free. All countries in the WHO European Region reported zero indigenous cases in 2016 and again in 2017. In 2017, both China and El Salvador reported zero indigenous cases. *Source: WHO database.*



WHO: World Health Organization.

track progress against Target 3.3. In addition, universal access to malaria prevention and treatment interventions to populations will contribute to SDG Goal 3.8, which is to ensure universal health coverage (UHC).

The main results are presented in **Sections 2–8** and cover the period 2010–2017. **Section 2** presents data on total funding for malaria control and elimination, for malaria research and for the supply of key commodities to endemic countries. The population level coverage achieved through these investments is presented in **Sections 3** and **4**. The status of surveillance systems (Pillar 3 of the GTS) is presented in **Section 5**. **Sections 6** and **7** describe the global trends in malaria morbidity and mortality, and progress towards elimination, respectively. **Section 8** describes the response to the stalling of progress in many high-burden countries, and to the threats of drug and insecticide resistance. The main text is followed by annexes that contain data sources and methods, regional profiles and data tables. Country profiles are presented online (*7*).

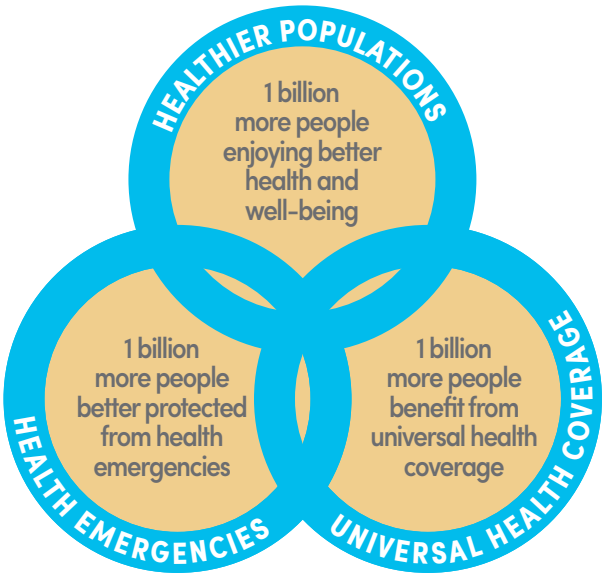
FIG. 1.2.

The SDGs 2016–2030 *Source: United Nations (2015)* (*5*).

SDG: Sustainable Development Goal.

FIG. 1.3.

GPW13 2019–2023: a set of interconnected strategic priorities and goals to ensure healthy lives and promote well-being for all at all ages *Source: WHO (2018)* (*6*).



GPW13: WHO's 13th General Programme of Work; WHO: World Health Organization.

2

INVESTMENTS IN MALARIA PROGRAMMES AND RESEARCH

Despite considerable investment in the fight against malaria since 2000, ensuring sufficient, sustained and predictable funding to achieve the GTS milestones and targets remains one of the biggest challenges. The GTS 2020 milestones are a global reduction of at least 40% in malaria case incidence and mortality rates, and elimination in at least 10 countries. To achieve these milestones and targets, the amount of funding required is estimated at US$ 4.4 billion in 2017, increasing to US$ 6.6 billion by 2020[1] (*2*, *8*).

This section presents the most up-to-date trends in total funding for malaria control and elimination by source of funding for the period 2010–2017, both globally and for major country groupings. It also describes recent changes in funding per person at risk of malaria in 41 high-burden countries. It ends by presenting financing for malaria-related research and development (R&D) for the period 2010–2016.

2.1 FUNDING FOR MALARIA CONTROL AND ELIMINATION

In 2017, global financing for malaria control and elimination fell short of the estimated US$ 4.4 billion needed that year, with total funding estimated at US$ 3.1 billion (*8*, *2*). This represented an annual shortfall of US$ 1.3 billion for 2017 (**Fig. 2.1**). Total malaria financing increased by US$ 0.2 billion (7%) between 2016 and 2017 and is at the same level as 2013. In 2017, the annual funding gap between the total malaria financing and the resource needs identified in the GTS widened by nearly US$ 0.3 billion compared with the shortfall estimated for 2016 (**Fig. 2.1**).

Of the US$ 3.1 billion invested in 2017, governments of malaria endemic countries contributed close to US$ 0.9 billion (28%) (**Fig. 2.2**). Of the US$ 0.9 billion, US$ 0.6 billion was used for malaria control activities, while US$ 0.3 billion was estimated as the cost of patient care in the public sector.

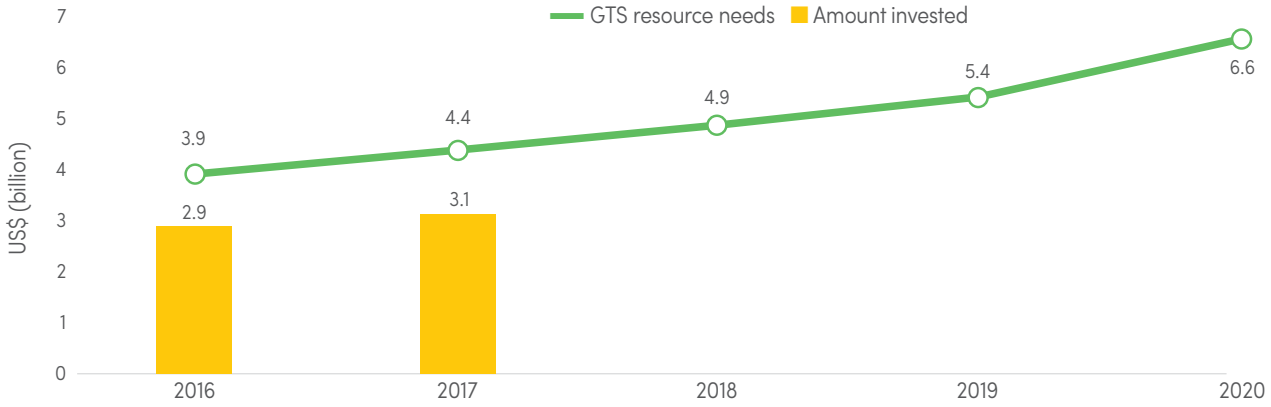
International financing amounted to US$ 2.2 billion (72% of total global financing) in 2017, of which 1.4 billion was provided through multilateral organizations and US$ 0.8 billion bilaterally. The United States of America (USA) was the largest single international source of malaria control financing, with contributions totalling US$ 1.2 billion (39% of total global funding), followed by the United Kingdom of Great Britain and Northern Ireland (United Kingdom) with contributions of around US$ 0.3 billion (9%). The remaining international funding originated from multilateral and bilateral contributions of other members of the Development Assistance Committee (total of US$ 0.7 billion, 21%) and multilateral funding from the Bill & Melinda Gates Foundation (US$ 0.1 billion, 2%)[2] (**Fig. 2.2**). Of the US$ 3.1 billion invested in 2017, US$ 1.3 billion (44%) were disbursed through the Global Fund to Fight AIDS, Tuberculosis and Malaria, representing a funding increase of US$ 0.3 billion compared with 2016 (**Fig. 2.3**). The largest contributors to the Global Fund are the USA, the United Kingdom, France, Germany, Canada and Japan. USA bilateral planned funding for 2017 amounted to about US$ 0.8 billion (25% of total global funding) (**Fig. 2.3**), with contributions from the United States Agency for International Development increasing by nearly US$ 0.1 billion compared to 2016. The United Kingdom remained the second largest bilateral funder in 2017, with disbursements US$ 0.1 billion lower than in 2016 (**Fig. 2.3**).

[1] Published estimates converted to constant 2017 US$.

[2] Through contributions to the Global Fund, excluding private financial flows.

FIG. 2.1.

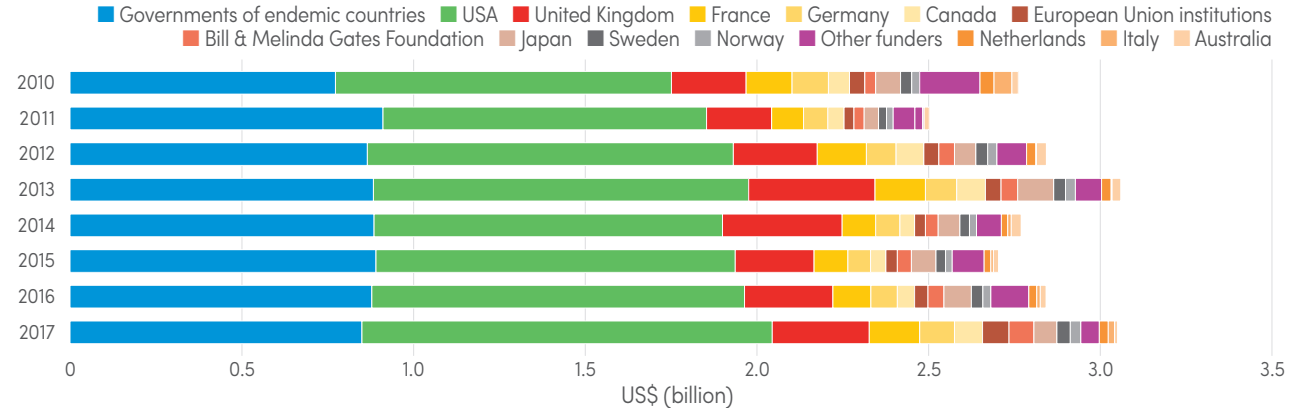
GTS investment targets for the period 2016–2020 and estimated amounts invested in 2016 and 2017 (constant 2017 US$) *Sources: GTS (2), Patouillard et al. (2016) (8), ForeignAssistance.gov, United Kingdom Department for International Development, NMP reports, OECD creditor reporting system database, the World Bank Data Bank and WHO estimates.*



GTS: *Global Technical Strategy for malaria 2016–2030*; NMP: national malaria programme; OECD: Organisation for Economic Co-operation and Development; WHO: World Health Organization.

FIG. 2.2.

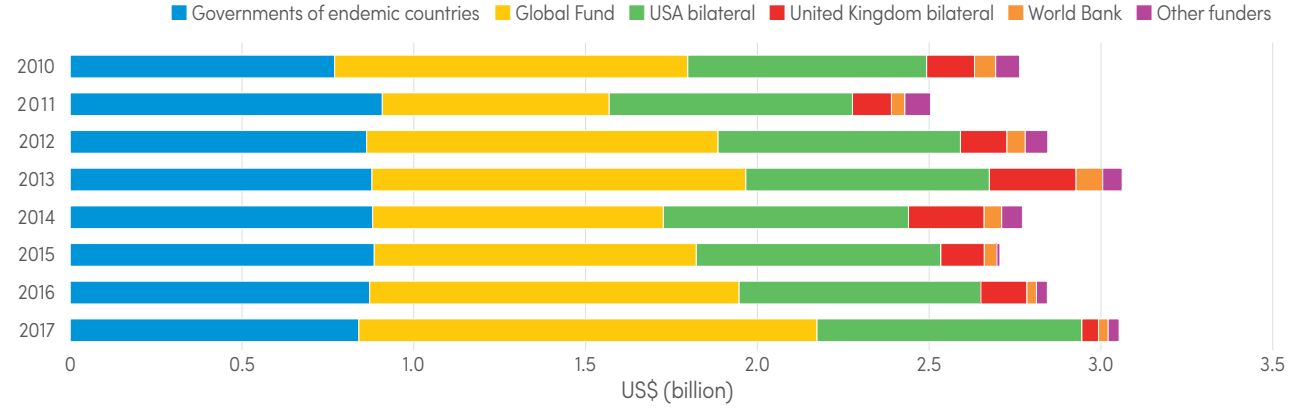
Funding for malaria control and elimination 2010–2017, by source of funds (constant 2017 US$) *Sources: ForeignAssistance.gov, United Kingdom Department for International Development, NMP reports, OECD creditor reporting system database, the World Bank Data Bank and WHO estimates.*



NMP: national malaria programme; OECD: Organisation for Economic Co-operation and Development; USA: United States of America; WHO: World Health Organization.

FIG. 2.3.

Funding for malaria control and elimination 2010–2017, by channel (constant 2017 US$) *Sources: ForeignAssistance.gov, United Kingdom Department for International Development, Global Fund, NMP reports, OECD creditor reporting system database, the World Bank Data Bank and WHO estimates.*



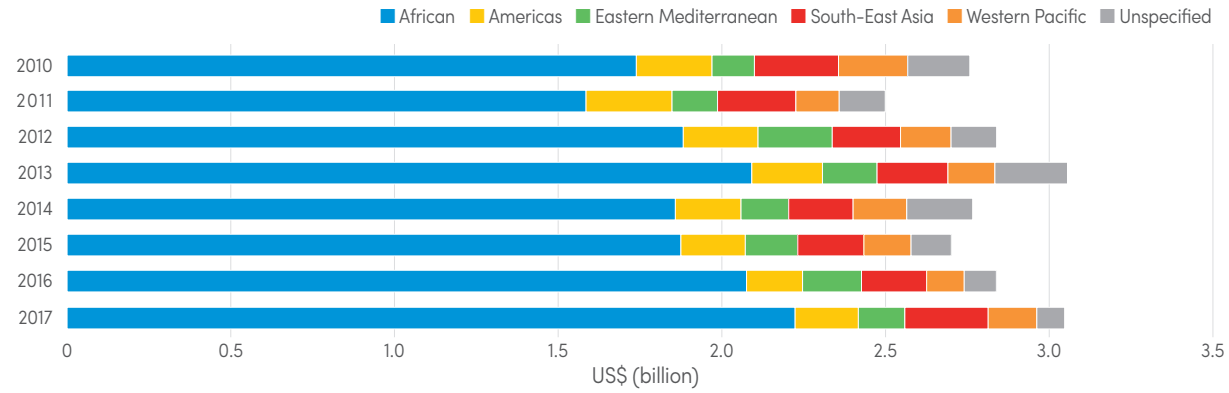
NMP: national malaria programme; OECD: Organisation for Economic Co-operation and Development; USA: United States of America; WHO: World Health Organization.

Of the US$ 3.1 billion invested in 2017, US$ 2.2 billion benefited the WHO African Region, followed by the WHO South-East Asia Region (US$ 0.3 billion, 8%), the WHO Region of the Americas (US$ 0.2 billion,6%), the WHO Western Pacific Region and the WHO Eastern Mediterranean Region (each US$ 0.1 billion, 5%). (**Fig. 2.4**). Funding flows for which there was no geographical information on recipients represented less than US$ 0.1 billion (3%).

Close to US$ 1.4 billion were invested in low-income countries, US$ 1.2 billion in lower-middle-income countries and US$ 0.3 billion in upper-middle-income countries (**Fig. 2.5**). In the low-income country group, international disbursements represented 87% of total funding in this category and 70% in lower-middle-income countries.

FIG. 2.4.

Funding for malaria control and elimination 2010–2017, by WHO region (constant 2017 US$)[a] *Sources: ForeignAssistance.gov, United Kingdom Department for International Development, Global Fund, NMP reports, OECD creditor reporting system database, the World Bank Data Bank and WHO estimates.*

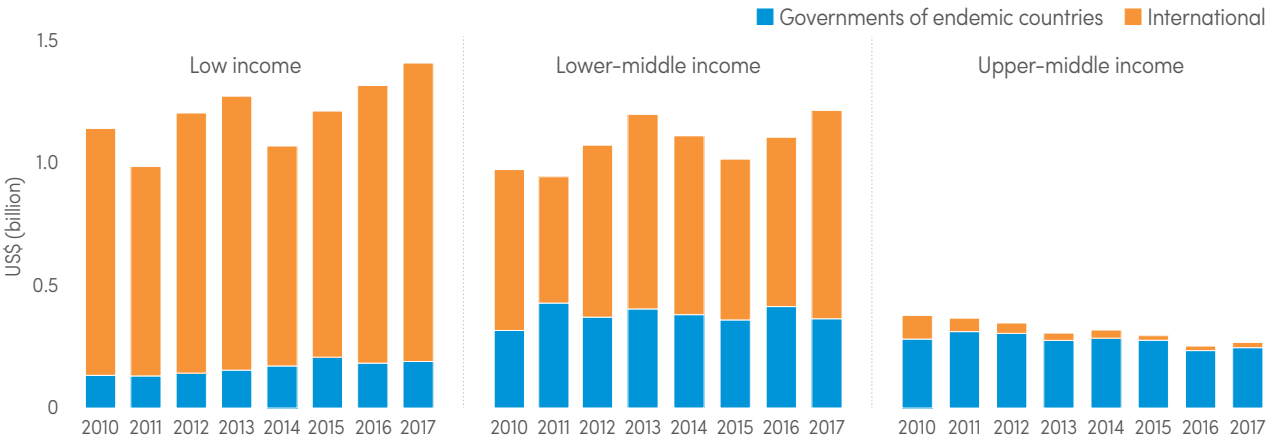


NMP: national malaria programme; OECD: Organisation for Economic Co-operation and Development; WHO: World Health Organization.

[a] The category "Unspecified" refers to funding flows, with no information on the geographical localization of their recipient (3% of total funding in 2017).

FIG. 2.5.

Funding for malaria control and elimination 2010–2017, by World Bank 2017 income group and source of funding (constant 2017 US$) *Sources: ForeignAssistance.gov, United Kingdom Department for International Development, Global Fund, NMP reports, OECD creditor reporting system database, the World Bank Data Bank and WHO estimates.*

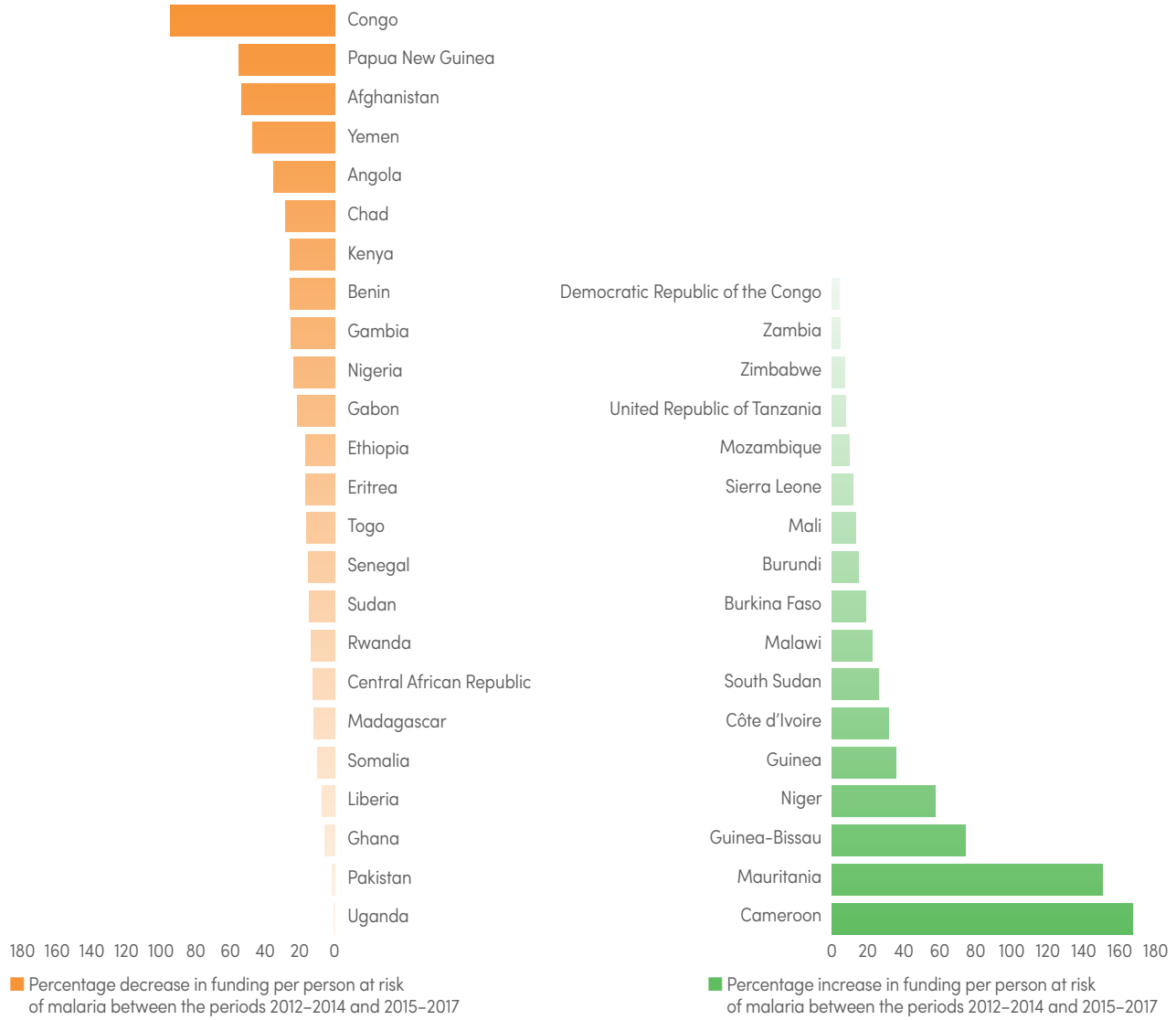


NMP: national malaria programme; OECD: Organisation for Economic Co-operation and Development; WHO: World Health Organization.

Fig. 2.6 shows the percentage change in average funding per person at risk of malaria, comparing the periods 2012–2014 and 2015–2017 in 41 high-burden countries, most (70%) of which were categorized as low income in 2017. In 24 of these 41 high-burden countries, funding per person at risk of malaria declined in 2015–2017 compared with the period 2012–2014. In the 11 countries that experienced a 20% or more decrease in total funding per person at risk, international financing declined, and this decline was combined with lower domestic investments in most of these countries. Similarly, in most of the 17 countries that experienced an increase in malaria financing in the period 2015–2017 compared with 2012–2014, the increase was due to a combination of rising international contributions and higher domestic financing.

FIG. 2.6.

Percentage change in average funding[a] per person at risk of malaria in the periods 2012–2014 and 2015–2017, in 41 high-burden countries *Sources: ForeignAssistance.gov, United Kingdom Department for International Development, Global Fund, NMP reports, OECD creditor reporting system database, the World Bank Data Bank and WHO estimates.*



NMP: national malaria programme; OECD: Organisation for Economic Co-operation and Development; WHO: World Health Organization.

[a] In **Fig 2.6**, funding includes international disbursements and contributions from governments of endemic countries, excluding resources absorbed for malaria case management through health services utilisation.

2.2 INVESTMENTS IN MALARIA R&D

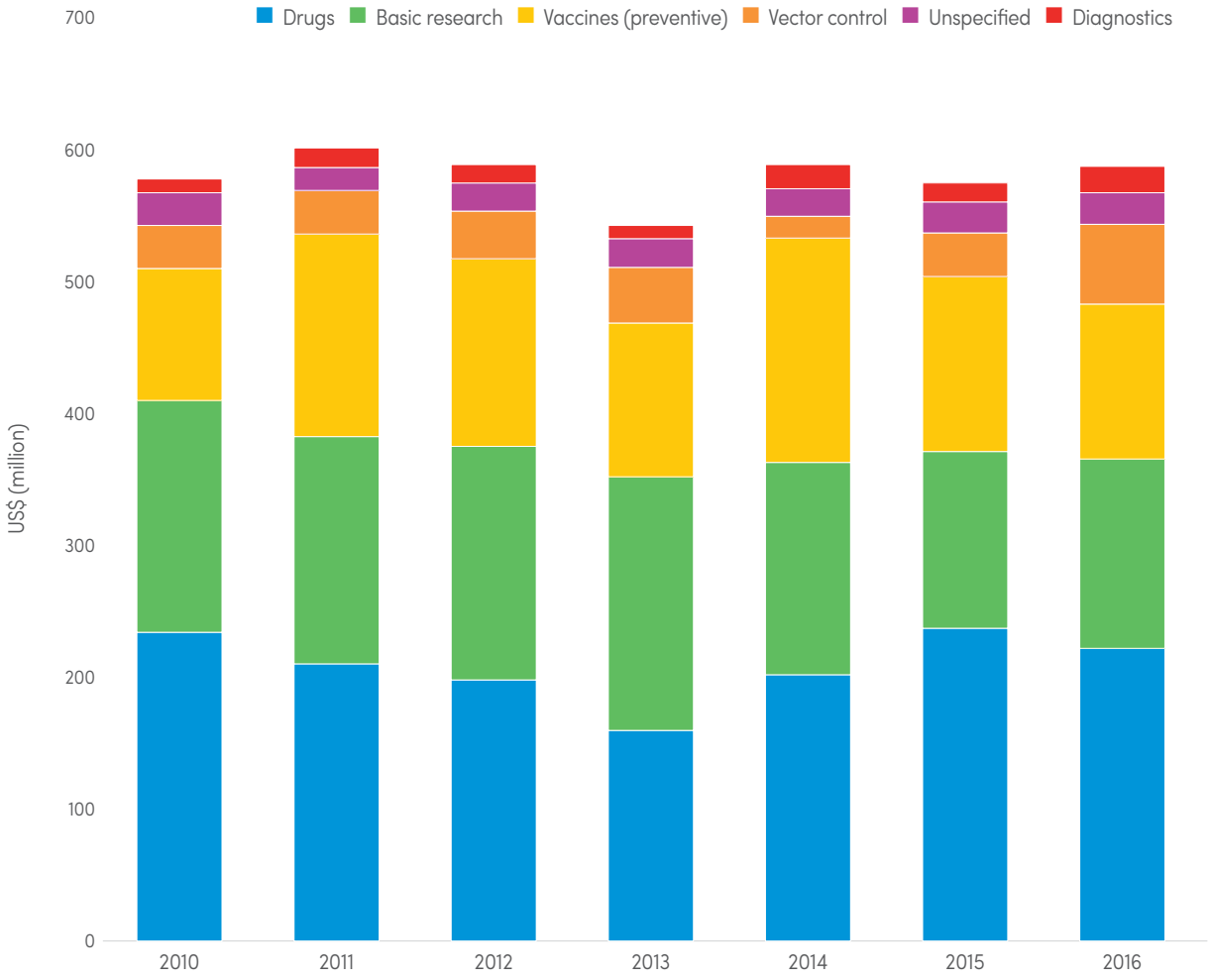
This section draws on the 2017 G-FINDER data from Policy Cures Research. Based on the data available, it presents total annual funding in malaria basic research and product development for the period 2010–2016. Funding for malaria research implementation is presented in a separate report published earlier this year (*9*); that report covers funding for implementation research, operational research and health systems research, which are essential to maximize access to new products and tools in different settings.

A total of US$ 588 million was invested in malaria basic research and product development in 2016. This represented about 85% of the US$ 693 million needed every year for malaria R&D, as estimated in the GTS (*2*).[1] Funding for malaria vaccine R&D fell in 2016 (from US$ 133 million to US$ 118 million) because of declining philanthropic funding, reflecting progress of the RTS,S/AS01 vaccine to pilot implementation and reduced industry investment in vaccine discovery research (**Fig. 2.7**). Investment in drug development

[1] Estimate converted to US$ 2017.

FIG. 2.7.

Funding for malaria-related R&D 2010–2016, by research area (constant 2017 US$) *Source: Policy Cures Research G-FINDER database (public search tool) available at http://www.policycuresresearch.org/g-finder/.*



R&D: research and development.

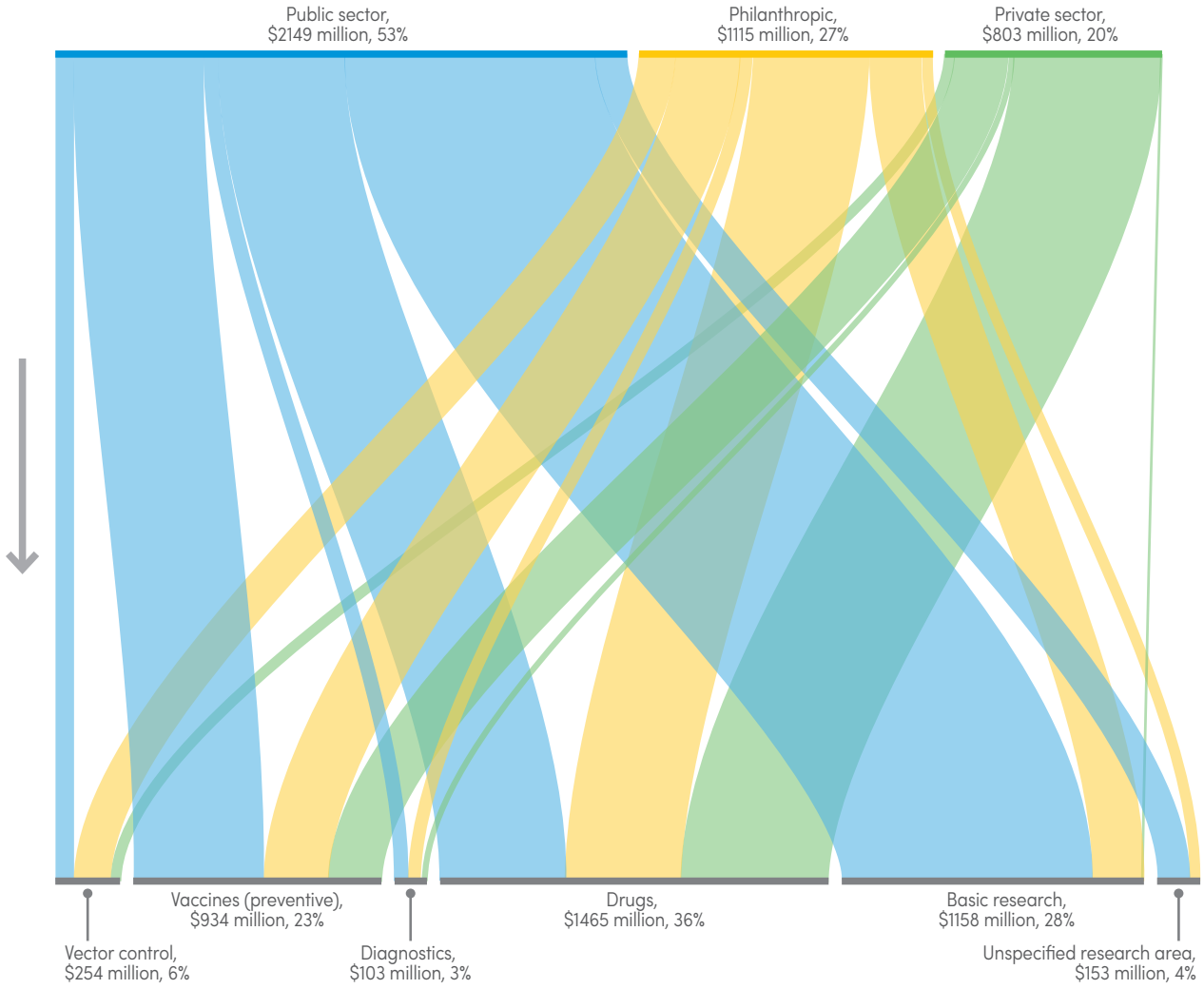
also declined (from US$ 238 million to US$ 222 million), mostly because of cyclical funding patterns in product development partnerships.

However, investment in the remaining research areas increased: vector control product investment almost doubled (from US$ 33 million to US$ 61 million), basic research increased after 2 years of decline (from US$ 134 million to US$ 144 million) and diagnostics R&D funding also rose (from US$ 15 million to US$ 20 million) (**Fig. 2.7**).

From 2010 to 2016, the contributions made by each of the categories of funders were relatively stable, although industry investment fluctuated more than public or philanthropic funding. Public sector funders accounted for 53% of total funding over this period, followed by the philanthropic and private sectors, which contributed 27% and 20%, respectively (**Fig 2.8**). In 2016, the US National Institutes of Health, private sector industry and the Bill & Melinda Gates Foundation collectively contributed three quarters of all malaria R&D funding.

FIG. 2.8.

Flows of funding for malaria-related R&D for the period 2010–2016: from sources to research areas (constant 2017 US$) *Source: Policy Cures Research G-FINDER database (public search tool) available at http://www.policycuresresearch.org/g-finder/.*



R&D: research and development.

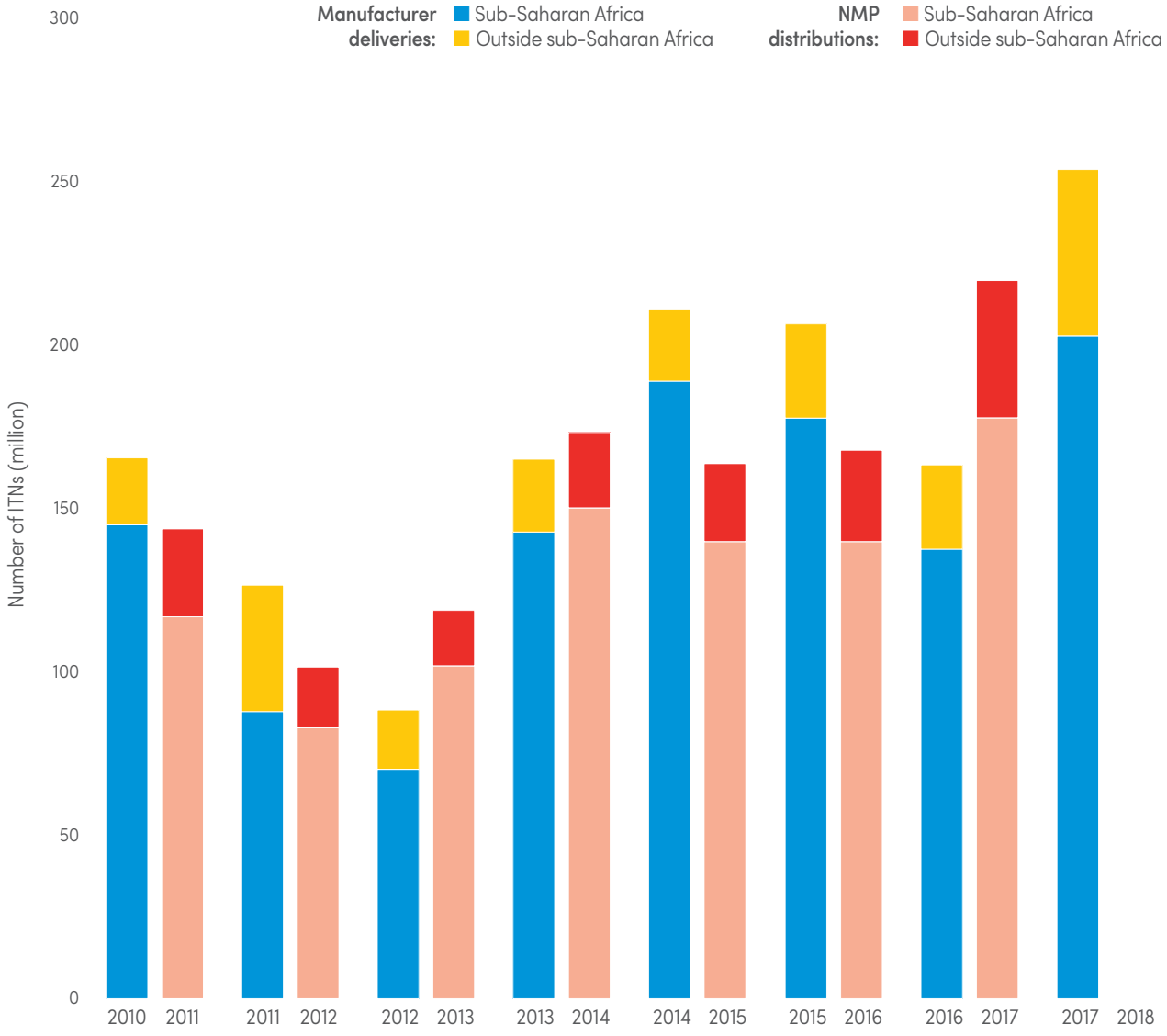
2.3 DELIVERIES OF INSECTICIDE-TREATED MOSQUITO NETS

In 2017, 254 million insecticide-treated mosquito nets (ITNs) were reported by manufacturers as having been delivered globally. In the same year, 220 million ITNs were distributed globally by national malaria programmes (NMPs), of which 175 million (81%) in sub-Saharan Africa (**Fig. 2.9**). Globally, 85% of ITNs were distributed through free mass campaigns, 8% in antenatal care (ANC) facilities and 4% as part of immunization programmes.

A lag of about 6–12 months between manufacturer deliveries to countries and NMP distributions is expected, and this should be considered when interpreting the relationship between manufacturer deliveries, NMP distributions and likely population coverage. Additional considerations include nets that are in storage in country and yet to be distributed by NMPs, and those that are sold through the private sector and are not reported by programmes.

FIG. 2.9.

Number of ITNs delivered by manufacturers[a] and distributed[b] by NMPs, 2010–2017 *Sources: Milliner Global Associates and NMP reports.*



ITN: insecticide-treated mosquito net; NMP: national malaria programme.

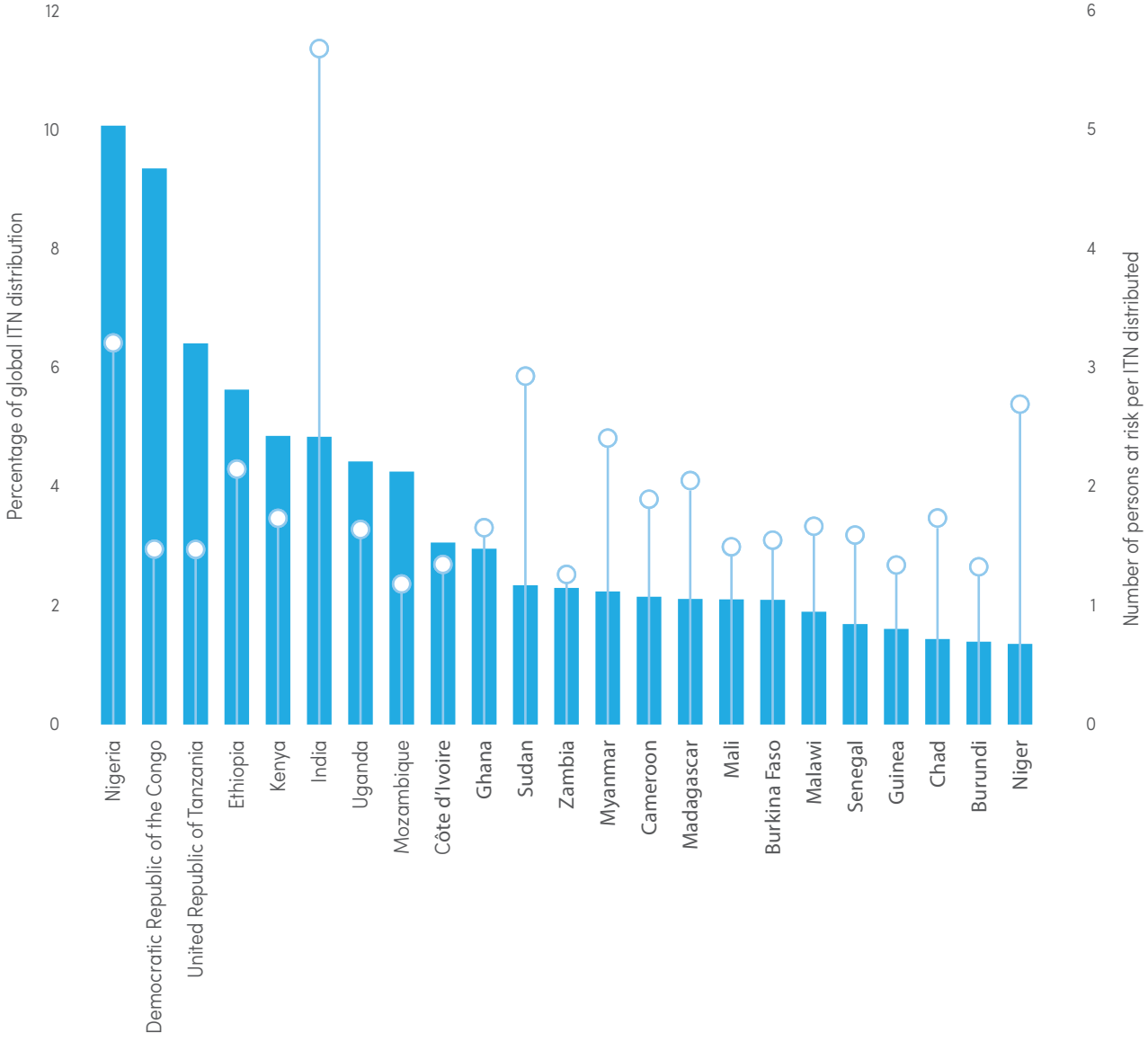
[a] Deliveries by manufacturers in a given year may not reflect distributions by NMPs in that year; a lag of up to a year may occur.

[b] Distributions of ITNs reported by NMPs may not reflect all nets that have been distributed to communities depending on completeness of recording and reporting.

During the period 2015–2017, 624 million ITNs – most of which were long-lasting insecticidal nets (LLINs) – were delivered globally by manufacturers; this was a substantial increase compared with the 465 million delivered during the 3-year period 2012–2014. A total of 552 million ITNs were distributed by national programmes globally, of which 459 million (83%) were distributed in sub-Saharan Africa in the period 2015–2017 (**Fig. 2.9**). In 23 countries where 80% of the ITNs globally were distributed, only seven countries (Ethiopia, India, Madagascar, Myanmar, Niger, Nigeria and Sudan) were below the operational universal coverage target of one ITN per two persons at risk by 2017 (**Fig. 2.10**). However, from household surveys, only eight of the 23 countries had achieved more than 70% coverage (**Section 3**), highlighting potential inefficiencies in targeting of ITNs.

FIG. 2.10.

Percentage of total ITNs distributed to communities globally in the period 2015–2017, and access to ITNs by population at risk (one ITN for every two people) in 2017 in countries that account for 80% of ITNs distributed globally in the period 2015–2017 *Source: NMP reports.*



ITN: insecticide-treated mosquito net; NMP: national malaria programme.

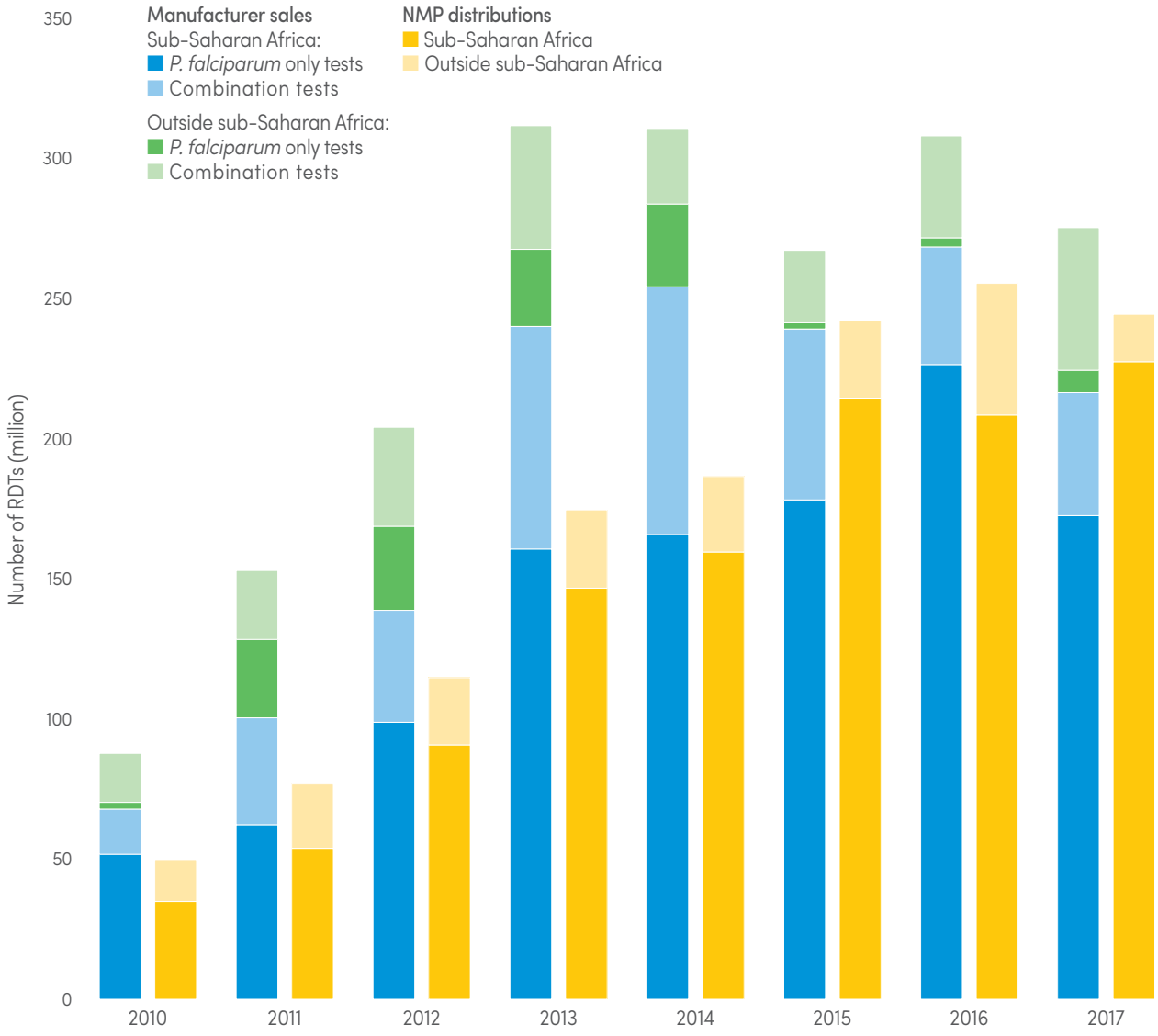
2.4 DELIVERIES OF RAPID DIAGNOSTIC TESTS

In the period 2010–2017, globally, 1.92 billion rapid diagnostic tests (RDTs) were sold by manufacturers eligible for procurement according to the Malaria RDT Product Testing Programme, and NMPs reported the distribution of 1.35 billion RDTs (**Fig. 2.11**). In 2017, 276 million RDTs were sold by manufacturers, and NMPs reported the distribution of 245 million RDTs. Of the RDTs sold by manufacturers in 2017, most (66%) were tests that detected only *Plasmodium falciparum,* supplied to sub-Saharan Africa.

Differences between sales and distributions of RDTs can usually be attributed to one or more of the following: manufacturer data include both public and private health sector sales, whereas data on RDTs distributed by

FIG. 2.11.

Number of RDTs sold by manufacturers and distributed by NMPs for use in testing suspected malaria cases,[a] 2010–2017 *Sources: NMP reports and sales data from manufacturers eligible for WHO's Malaria RDT Product Testing Programme.*



NMP: national malaria programme; *P. falciparum*: *Plasmodium falciparum*; RDT: rapid diagnostic test; WHO: World Health Organization.

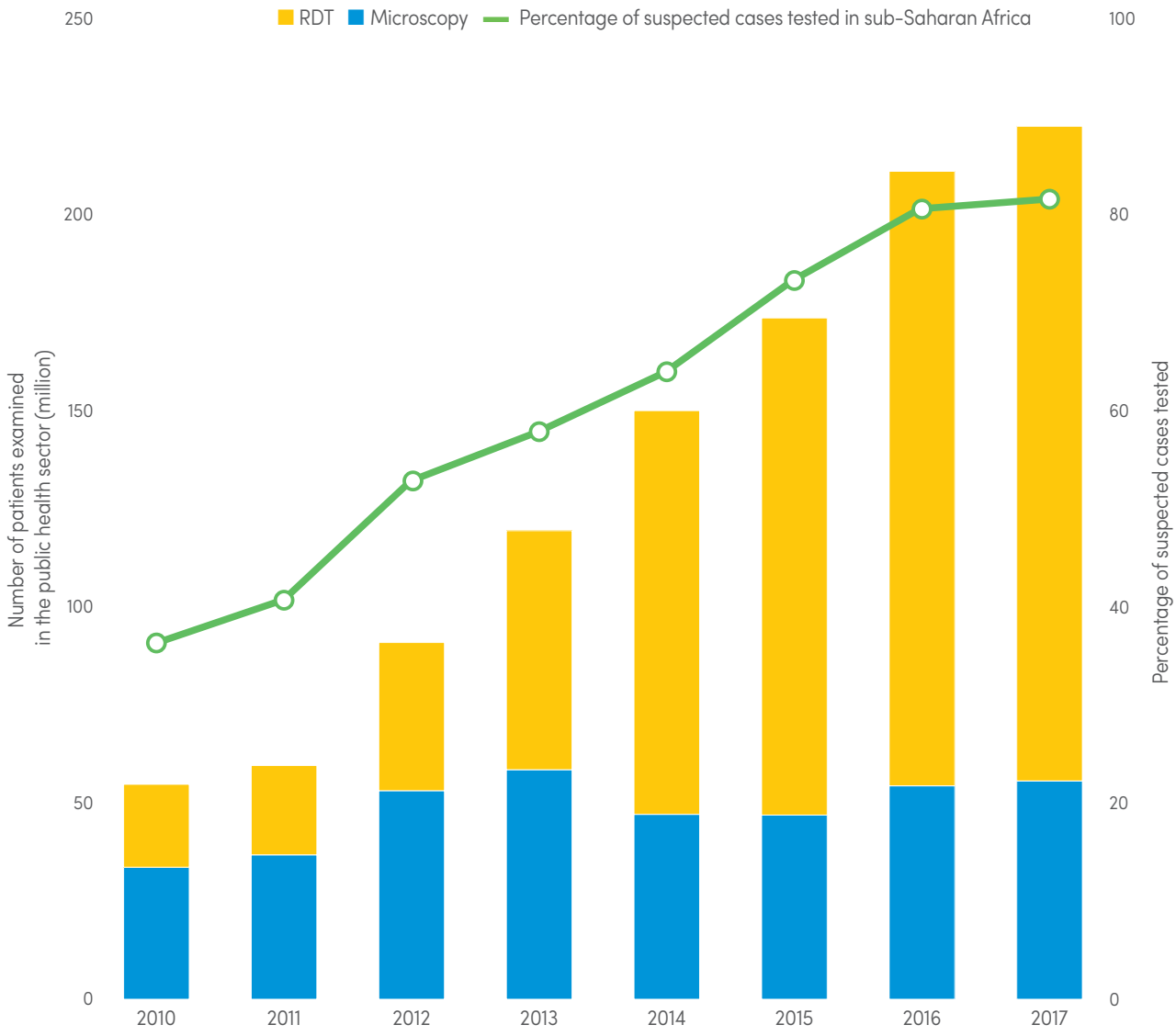
[a] NMP distributions do not reflect RDTs that may still be in storage and have yet to be delivered to health facilities and community health workers.

NMPs represent tests in the public sector only; a high distribution may be followed by a lower one as countries use commodities procured in the previous year; weak national reporting systems or manufacturer data that may represent recent orders that are yet to arrive in the country. Overall, global sales to the public sector and NMP distributions of RDTs appear to be moving towards convergence over the period 2015–2017.

In the period 2010-2017, the number of malaria tests performed in sub-Saharan Africa almost quadrupled, from 55 million to over 223 million (**Fig. 2.12**). By 2010, only 40% of tests were done using RDTs but this increased to 75% in 2017. In the same period, the percentage of suspected cases tested in the public health sector rose from 36% to 82%.

FIG. 2.12.

Malaria patients examined using RDT and microscopy, and percentage of suspected cases tested in health facilities in sub-Saharan Africa, 2010–2017 *Source: NMP reports.*



NMP: national malaria programme; RDT: rapid diagnostic test.

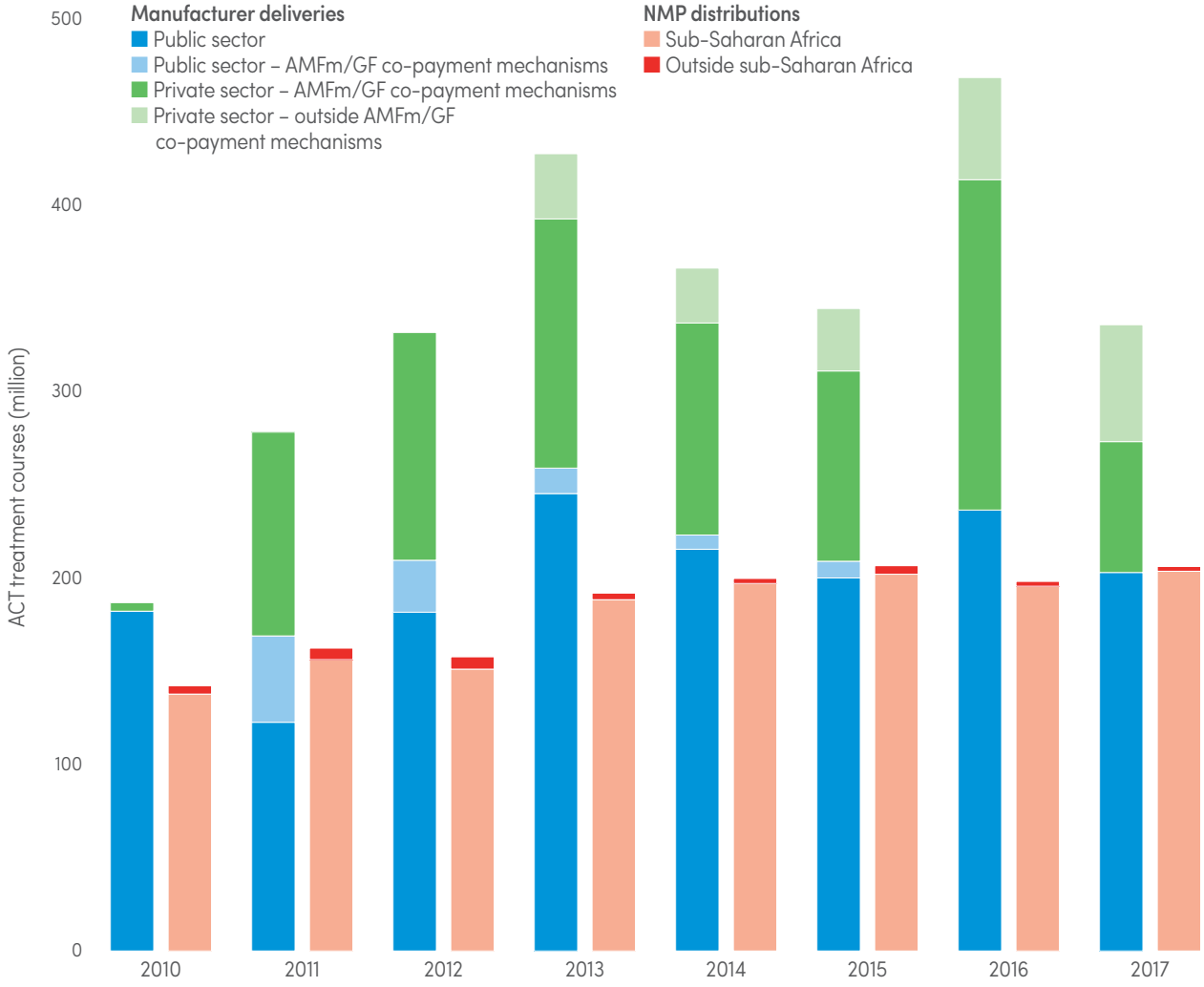
2.5 DELIVERIES OF ARTEMISININ-BASED COMBINATION THERAPIES

Between 2010 and 2017, global manufacturer delivery reports show that countries procured 2.74 billion treatment courses of artemisinin-based combination therapy (ACT), with sales peaking in 2016 (**Fig. 2.13**). Of these procurements, 62% were reported to have been made for the public sector. Within the public sector, about 7% of all sales were made through the Affordable Medicines Facility–malaria (AMFm)/Global Fund co-payment mechanisms. Within the period 2010–2017, about 1.45 billion treatment courses of ACT were delivered by NMPs, of which 1.42 billion (98%) were delivered in sub-Saharan Africa. The private sector delivery of ACTs under the co-payment mechanisms is becoming increasingly important, but national distribution data from the private sector are rarely available to NMPs, making it difficult to interpret trends and identify potential gaps.

In 2017, 206 million ACTs were distributed by NMPs globally, 99% in sub-Saharan Africa. With increases in diagnostics over recent years, it is expected that fewer cases will be treated presumptively; the ultimate goal is that all patients who receive antimalarial drugs would have tested positive for malaria. Hence, countries adhering to diagnosis before treatment will perform more tests than the number of treatment

FIG. 2.13.

Number of ACT treatment courses delivered by manufacturers and distributed by NMPs to patients, 2010–2017[a,b] *Sources: Companies eligible for procurement by WHO/UNICEF and NMP reports.*



ACT: artemisinin-based combination therapy; AMFm: Affordable Medicines Facility–malaria; GF: Global Fund to Fight AIDS, Tuberculosis and Malaria; NMP: national malaria programme; UNICEF: United Nations Children's Fund; WHO: World Health Organization.

[a] NMP distributions to patients reflect consumption reported in the public health sector; they do not include ACT treatment courses that may be in storage and are yet to be used to treat patients.

[b] AMFm/GF indicates that the AMFm operated from 2010 to 2013, and the GF co-payment mechanism from 2014.

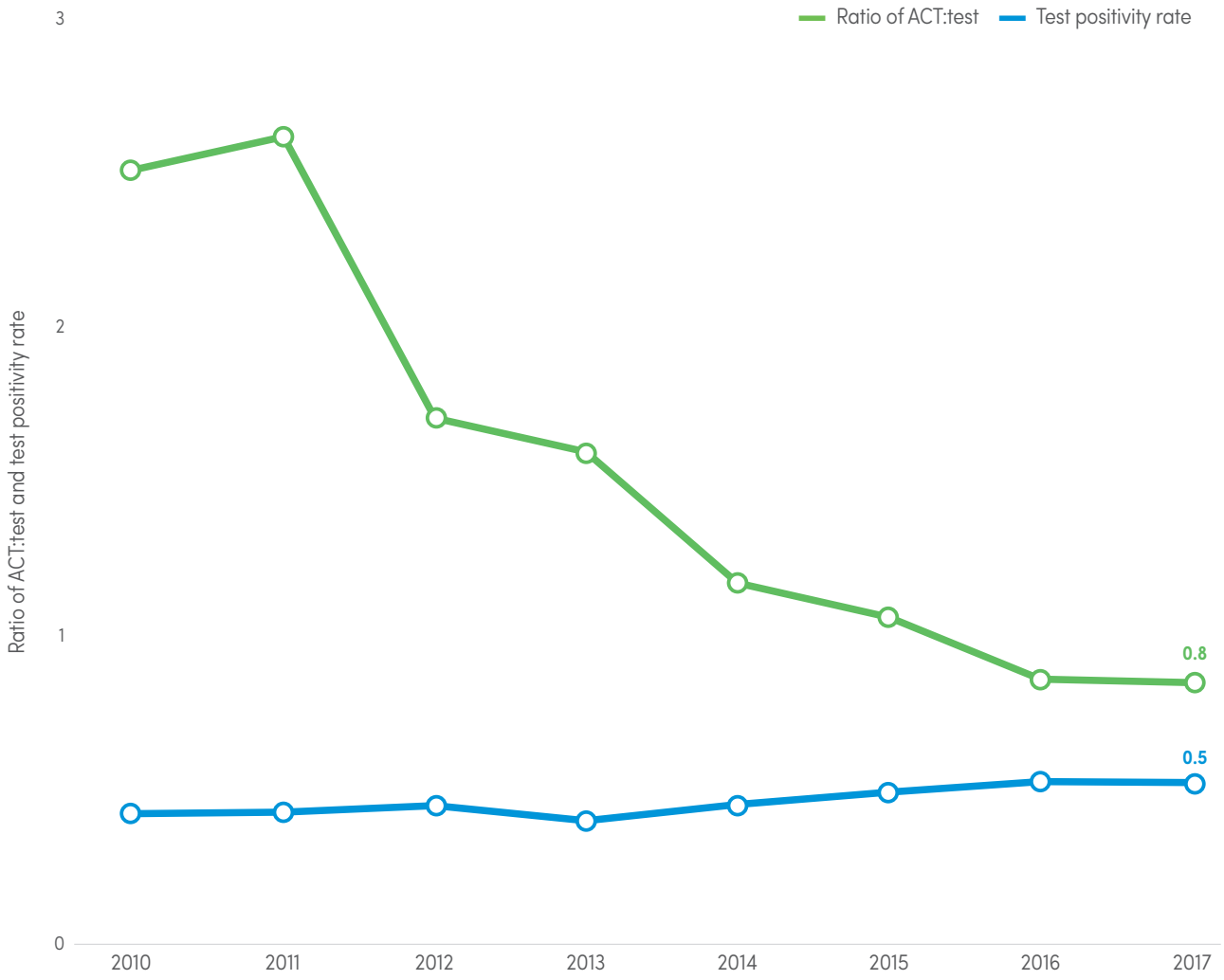
courses they dispense. This is because only a percentage of those tested will be positive, as measured through the test positivity rate. The number of treatments dispensed should therefore be roughly equal to the number of malaria positive cases reported. The ratio of treatments to tests will also be roughly equal to the test positivity rate.

Fig. 2.14 presents the results of an analysis of this relationship in the WHO African Region, where most cases are due to *P. falciparum* and would therefore be treated with ACTs, as per WHO recommendations (*10*).

The ratio of ACT treatment courses to tests (RDTs and microscopy) reported by countries was 2.5 in 2010, but fell to 0.8 in 2017, a threefold reduction. In the same period, the test positivity rate rose slightly, from 0.4 to 0.5 (**Fig. 2.14**). This suggests that ACT treatments are increasingly targeted at malaria positive cases; however about 30% of ACT treatments may have been given to patients who were either not tested or were negative for malaria, recognizing that data reported by national programmes may be incomplete.

FIG. 2.14.

Ratio of ACT treatment courses distributed to diagnostic tests performed (RDTs or microscopy) and test positivity rate, WHO African Region, 2010–2017 *Source: NMP reports, WHO African Region.*



ACT: artemisinin-based combination therapy; NMP: national malaria programme; RDT: rapid diagnostic test; WHO: World Health Organization.

3

PREVENTING MALARIA

For the prevention of malaria, WHO recommends vector control (i.e. preventing 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 (e.g. complex emergencies and elimination). The core interventions recommended by WHO to prevent mosquito bites are sleeping under an ITN and indoor residual spraying (IRS). In a few specific settings and circumstances, ITNs and IRS can be supplemented by larval source management or other environmental modifications.[1]

In sub-Saharan Africa, intermittent preventive treatment in pregnancy (IPTp) with sulfadoxine-pyrimethamine (SP) has been shown to reduce maternal anaemia, low birth weight and perinatal mortality (*11*). Intermittent preventive treatment in infants (IPTi) with SP provides protection against clinical malaria and anaemia (*12*); however, as of 2015, no countries have reported implementation of an IPTi policy. Seasonal malaria chemoprevention (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%, and could avert millions of cases and thousands of deaths among children living in areas of highly seasonal malaria transmission in the Sahel subregion (*13*). Since March 2012, WHO has recommended SMC for children aged 3–59 months living in areas of highly seasonal malaria transmission in the Sahel subregion of Africa.

Mass drug administration is 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. It is recommended for malaria elimination settings in combination with high coverage of core interventions and a means of rapidly reducing malaria burden among restricted high-risk groups (*14*).

This section discusses the population level coverage of ITNs, IRS, IPTp and 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 IPTi is not reported because, so far, it has not been adopted by countries.

3.1 POPULATION AT RISK COVERED WITH ITNS

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. Household surveys were used, together with manufacturer deliveries and NMP distributions, to estimate the following main indicators (*15*, *16*):

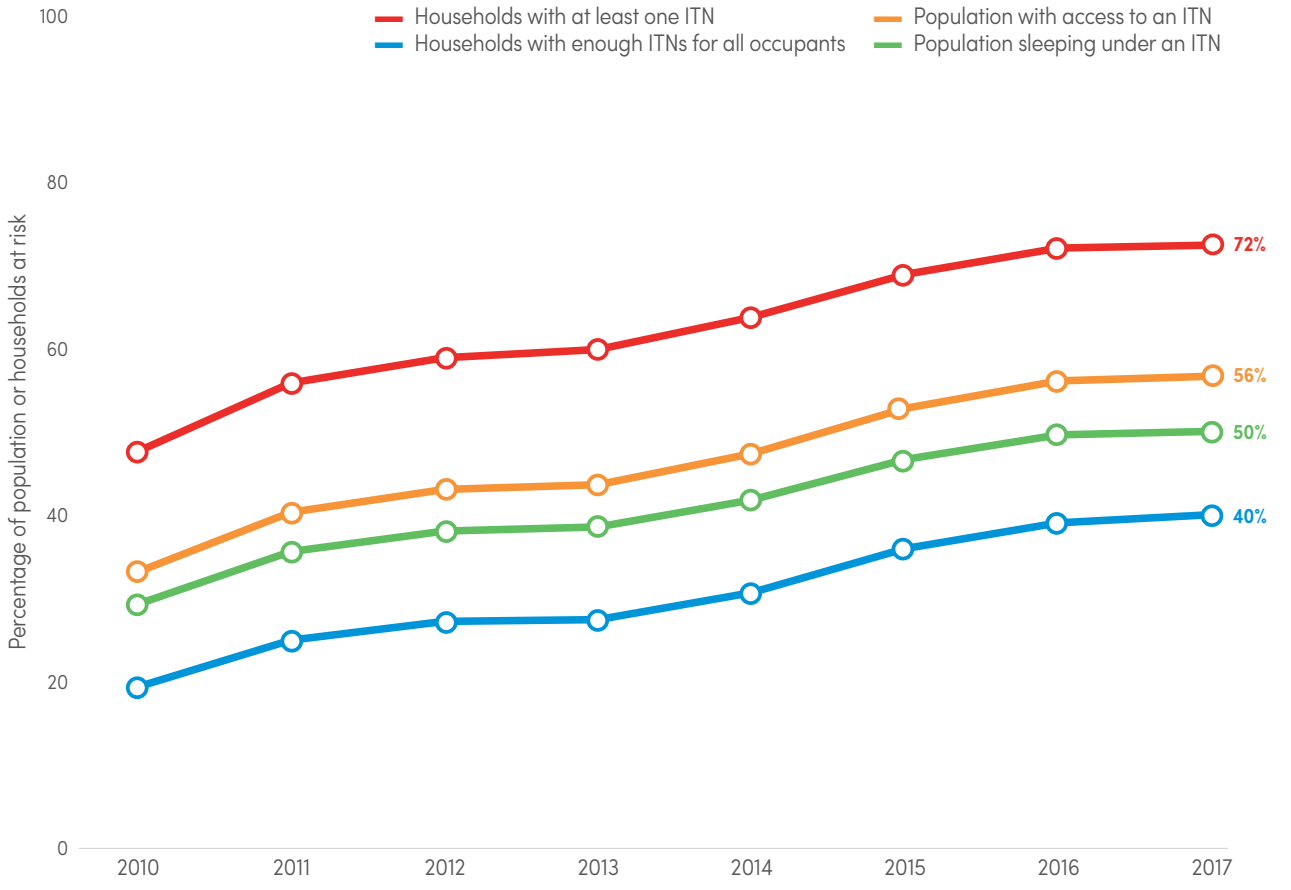
- net use (i.e. the percentage of a given population group that slept under an ITN the night before the survey);
- ITN ownership (i.e. percentage of households that owned at least one ITN);
- percentage of households with at least one ITN for every two people;
- percentage of the population with access to an ITN within their household (i.e. the percentage of the population that could be protected by an ITN, assuming that each ITN in a household can be used by two people); and
- household ITN ownership gap, measured as percentage of households with at least one ITN for every two people among households owning at least one ITN in the household.

[1] These approaches will be discussed in vector control guidelines under development by WHO.

Overall, all ITN indicators increased steadily since 2010. Comparing 2010 with 2017, an estimated 30% versus 50% of the population at risk, 36% versus 61% of children aged under 5 years, and 26% versus 61% of pregnant women, respectively, slept under an ITN. In the period 2010–2017, household ownership of at least one ITN increased from 47% to 72%, while the percentage of households with at least one ITN for every two people increased from 20% to 40%. The percentage of the population that could be protected by an ITN, assuming that each ITN in a household is used by two people (defined as access to ITNs), increased from 33% in 2010 to 56% in 2017 (**Fig. 3.1**).

FIG. 3.1.

Percentage of population at risk with access to an ITN and sleeping under an ITN, and percentage of households with at least one ITN and enough ITNs for all occupants, sub-Saharan Africa, 2010–2017
Source: ITN coverage model from MAP.[a]



ITN: insecticide-treated mosquito net; MAP: Malaria Atlas Project.
[a] http://www.map.ox.ac.uk/

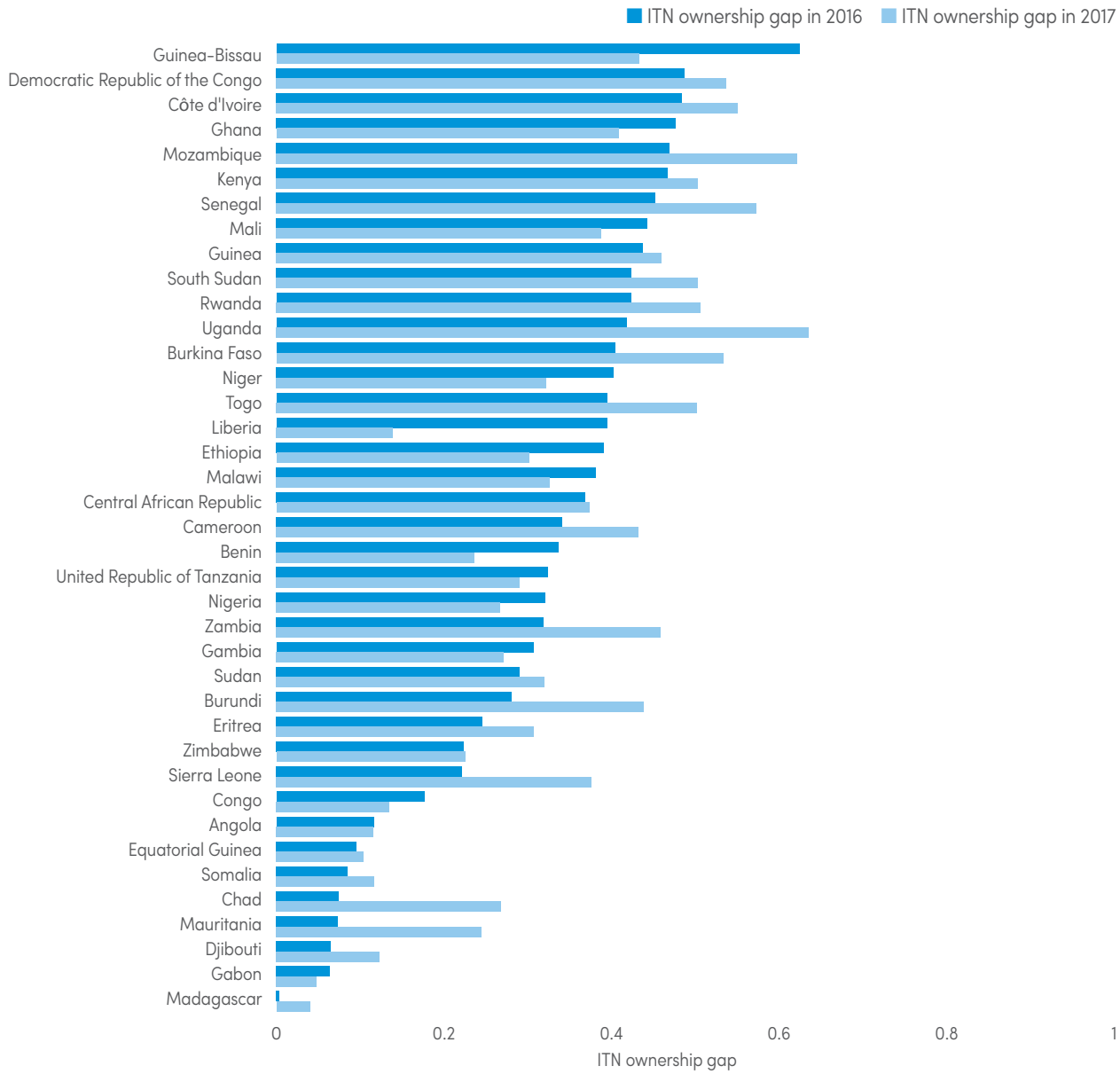
An analysis of household ITN ownership gap is presented in **Fig. 3.2**. The indicator is measured as the percentage of households with at least one ITN for every two people among households owning at least one ITN. It reflects the ITN gap in households that have some nets, but not enough nets between occupants. The analysis shows that – of the 39 countries for which the ITN gap was estimated – 22 (56%) had a higher ownership gap in 2017 than in 2016, despite large distributions in several of these countries. This suggests that, in these countries, most of the nets distributed to households were used to replace old nets, leaving insufficient numbers of nets to cover new or previously unreached populations.

3.2 POPULATION AT RISK PROTECTED BY IRS

The percentage of the population at risk protected by IRS declined globally from a peak of 5% in 2010 to 3% in 2017, with decreases seen in all five WHO regions for which data were analysed (**Fig. 3.3**). The number of people protected in 2010 was 180 million globally, but by 2017 this had reduced to about 116 million. In the WHO African Region, the percentage of the population at risk protected by IRS declined from 10.1% (80 million) in 2010 to a low point of 5.4% (51 million) in 2016, before rising to 6.6% (64 million) in 2017. Most of these

FIG. 3.2.

Household ITN ownership gap, 2016 and 2017 *Source: ITN coverage model from MAP.[a] (16)*



ITN: insecticide-treated mosquito net; MAP: Malaria Atlas Project.

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

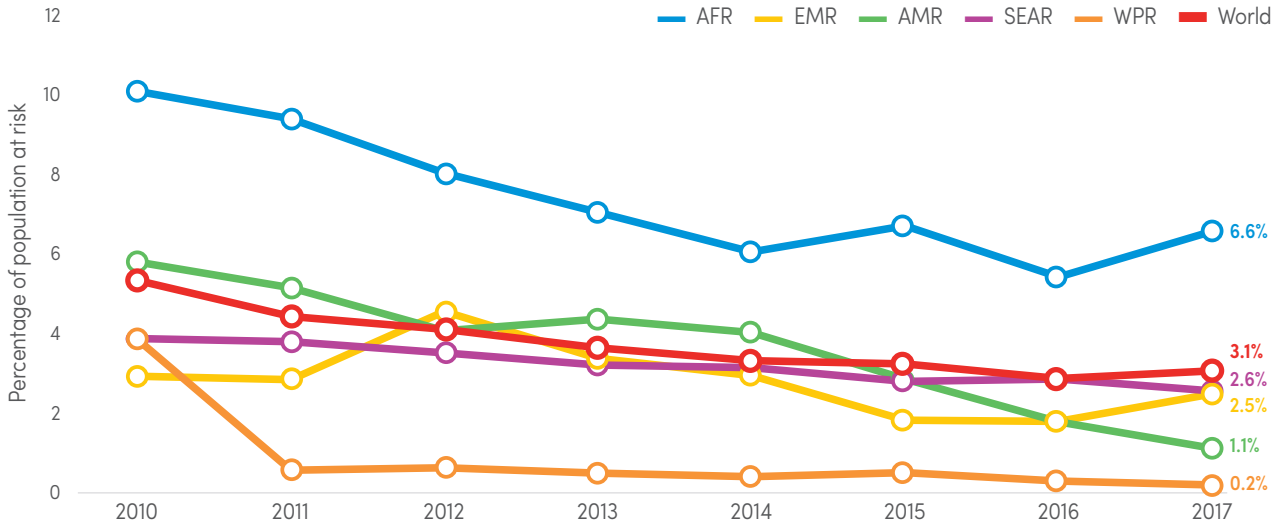
increases in the period 2016–2017 were reported in Burundi, Ethiopia, Ghana, Kenya, Mozambique, Uganda, the United Republic of Tanzania and Zambia. In other WHO regions, the number of people protected with IRS was 1.5 million in the Americas, 7.5 million in the Eastern Mediterranean, 41 million in South-East Asia and 1.5 million in the Western Pacific.

When interpreting the trends in IRS coverage, the denominator of population at risk used is that of all populations living in areas where there is ongoing malaria transmission, to allow for consistency in trend. However, in most countries, IRS implementation is focal and is targeted at a much smaller population at risk; NMP reports show that, among the targeted population, operational coverage is substantially higher than what is shown in **Fig. 3.3**. Reasons for the declining IRS coverage may include the switch from pyrethroids to more expensive chemicals (**Fig. 3.4**) in response to increasing pyrethroid resistance, or changes in operational strategies (e.g. decreasing at-risk populations in countries aiming for elimination of malaria).

Fig. 3.4 shows the main chemical classes used for IRS across countries that have reported the implementation of this intervention. Most countries rely on pyrethroids, despite increasing resistance (**Section 8.3**). In more recent years, countries have reported increasing use of carbamates and organophosphates.

FIG. 3.3.

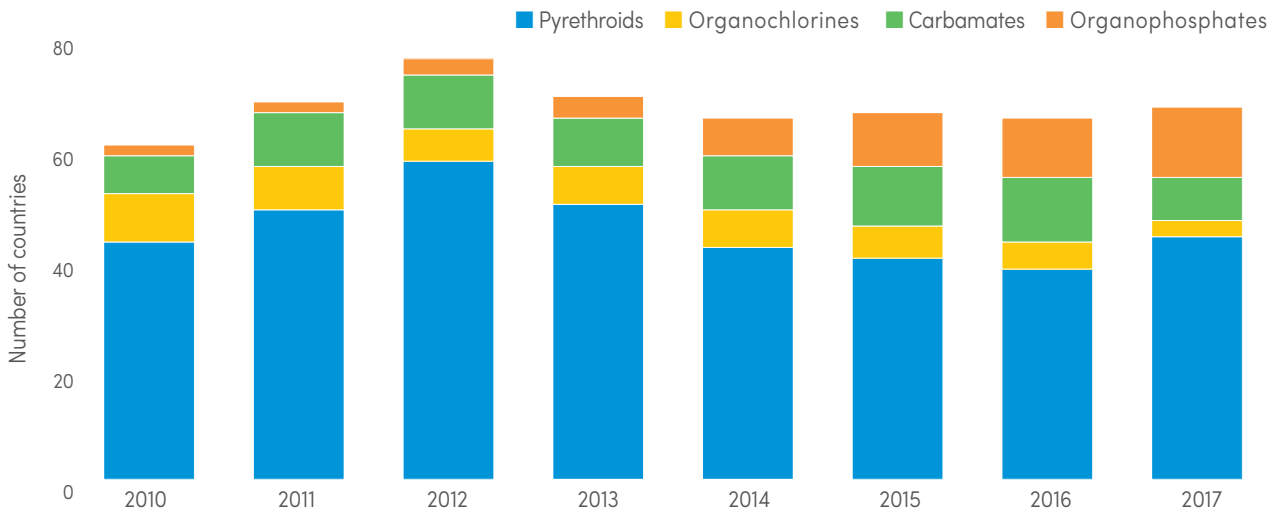
Percentage of the population at risk protected by IRS by WHO region, 2010–2017 *Source: NMP reports.*



AFR: WHO African Region; AMR: WHO Region of the Americas; EMR: WHO Eastern Mediterranean Region; IRS: indoor residual spraying; NMP: national malaria programme; SEAR: WHO South-East Asia Region; WHO: World Health Organization; WPR: WHO Western Pacific Region.

FIG. 3.4.

Main chemical classes used for IRS by national programmes globally, 2010–2017 *Source: NMP reports.*



IRS: indoor residual spraying; NMP: national malaria programme.

3.3 PREGNANT WOMEN RECEIVING THREE OR MORE DOSES OF ITPp

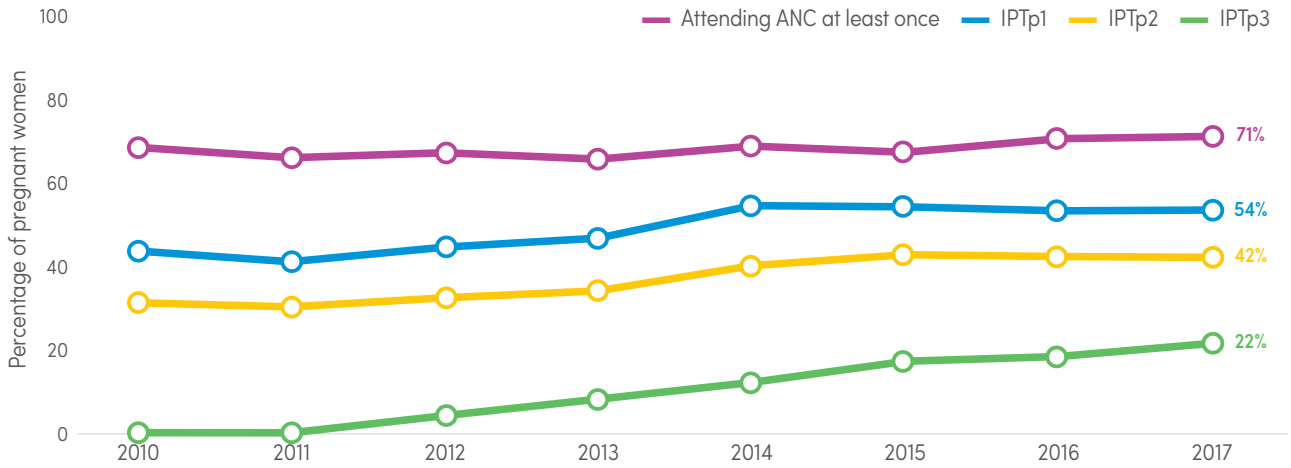
Since October 2012, WHO has recommended that IPTp be given to all pregnant women at each ANC visit, starting as early as possible in the second trimester (i.e. not during the first trimester). Each IPTp-SP dose should be given at least 1 month apart, with at least three doses during each pregnancy (*11*). To date, 39 African countries have adopted this policy. Countries reported routine health facility data from the public sector on the number of women receiving the first, second, third and fourth doses of IPTp. Using as the denominator annual expected pregnancies (discounted for fetal loss and stillbirths), the percentages of IPTp1 and IPTp2 were computed for 35 countries, and IPTp3 for 33 countries. As of 2017, coverage of IPTp1, IPTp2 and IPTp3 were 54%, 42% and 22%, respectively (**Fig. 3.5**). Coverage was variable by country, but only Zambia had IPTp3 coverage of 50% or more.

3.4 SEASONAL MALARIA CHEMOPREVENTION

Countries were quick to adopt SMC and include its implementation in their strategic plans for malaria control, following the WHO policy recommendation on SMC for *P. falciparum* malaria control in highly

FIG. 3.5.

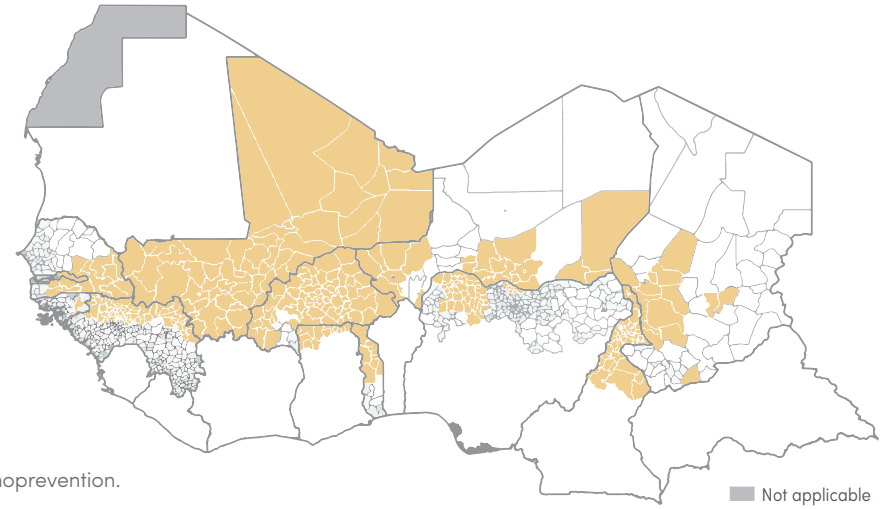
Percentage of pregnant women attending ANC at least once and receiving IPTp, by dose, sub-Saharan Africa, 2010–2017 *Source: NMP reports, WHO and US Centers for Disease Control and Prevention (CDC) estimates.*



ANC: antenatal care; IPTp: intermittent preventive treatment in pregnancy; NMP: national malaria programme; WHO: World Health Organization.

FIG. 3.6.

Maps of countries and subnational areas where SMC has been implemented, as of 2017 *Source: London School of Hygiene & Tropical Medicine.*



SMC: seasonal malaria chemoprevention.

seasonal transmission areas of the Sahel subregion in Africa in March 2012, and the later dissemination of a field implementation guide (*13*). Implementation of SMC was scaled up from 2015, and 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.

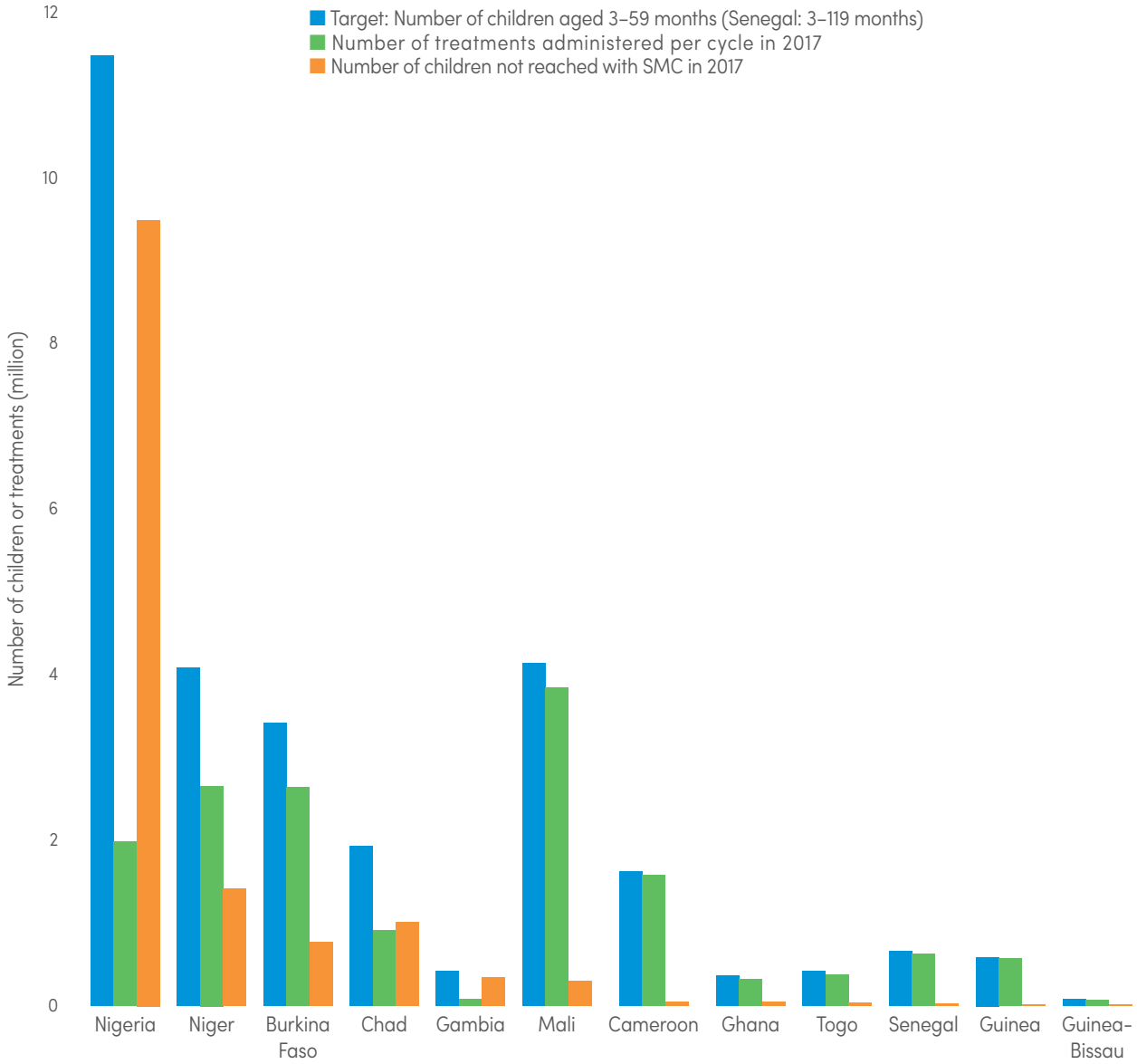
So far, 12 countries have implemented SMC (**Fig. 3.6**). In most of these areas, SMC was provided for 4 months of the year. In Togo and in parts of Ghana and Senegal, SMC was provided for 3 months. In Senegal, SMC is administered to children aged up to 10 years; in the other countries, SMC is provided for children aged under 5 years.

The total number of children eligible for SMC in the 12 countries (as estimated by the national programmes) is 29.3 million and the number treated in 2017 was estimated to be 15.7 million, leaving a gap of 13.6 million children in eligible areas not yet served by current SMC programmes (**Fig. 3.7**). The largest gap was in Nigeria, which also accounted for the most children covered by country in 2017.

Coverage of four treatments at monthly intervals in seven surveys in 2016 for the ACCESS-SMC project was 53% overall. Surveys carried out in 2017 show that coverage of four treatments was 67% in Chad, 63% in Guinea, 45% in Nigeria and 88% in Burkina Faso.

FIG. 3.7.

Number of SMC target children and treatments administered in SMC implementation countries in 2017
Source: London School of Hygiene & Tropical Medicine.



SMC: seasonal malaria chemoprevention.

4

DIAGNOSTIC TESTING AND TREATMENT

Diagnostic testing and treatment is a key component of malaria control and elimination strategies. In addition to the treatment of uncomplicated malaria illness, prompt and effective case management helps to prevent severe disease and probable death; it may also reduce the pool of individuals who can contribute to malaria transmission. Diagnosing patients rather than treating them presumptively may help health service providers to further investigate other potential causes of febrile illnesses that have a negative parasitological result; reduce the unnecessary use of antimalarial drugs and associated side-effects; and mitigate against the rapid emergence and spread of drug resistance (*10*). Current WHO recommendations for the diagnosis and treatment of malaria are given in **Box 4.1**.

The ability of health systems to provide quality malaria case management at high coverage is influenced by the extent to which patients with suspected malaria seek treatment and, after seeking care, receive a diagnostic test and, if positive for malaria, are treated appropriately. These indicators are usually measured through household surveys, such as malaria indicator surveys (MIS), and demographic and health surveys (DHS). For reasons of data availability, the analysis in this section is largely confined to sub-Saharan Africa, the region that carries the highest share of the global malaria burden. **Annex 1** discusses the countries included, the data, and limitations of the use of DHS and MIS data.

The signs and symptoms of malaria are similar to those of many other febrile illnesses. In non-immune individuals, malaria typically presents with fever, sometimes accompanied by chills, sweats, headache or other symptoms that may resemble other illnesses. Consequently, fever is the main basis for suspicion of malaria, and a trigger for diagnostic testing of the patient in most malaria endemic settings. A history of fever in children aged under 5 years and subsequent steps taken to seek treatment have been the basis of measuring access to malaria case management. However, some important limitations of these data are as follows: what constitutes a "fever" varies by cultural context, which means that making comparisons across cultural groups can be problematic; the percentage of fevers that are due to malaria varies according to the underlying transmission intensity and level of control; there is no conclusive evidence that the household-level and individual-level decision-making processes for treatment seeking for malaria fevers are the same as those for other fevers or across different ages; and a percentage of respondents may not recall the medication they received, resulting in misclassification of the drugs that were prescribed.

Sections 4.1–4.4 focus on data for the period 2015–2017, given the limited number of household surveys each year. Analysis from the period 2010–2017 is used to describe change over a longer period, represented by overlapping intervals of 3 years. However, the trend data should be interpreted with caution because most countries conduct a household survey once every 3–5 years, and data shown in any period may be from countries not in preceding or subsequent periods.

Box 4.1 WHO recommendations for the diagnosis and treatment of malaria (*10*)

1 Patients with suspected malaria should have prompt parasitological confirmation of diagnosis, with either microscopy or RDT, before antimalarial treatment is started. Treatment based on clinical grounds should only be given if diagnostic testing is not immediately accessible within 2 hours of patients presenting for treatment.

2 All uncomplicated *P. falciparum* infections should be treated with ACTs. In low-transmission areas, a single low dose of primaquine should be added to the antimalarial treatment, to reduce transmission of the infection. Testing for glucose-6-phosphate dehydrogenase (G6PD) deficiency is not required.

3 *P. vivax* infections should be treated with an ACT or chloroquine in areas where chloroquine-resistant *P. vivax* is not found. In areas where chloroquine-resistant *P. vivax* has been identified, infections should be treated with an ACT. To prevent relapses, full primaquine treatment should be added to the treatment; the dose and frequency of the administration should be guided by the patient's G6PD enzyme activity.

4 Severe malaria should be treated with injectable artesunate (intramuscular or intravenous) for at least 24 hours, followed by a complete 3-day course of an ACT once the patient can tolerate oral medicines.

4.1 PREVALENCE OF FEVER IN CHILDREN AGED UNDER 5 YEARS

Based on 19 household surveys conducted in sub-Saharan Africa between 2015 and 2017, a median of 28% of children (interquartile range [IQR]: 18–36%) had a fever in the 2 weeks preceding the survey, with minor variation by age (**Fig. 4.1**).

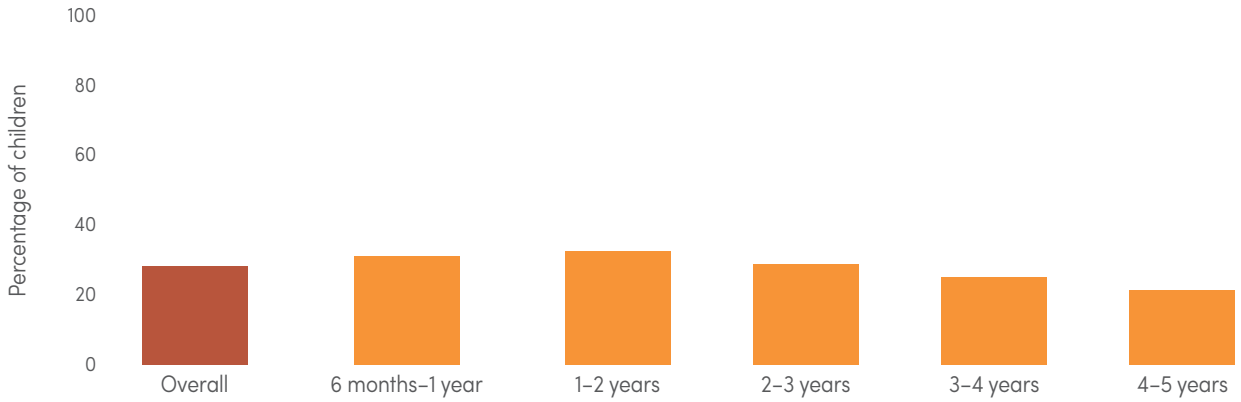
Prevalence of fever was slightly higher in children living in the poorest households (median: 30%, IQR: 17–40%) compared with the wealthiest households (median: 22%, IQR: 18–28%), and among those living in rural areas (median: 30%, IQR: 18–39%) compared with urban areas (median: 24%, IQR: 19–29%). Fever prevalence did not vary much by mother's education level or child's gender (**Fig. 4.2**).

4.2 TREATMENT SEEKING FOR FEVER

Based on 19 nationally representative household surveys in sub-Saharan Africa conducted between 2015 and 2017, a higher percentage of febrile children attended public health facilities (median: 36%, IQR: 30–46%).

FIG. 4.1.

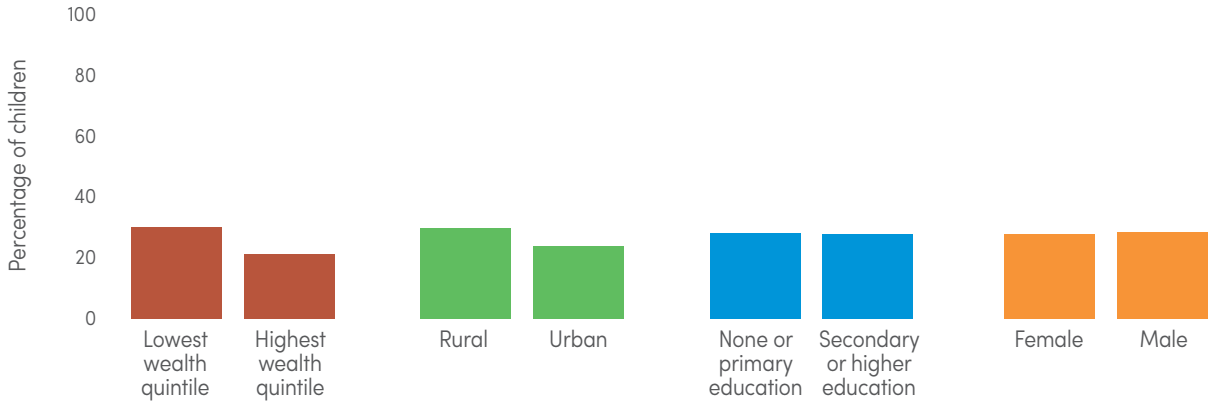
Median percentage of children who had a fever in the 2 weeks preceding the survey, overall and in each age group, sub-Saharan Africa, 2015–2017 *Sources: Nationally representative household survey data from DHS and MIS.*



DHS: demographic and health survey; MIS: malaria indicator survey.

FIG. 4.2.

Disparities in the median percentage of febrile children by wealth quintile, residence, mother's education level and child's gender, sub-Saharan Africa, 2015–2017 *Sources: Nationally representative household survey data from DHS and MIS.*



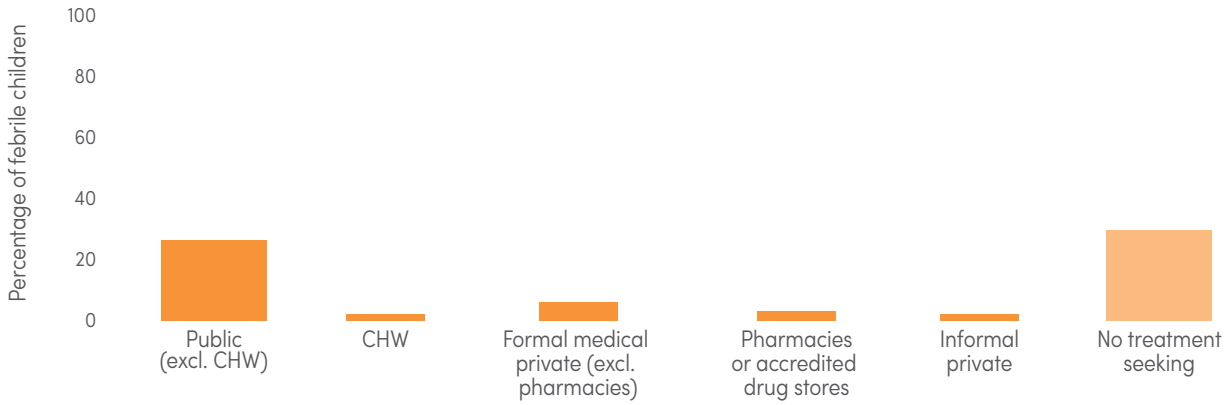
DHS: demographic and health survey; MIS: malaria indicator survey.

Visits to the private sector were to the formal medical private sector (median: 8%, IQR: 5–10%), followed by pharmacies or accredited drug stores (median: 4%, IQR: 2–6%), and the informal sector (median: 3%, IQR: 2–4%), which comprises shops, markets, kiosks, itinerant drug sellers, traditional healers, friends and relatives, and other non-medical health facilities. Visits to community health workers (CHWs) in the public sector accounted for 3% (IQR: 1–5%). Overall, a median of 52% (IQR: 44–62%) of febrile children brought for care were taken to a trained provider (i.e. to public sector health facilities, CHWs or formal private health facilities). A considerable percentage of febrile children were not brought for care (median: 40%, IQR: 28–45%) (**Fig. 4.3**).

The percentage of febrile children brought for care was higher in the wealthiest households (median: 72%, IQR: 62–75%) than in the poorest households (median: 58%, IQR: 47–67%); in those living in urban areas (median: 69%, IQR: 59–76%) than in those living in rural areas (median: 60%, IQR: 51–71%); and in mothers with higher education (median: 71%, IQR: 63–77%) than in mothers with lower education (median: 57%, IQR: 51–70%). Differences in treatment seeking by gender were minor (**Fig.4.4**).

FIG. 4.3.

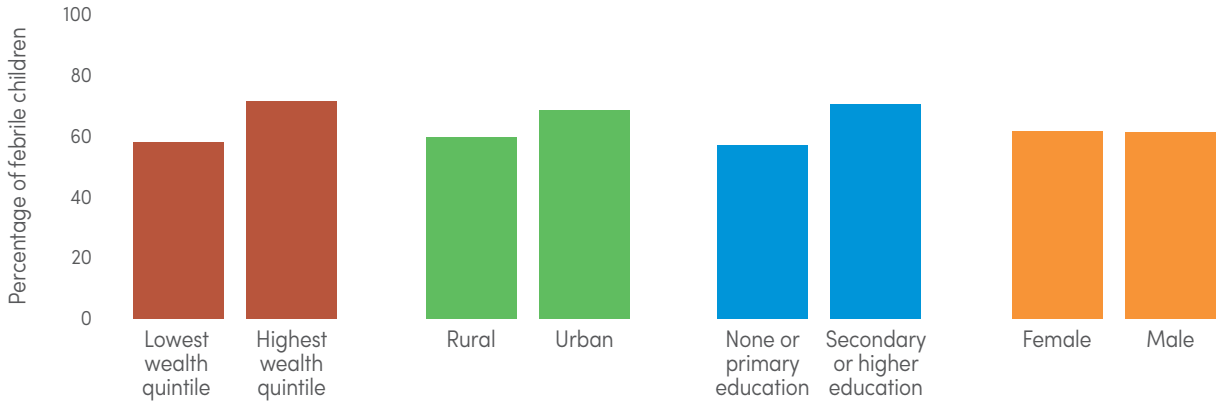
Median percentage of febrile children by treatment seeking behaviour, sub-Saharan Africa, 2015–2017[a,b]
Sources: Nationally representative household survey data from DHS and MIS.



CHW: community health worker; DHS: demographic and health survey; MIS: malaria indicator survey.
[a] Respondents can select more than one source of care for one episode of fever.
[b] CHW data are based on 13 countries: Burundi, Chad, Ghana, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Togo and Uganda.

FIG. 4.4.

Disparities in the median percentage of febrile children brought for care by wealth quintile, residence, mother's education level and child's gender, sub-Saharan Africa, 2015–2017 *Sources: Nationally representative household survey data from DHS and MIS.*



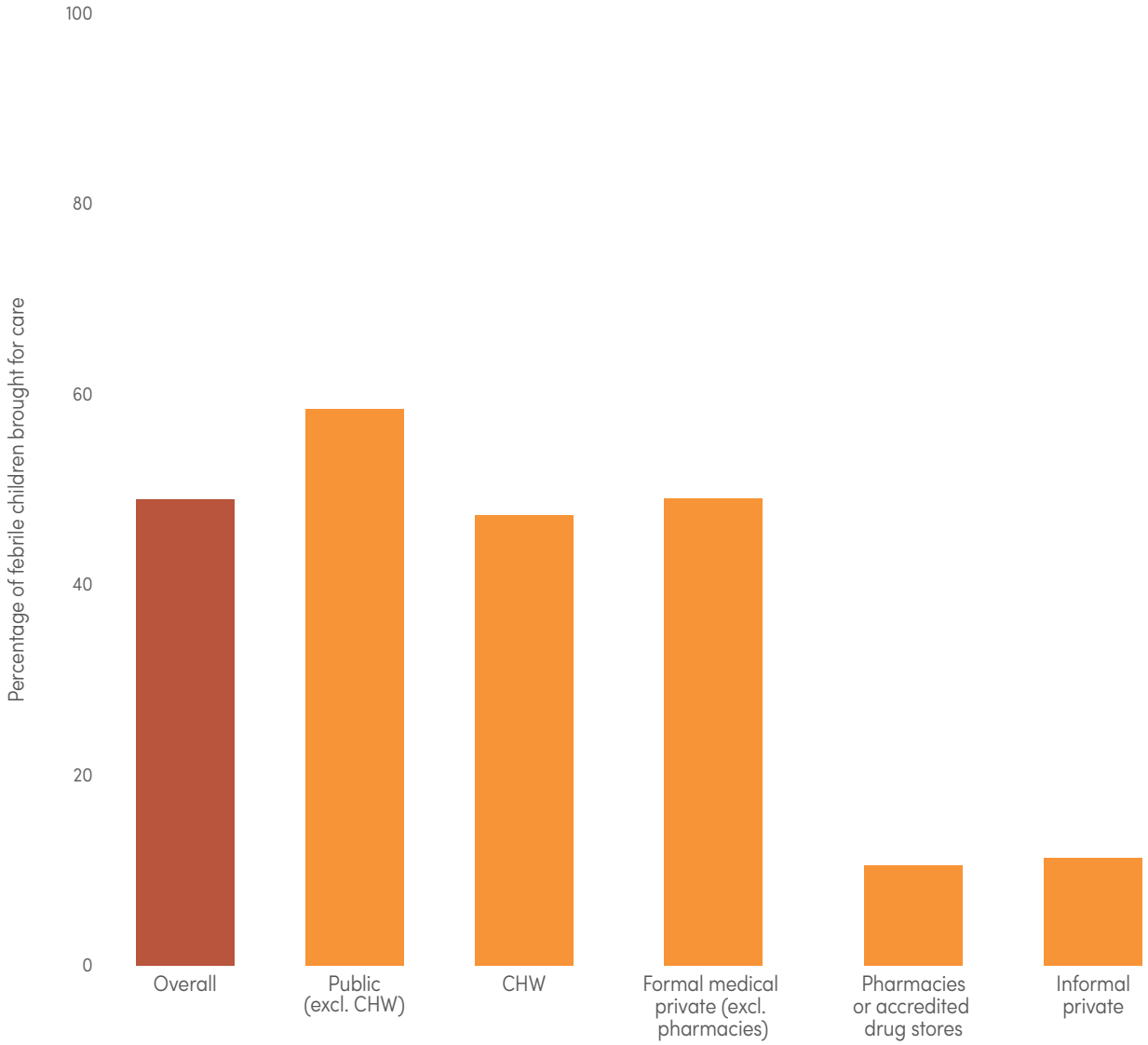
DHS: demographic and health survey; MIS: malaria indicator survey.

4.3 PARASITOLOGICAL TESTING OF FEBRILE CHILDREN

Based on 18 nationally representative household surveys conducted between 2015 and 2017 in sub-Saharan Africa, the median percentage of febrile children brought for care who received a finger or heel stick (suggesting that a malaria diagnostic test may have been performed) was 49% (IQR: 25–59%). Although IQRs of the medians are wide, indicating considerable variation among countries, this percentage was greater in the public sector (median: 59%, IQR: 35–76%) than in the formal medical private sector (median: 49%, IQR: 34–76%). Of the few children who were brought to a CHW for care, a median of 47% received a diagnostic test (IQR: 29–71%). Overall, 61% of children brought for care from a trained provider received a diagnostic test (IQR: 35–71%). Only about 10% of febrile children received a blood test in pharmacies (median: 10%, IQR: 9–18%) or in the informal private sector (median: 11%, IQR: 5–22%) (**Fig. 4.5**).

FIG. 4.5.

Median percentage of febrile children brought for care who received a blood test, overall and in each health sector, sub-Saharan Africa, 2015–2017[a] *Sources: Nationally representative household survey data from DHS and MIS.*



CHW: community health worker; DHS: demographic and health survey; MIS: malaria indicator survey.

[a] CHW data are based on 10 countries: Burundi, Chad, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Togo and Uganda.

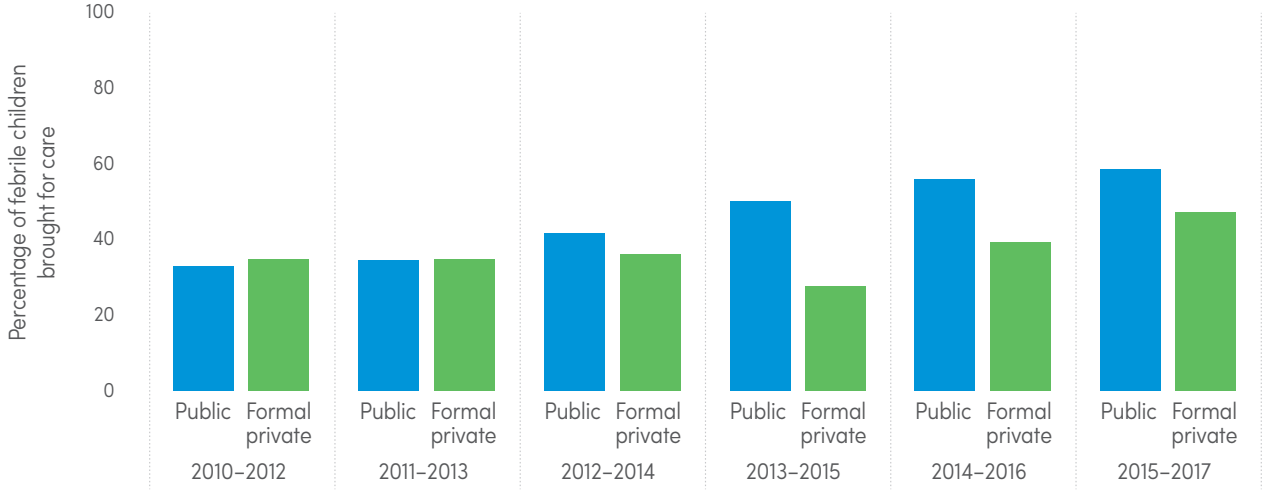
Based on 58 surveys conducted in 30 sub-Saharan African countries between 2010 and 2017, the percentage of febrile children brought for care to a trained provider (including CHWs) who received a diagnostic test in the public sector increased, from a median of 33% (IQR: 18–44%) in 2010–2012, to a median of 59% (IQR: 34–75%) in 2015–2017 (**Fig. 4.6**). This increase was mainly due to an increase in the procurement and use of high-quality and inexpensive RDTs in public health facilities (**Section 3**).

As countries have started scaling up the use of diagnostic testing in the public sector, treatment has increasingly relied on the results of tests, rather than being based on fever without laboratory confirmation.

Based on 56 surveys conducted in 29 sub-Saharan African countries between 2010 and 2017, the percentage of febrile children attending public health facilities that had a blood test before treatment increased from a median of 35% in 2010–2012 (IQR: 27–56%) to 74% in 2015–2017 (IQR: 51–81%). In the formal private sector, this percentage also increased, from 41% in 2010–2012 (IQR: 17–67%) to 63% in 2015–2017 (IQR: 41–83%) (**Fig. 4.7**).

FIG. 4.6.

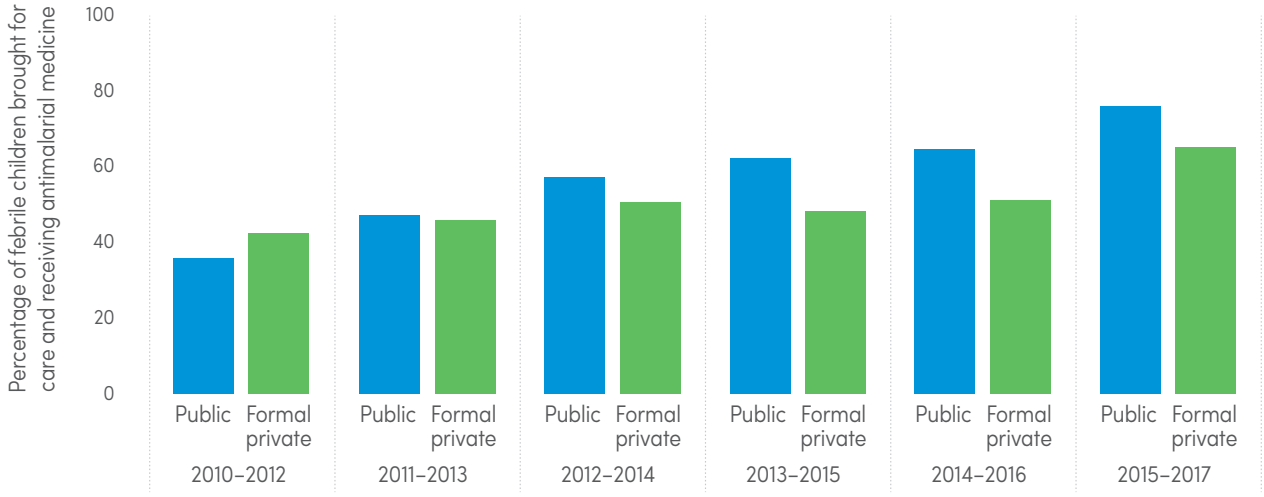
Trend in the median percentage of febrile children brought for care who received a blood test in the public sector and the formal private sector, sub-Saharan Africa, 2010–2017 *Sources: Nationally representative household survey data from DHS and MIS.*



DHS: demographic and health survey; MIS: malaria indicator survey.

FIG. 4.7.

Trend in the median percentage of febrile children brought for care who received a blood test among those who received antimalarial medicine in the public sector and the formal private sector, sub-Saharan Africa, 2010–2017 *Sources: Nationally representative household survey data from DHS and MIS.*



DHS: demographic and health survey; MIS: malaria indicator survey.

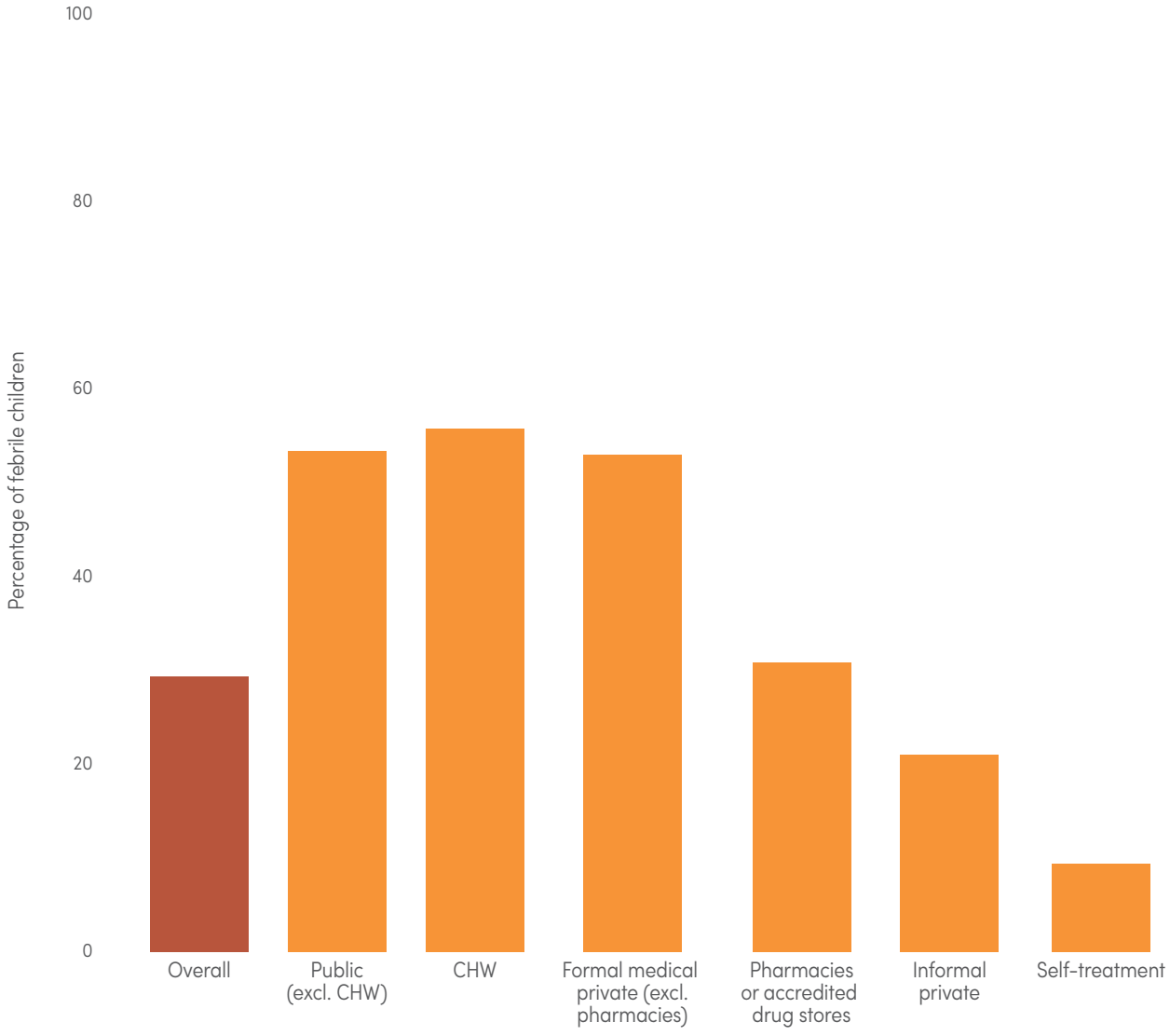
4.4 FIRST-LINE ANTIMALARIAL TREATMENT ACCORDING TO NATIONAL POLICY

Based on 19 household surveys conducted in sub-Saharan Africa in 2015–2017, the median percentage of febrile children who received any antimalarial drug was 29% (IQR: 15–48%). When analysed by source of care, the median percentage of children receiving antimalarial drugs among those who used the public sector was 54% (IQR: 21–64%) compared with 53% in the formal medical private sector (IQR: 19–56%), as shown in **Fig. 4.8**. A median of 56% of febrile children (IQR: 48–77%) received an antimalarial drug when they sought care from a CHW. Overall, 54% (IQR: 25–63%) of febrile children who visited a trained provider received antimalarial drugs. Among febrile children not brought for care, 9% received an antimalarial drug as part of self-treatment at home (IQR: 6–19%).

Although there is considerable variation between countries, a slight increasing trend in the median percentage of febrile children receiving antimalarial drugs is notable, both in the public sector and in the

FIG. 4.8.

Median percentage of febrile children who received antimalarial medicine, overall and in each health sector, sub-Saharan Africa, 2015–2017[a] *Sources: Nationally representative household survey data from DHS and MIS.*



CHW: community health worker; DHS: demographic and health survey; MIS: malaria indicator survey.

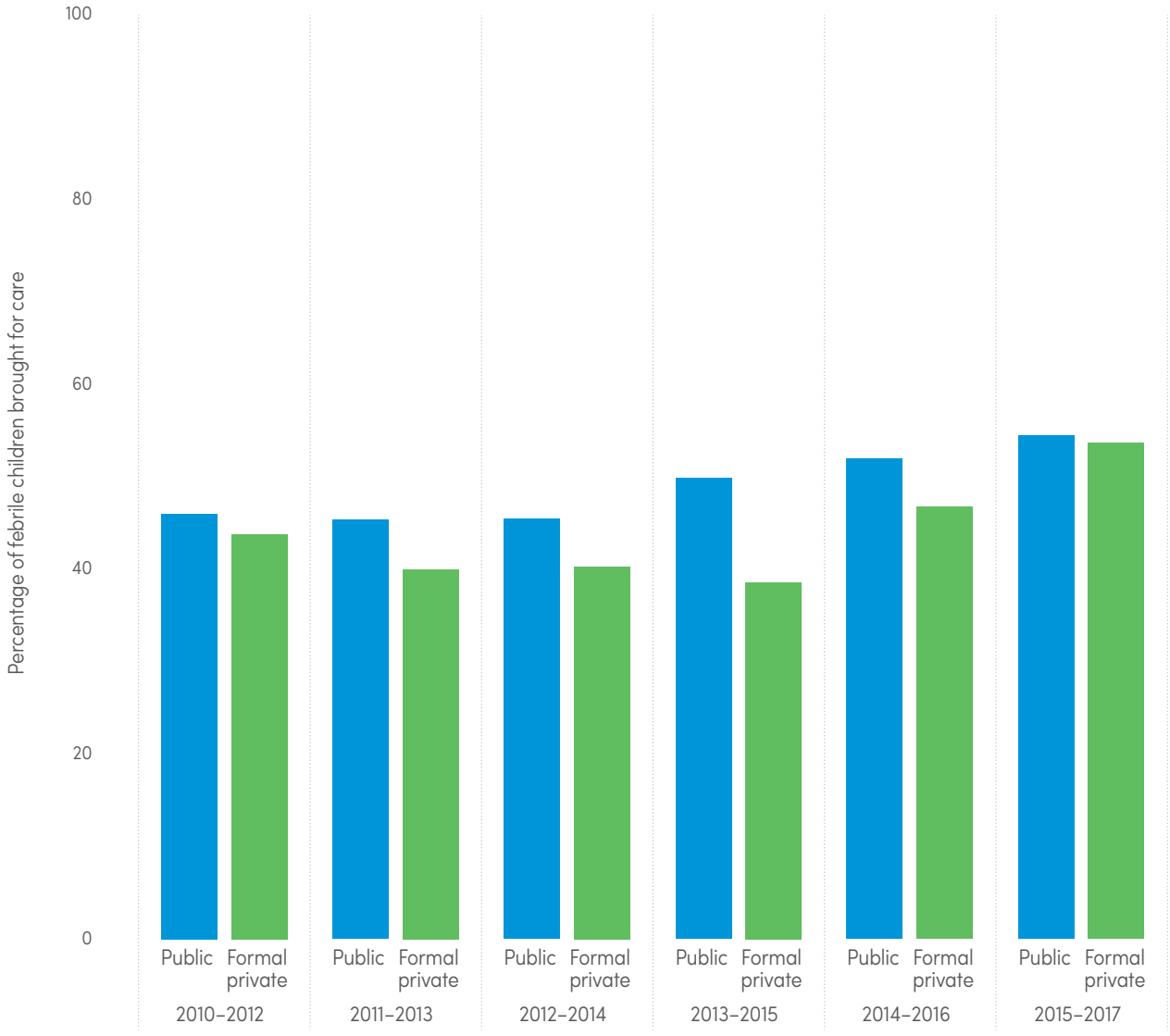
[a] CHW data are based on 10 countries: Burundi, Chad, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Togo and Uganda.

formal private sector. Based on 64 surveys conducted in 32 sub-Saharan African countries between 2010 and 2017, the median percentage of febrile children brought for care in public health facilities who received any antimalarial drug increased slightly, from 45% (IQR: 27–61%) in 2010–2012 to 53% (IQR: 23–66%) in 2015–2017. In the formal private sector, this percentage rose from 43% in 2010–2012 (IQR: 25–56%) to 52% in 2015–2017 (IQR: 16–54%) (**Fig. 4.9**).

Interpretation of levels and trends in malaria treatment coverage among all febrile children is limited because fevers are not always the result of malaria infection, especially in countries with significant percentages of the population living in areas with low malaria transmission. Even if a country achieves a reasonably high level of treatment of fevers with an antimalarial drug, this measure can be misleading because it includes inappropriate treatment of non-malarial fevers.

FIG. 4.9.

Trend in the median percentage of febrile children brought for care who received antimalarial medicine in the public sector and the formal private sector, sub-Saharan Africa, 2010–2017 *Sources: Nationally representative household survey data from DHS and MIS.*



DHS: demographic and health survey; MIS: malaria indicator survey.

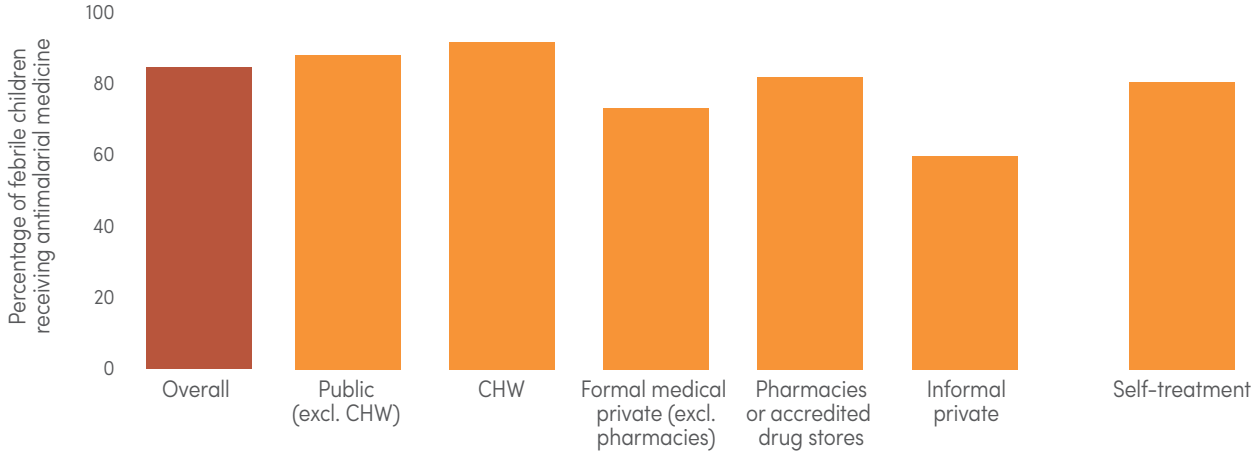
4.5 ACT USE AMONG ALL MALARIA TREATMENTS

Based on 18 surveys, ACT was the most commonly used drug among febrile children who received antimalarial medicine (median: 85%, IQR: 72–91%). Antimalarial treatments were more likely to be ACTs if treatment was sought in the public sector (88% in 2015–2017, IQR: 73–92%) or from a CHW (92% in 2015–2017, IQR: 54–98%) than in the formal medical private sector (74% in 2015–2017, IQR: 47–88%) (**Fig. 4.10**).

Based on 54 nationally representative household surveys conducted in 29 sub-Saharan African countries between 2010 and 2017, the percentage of febrile children brought for care to public health facilities receiving an ACT among those treated with antimalarial medicine increased from a median of 66% in 2010–2012 (IQR: 29–77%) to 89% in 2015–2017 (IQR: 75–93%) (**Fig. 4.11**). The same increasing trend was notable in the formal private sector.

FIG. 4.10.

Median percentage of febrile children who received an ACT among those treated with antimalarial medicine, overall and in each health sector, sub-Saharan Africa, 2015–2017[a] *Sources: Nationally representative household survey data from DHS and MIS.*

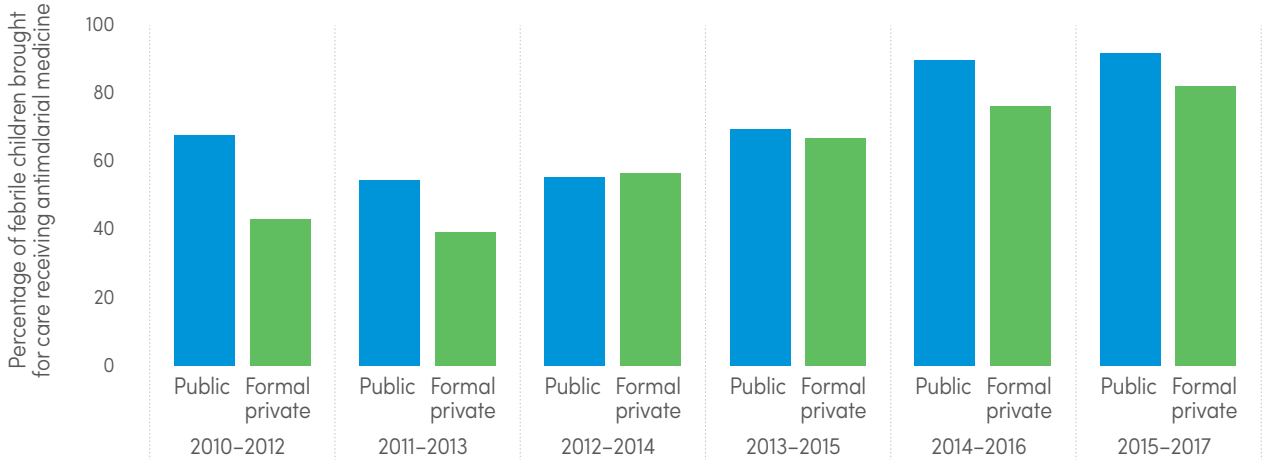


ACT: artemisinin-based combination therapy; CHW: community health worker; DHS: demographic and health survey; MIS: malaria indicator survey.

[a] CHW data are based on 10 countries: Burundi, Chad, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Togo and Uganda.

FIG. 4.11.

Median percentage of febrile children brought for care who received an ACT among those treated with antimalarial medicine in the public sector and the formal private sector, sub-Saharan Africa, 2010–2017
Sources: Nationally representative household survey data from DHS and MIS.



ACT: artemisinin-based combination therapy; DHS: demographic and health survey; MIS: malaria indicator survey.

4.6 INTEGRATED COMMUNITY CASE MANAGEMENT

A considerable percentage of the population, particularly those living in rural remote areas, do not have access to prompt diagnosis and effective treatment of malaria. Integrated community case management (iCCM) is a proven strategy to deliver effective and simple life-saving interventions for major killers of children (i.e. malaria, pneumonia and diarrhoea) to communities that are hard to reach and underserved. iCCM involves using trained CHWs, who may or may not be paid, to deliver health services to these communities. The introduction and increased availability of reliable malaria RDTs and ACTs, together with training of local CHWs, has made it possible to improve access to malaria case management in remote communities (*17*).

Globally, 49 countries have reported implementing iCCM at different scales; 26 of these countries were in the WHO African Region (*1*). From a survey carried out in 2017, among 21 high malaria burden countries in the WHO African Region, 20 had iCCM policies in place, with 12 countries having national level implementation (**Table 4.1**). Nigeria and the Democratic Republic of the Congo, which together have nearly 40% of the global burden of malaria, have been unable to deploy CHWs in most of the hard-to-reach areas of the countries.

TABLE 4.1.

Status of iCCM policy and implementation status

Country	iCCM policy	Child health policy or plan	National malaria strategy	Implementation coverage		
				National[a]	Selected subnational areas	Limited
Angola	○	○	○			
Burkina Faso	●	●	●		●	
Burundi	●	●	●	●		
Cameroon	●	●	●	●		
Chad	●	●	●			●
Democratic Republic of the Congo	●	●	●		●	
Eritrea	●	●	●	●		
Ethiopia	●	●	●	●		
Ghana	●	●	●	●		
Kenya	●	●	●		●	
Madagascar	●	●	●	●		
Malawi	●	●	●	●		
Mali	●	●	●		●	
Mozambique	●	●	●	●		
Niger	●	●	●		●	
Nigeria	●	●	●		●	
Rwanda	●	●	●	●		
Senegal	●	●	●	●		
Uganda	●	●	●	●		
United Republic of Tanzania	○	○	○			
Zambia	●	●	●	●		

iCCM: integrated community case management; ● = Yes ○ = No

[a] More than 50% of the districts/regions covered. However, this does not mean that all hard-to-reach areas within those districts have CHWs providing iCCM services.

5

MALARIA SURVEILLANCE SYSTEMS

Accelerating the elimination of malaria, and eventually interrupting its transmission, requires data and information from surveillance systems to inform decisions on the optimal deployment and impact of interventions. Effective surveillance of malaria cases and deaths, and of key entomological and efficacy indicators, is essential for identifying which areas or population groups are at risk of malaria or are vulnerable to reduced efficacy of interventions. In turn, this allows for effective programmatic planning, including response to epidemics and intensification of control when necessary.

To systematically track national progress towards achieving Pillar 3 of the GTS (*2*), which is to transform malaria surveillance into a core intervention, WHO recommends the regular monitoring and evaluation of surveillance systems (*18*). This involves assessment of the data in terms of structure, core and support functions, and quality across both passive and active case detection systems. This information is critical to the continuous improvement of surveillance systems. It is also useful for better understanding of the data captured through these systems; in turn, this makes it possible to make well-informed decisions about programmes. A key component of these assessments is a review of the quality of data, including case detection, recording and reporting.

Cases and deaths detected through the surveillance system reported by countries are often from the public health sector, predominantly from passive case detection systems. 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 percentage of patients who do not seek care remain undocumented by the surveillance system. Hence, a strong surveillance system requires high levels of access to care and case detection, and complete reporting by all health sectors.

This section presents testing and reporting rates for malaria, and the percentage of treatment seeking for fever in children aged under 5 years in public health facilities, as reported in household surveys (**Fig. 5.1**). It also provides a summary of initiatives to work with NMPs and partners to develop surveillance standards and tools to support the strengthening of national systems (**Section 5.2**).

5.1 STATUS OF NATIONAL SURVEILLANCE SYSTEMS

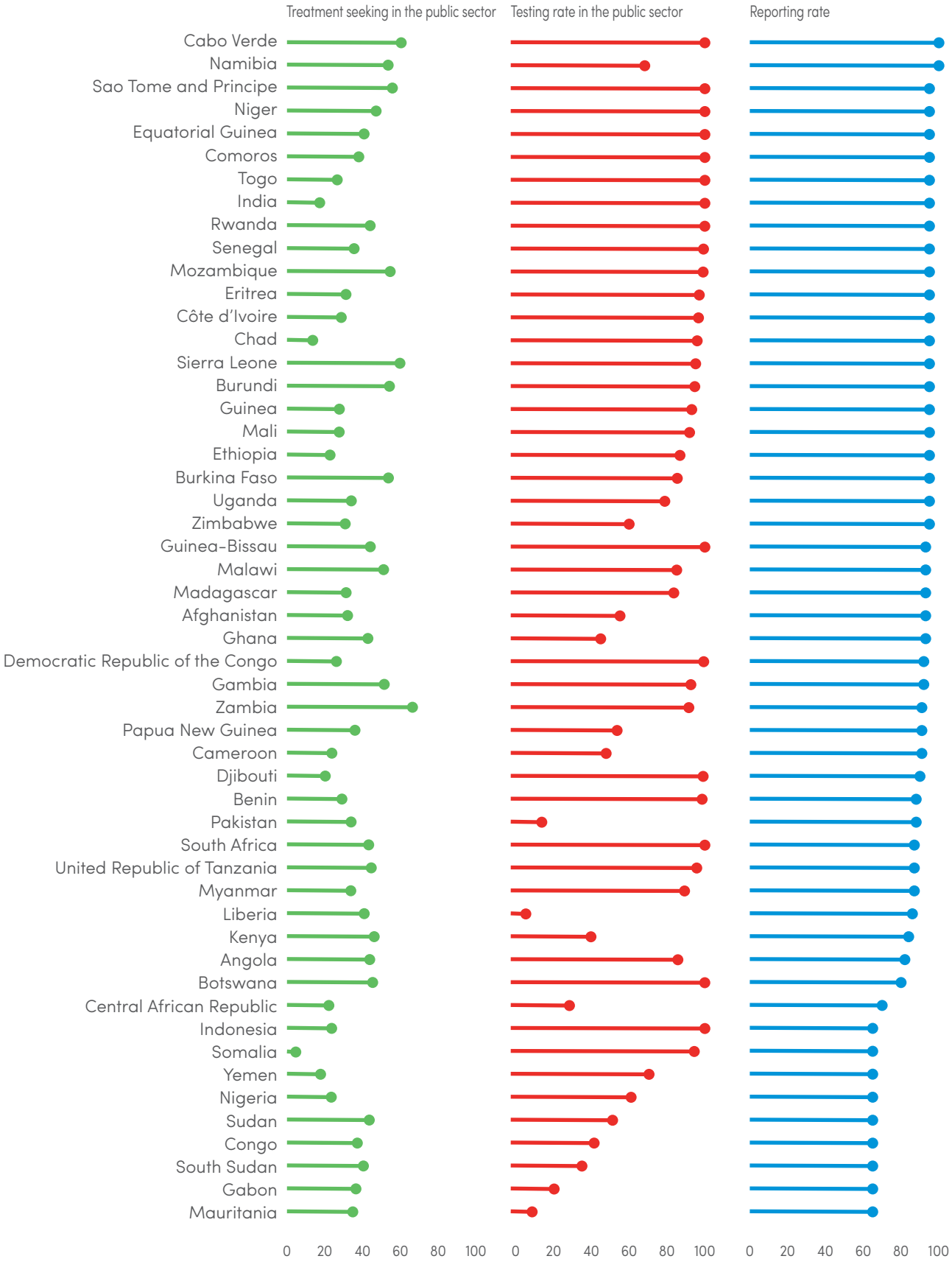
In previous reports, the reported cases from the surveillance system were used as the numerator and the overall estimated cases as the denominator, to compute the percentage of cases captured by the public sector surveillance system in each country. However, for most of the high-burden countries in Africa, which account for more than 80% of cases, the process of estimating the burden of malaria cases relies on a method that converts parasite rate to case incidence (**Section 6**), and is unrelated to the data reported through the surveillance system.

In the current report, the testing rate (i.e. the percentage of suspected malaria cases who are diagnosed), the reporting rate (i.e. the percentage of health facilities that provide the required number of reports over a 1-year period) and the treatment seeking rate for fever (i.e. the percentage of children aged under 5 years for whom treatment is sought) in the public sector (**Fig. 5.1**) are presented as broad measures of the status of surveillance systems. Lower treatment seeking rates, testing rates or reporting rates suggest a surveillance system that has a low likelihood of capturing all malaria cases in a country.

Overall, reporting rates were 60% or more in 52 moderate to high burden countries (**Fig. 5.1**). However, these reporting rates are likely to be an overestimate in

FIG. 5.1.

Public health sector testing rates and reporting rates in 2017, as well as treatment seeking for fever in children aged under 5 years, as reported in most recent household surveys[a] Countries are sorted by (highest to lowest) reporting rates, testing rates, then treatment seeking rates. *Sources: NMP reports and household surveys.*



NMP: national malaria programme.

[a] Data on treatment seeking were obtained from household surveys undertaken between 2015 and 2017 in 31 countries.

several countries, because most do not have a reliable process of measuring this indicator; in particular, because many do not have an up-to-date master list of health facilities. In addition, some countries are likely to report the administrative units that have submitted data rather than the number of health facilities that have reported. These problems are further compounded by highly variable testing and treatment seeking rates. Even in countries that have reporting rates of 100% in the public sector, some have testing rates as low as 70%, and public health sector treatment seeking rates of below 60%. On the extreme end, many of the countries with lower reporting rates also have some of the lowest confirmation and treatment seeking rates.

Where routine data are used to estimate the burden of malaria cases in a country (**Section 6**), the testing and reporting rates, and the source of treatment are all important in the adjustment of data, and any uncertainties in these indicators affect the overall national burden estimate. Consequently, WHO is working across the RBM Partnership to develop national surveillance assessment tools to better define testing and reporting rates; at the same time, WHO is developing improved tools and standards (**Section 5.2**).

5.2 STRENGTHENING NATIONAL SURVEILLANCE SYSTEMS

Despite the relatively weak status of the surveillance systems in malaria endemic countries, there have been significant improvements since 2010. The increasing use of malaria RDTs for diagnosis has enhanced the reliability of data reported by countries. Global and national support to improve the use of electronic systems for data recording, reporting and analysis of health data has increased in recent years. Over the past few years, the Global Fund has allowed countries to include improved surveillance, monitoring and evaluation systems in their requests for funding (*19*). The Global Fund has also provided further funding to support surveillance systems through its catalytic funding mechanisms (*20*). In addition, the United States President's Malaria Initiative has included *improving countries' capacity to collect and use information* as one of its five core areas of strategic focus (*21*), and it has since scaled up funding support in this area.

Over the past 2 years, WHO has embarked on an intensified process of improving national surveillance systems and the use of data for programmatic decision-making. In March 2018, the WHO *Malaria surveillance, monitoring and evaluation: a reference manual* (*18*) was released, to align with the concept of transmission continuum in the GTS (*2*) and the elimination framework (*22*), and to bring together epidemiological, entomological and efficacy surveillance in one reference guideline. To support the national adaptation of the surveillance guidelines, WHO has developed surveillance modules and data analysis dashboards, using District Health Information Software 2 (DHIS2),[1] for aggregated reporting in areas of elimination and those still focusing on reducing morbidity and mortality, and entomology.[2] These modules were developed as part of broader collaborative efforts to support national surveillance systems across WHO departments dealing with health information systems; immunization; maternal, newborn and child health; tuberculosis; and HIV/AIDS. In addition, WHO is working with several partners, with funding support from the Bill & Melinda Gates Foundation, to develop digital solutions for malaria elimination surveillance. These tools allow for the integration of index cases at point of care to the household and focus of residence; the aim is to improve the efficiency and utility of case and foci investigation processes. These efforts tap into the increasing momentum across several countries to use DHIS2 to support national health management and information systems.

[1] https://www.dhis2.org/inaction
[2] http://www.who.int/healthinfo/tools_data_analysis_routine_facility/en

6

REGIONAL AND GLOBAL TRENDS IN BURDEN OF MALARIA

Assessing progress in reducing the burden of malaria, to track the targets and milestones of the GTS (*2*), is a key mandate of the WHO Global Malaria Programme (GMP). This section of the report reviews the total number of cases and deaths estimated to have occurred between 2010 and 2017. Estimation of the burden of malaria cases and deaths relies on several methods, depending on the quality and completeness of the national surveillance systems and the availability of data over time (**Sections 6.1–6.3** and **Annex 1**).

6.1 ESTIMATED NUMBER OF MALARIA CASES BY WHO REGION, 2000–2017

An estimated 219 million cases of malaria occurred worldwide in 2017 (95% confidence interval [CI]: 203–262 million) compared with 239 million cases in 2010 (95% CI: 219–285 million) and 217 million cases in 2016 (95% CI: 200–259 million) (**Table 6.1**). Although there were 20 million fewer cases in 2017 than in 2010 globally, the period 2015 to 2017 registered only a minimal if slightly upward change in trend, despite a dip in cases in 2015, suggesting that progress had generally stalled.

The WHO African Region still bears the largest burden of malaria morbidity, with 200 million cases (92%) in 2017, followed by the WHO South-East Asia Region (5%) and the WHO Eastern Mediterranean Region (2%) (**Table 6.2**, **Fig. 6.1**). Globally, 3.4% of all estimated cases were caused by *P. vivax*, with 56% of the *vivax* cases being in the WHO South-East Asia Region (**Table 6.2**). *P. vivax* is the predominant parasite in the WHO Region of the Americas (74%), and is responsible for 37% of cases in the WHO South-East Asia Region and 31% in the WHO Eastern Mediterranean Region (**Table 6.2**).

TABLE 6.1.

Estimated malaria cases, 2010–2017 Estimated cases are shown with 95% upper and lower CI. *Source: WHO estimates.*

	Number of cases (000)							
	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Lower 95% CI	218 600	210 500	206 700	200 500	199 600	198 700	200 400	202 800
Estimated total	**238 800**	**229 100**	**226 400**	**221 000**	**217 100**	**214 200**	**216 600**	**219 000**
Upper 95% CI	285 400	273 200	271 600	266 200	259 300	257 200	259 000	262 000
Estimated *P. vivax*								
Lower 95% CI	11 440	10 390	9 190	7 040	6 040	5 530	5 960	5 720
Estimated total	**16 440**	**14 940**	**13 300**	**10 230**	**8 720**	**7 950**	**8 250**	**7 510**
Upper 95% CI	24 560	23 970	22 050	17 240	12 730	11 410	11 300	9 900

CI: confidence interval; *P. vivax*: *Plasmodium vivax*; WHO: World Health Organization.

TABLE 6.2.

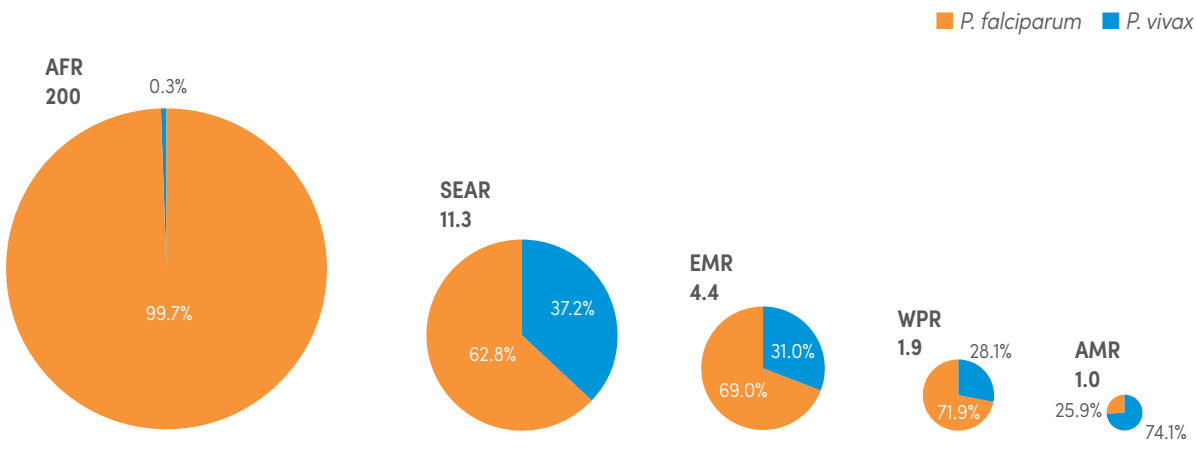
Estimated malaria cases by WHO region, 2017 Estimated cases are shown with 95% upper and lower CI. *Source: WHO estimates.*

	Number of cases (000)					
	African	**Americas**	**Eastern Mediterranean**	**South-East Asia**	**Western Pacific**	**World**
Lower 95% CI	184 500	880	3 630	8 560	1 395	202 800
Estimated total	**200 500**	**976**	**4 410**	**11 290**	**1 857**	**219 000**
Upper 95% CI	243 600	1 128	5 560	14 840	2 399	262 000
Estimated *P. vivax*						
Lower 95% CI	19	648	1 162	2 881	330	5 720
Estimated total	**701**	**723**	**1 366**	**4 200**	**523**	**7 510**
Upper 95% CI	2 197	843	1 773	5 900	774	9 900
Proportion of *P. vivax* cases	0.3%	74.1%	31.0%	37.2%	28.1%	3.4%

CI: confidence interval; *P. vivax*: *Plasmodium vivax*; WHO: World Health Organization.

FIG. 6.1.

Estimated malaria cases (millions) by WHO region, 2017 The area of the circles is shown as a percentage of the estimated number of cases in each region. *Source: WHO estimates.*



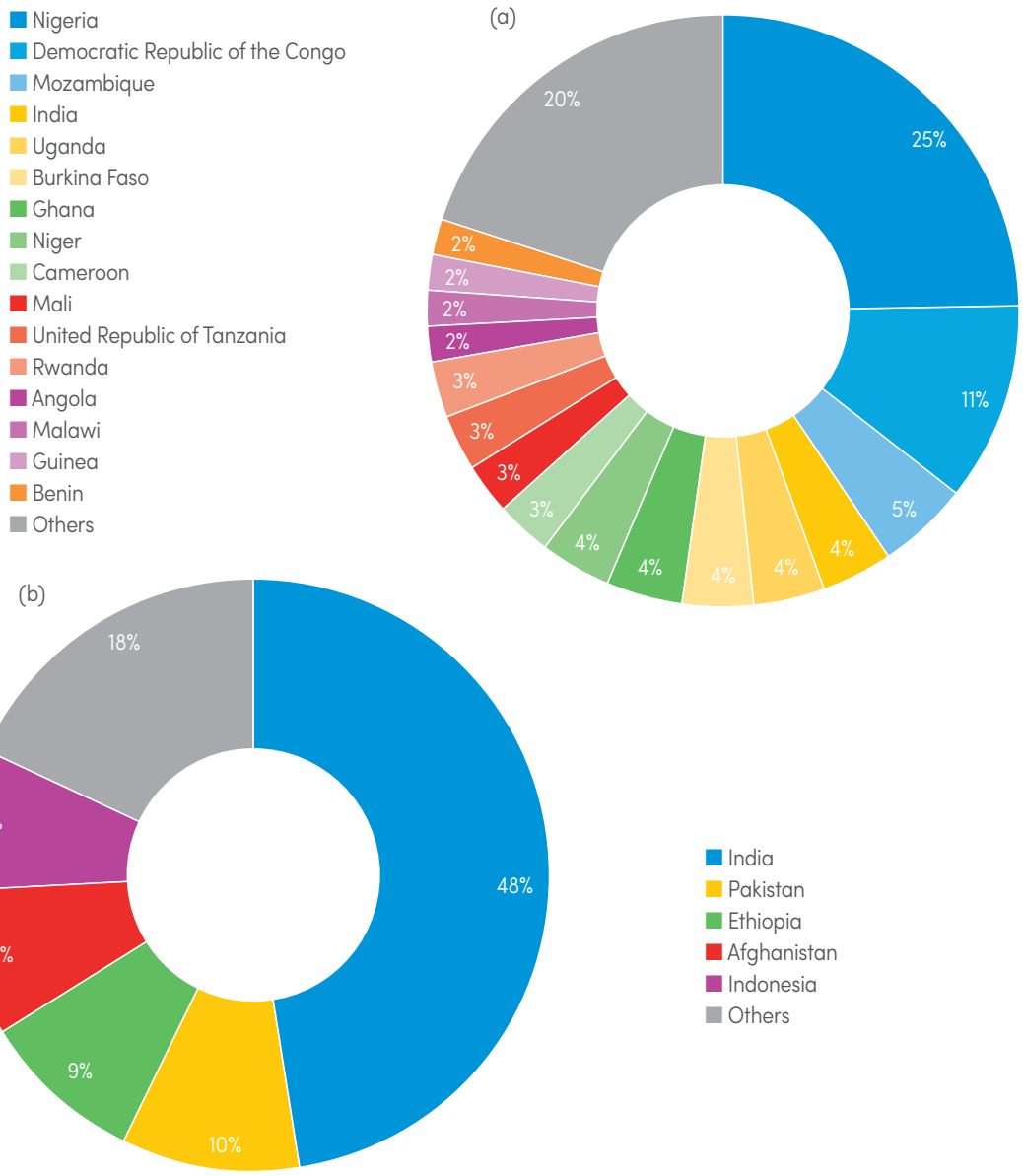
AFR: WHO African Region; AMR: WHO Region of the Americas; EMR: WHO Eastern Mediterranean Region; *P. falciparum*: *Plasmodium falciparum*; *P. vivax*: *Plasmodium vivax*; SEAR: WHO South-East Asia Region; WHO: World Health Organization; WPR: WHO Western Pacific Region.

Almost 80% of all malaria cases globally were in 15 African countries and in India (**Fig. 6.2a**). Nearly 50% of all cases globally were accounted for by Nigeria (25%), the Democratic Republic of the Congo (11%), Mozambique (5%), India (4%) and Uganda (4%). About 82% of estimated vivax malaria cases in 2017 occurred in just five countries (India, Pakistan, Ethiopia, Afghanistan and Indonesia) (**Fig. 6.2b**).

Of the 87 countries that had an indigenous malaria case in 2017, a decrease in malaria cases of more than 20% compared with 2016 was reported in 20 countries, and an increase of a similar magnitude was reported in 20 countries (**Fig. 6.3**). Most of these changes occurred in countries with low to very low malaria burden, and in several countries the absolute difference was small.

FIG. 6.2.

Estimated country share of (a) total malaria cases and (b) vivax malaria cases, 2017 *Source: WHO estimates.*

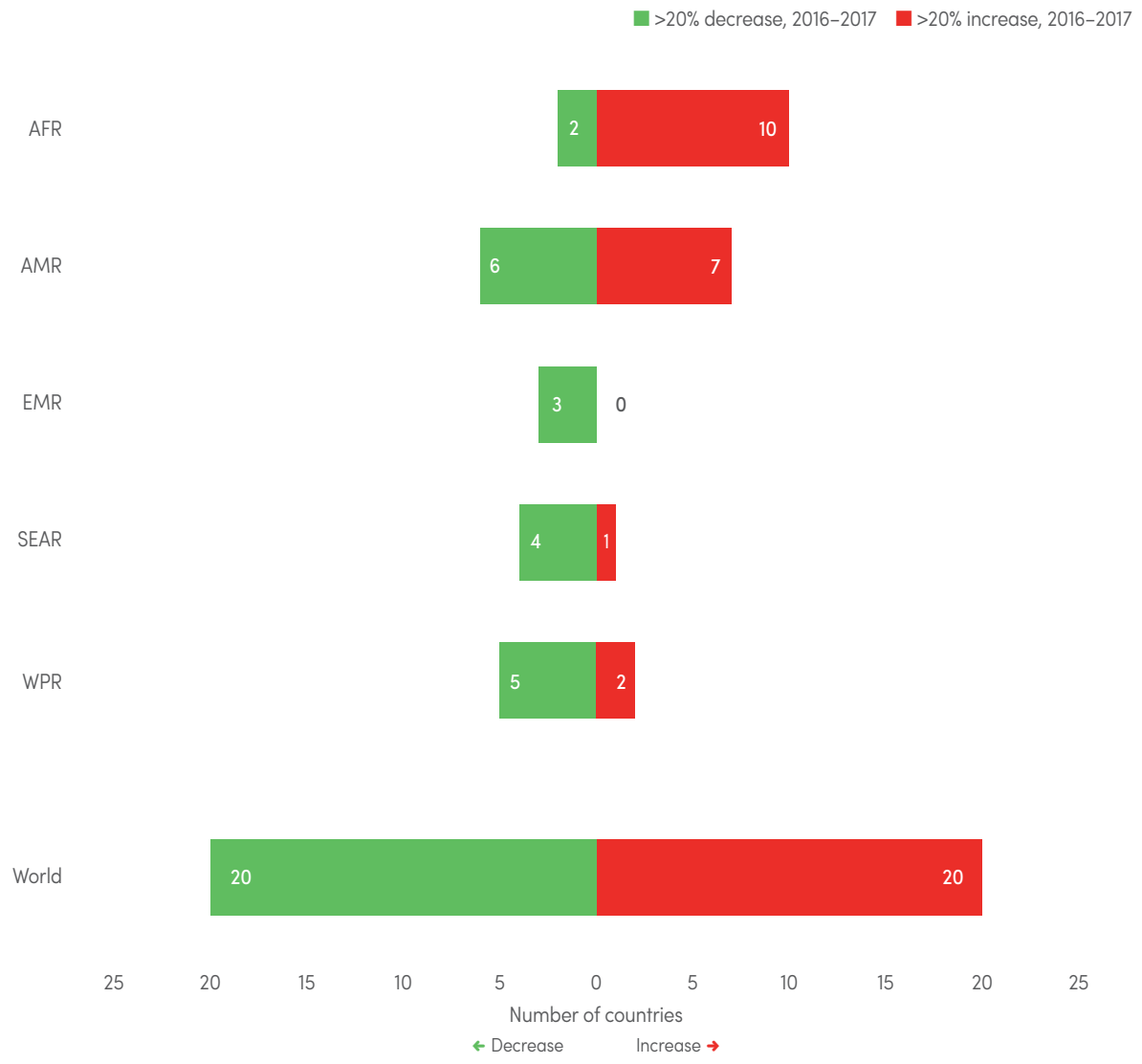


WHO: World Health Organization.

Countries reporting a decrease of more than 20% were as follows: WHO African Region (Gambia and Mauritania); WHO Region of the Americas (Colombia, Dominican Republic, El Salvador, Guatemala, Honduras and Suriname); WHO Eastern Mediterranean Region (Iran [Islamic Republic of], Pakistan and Saudi Arabia); WHO South-East Asia Region (Bhutan, India, Myanmar and Timor-Leste); and WHO Western Pacific Region (China, Lao People's Democratic Republic, Malaysia, Republic of Korea and Vanuatu). Countries and areas reporting an increase of more than 20% were as follows: WHO African Region (Botswana, Cabo Verde, Comoros, Eritrea, Eswatini, Madagascar, Namibia, Senegal, South Africa and Zimbabwe); WHO Region of the Americas (Belize, Brazil, Costa Rica, French Guiana, Mexico, Nicaragua and Venezuela [Bolivarian Republic of]); WHO South-East Asia Region (Nepal); and WHO Western Pacific Region (Cambodia and Solomon Islands). In the WHO Region of the Americas, Venezuela (Bolivarian Republic of) accounted for 84% of the increase in cases.

FIG. 6.3.

Number of countries and areas where a reduction (green) or an increase (red) of more than 20% in malaria cases has occurred between 2016 and 2017, by WHO region *Sources: NMP reports and WHO estimates.*

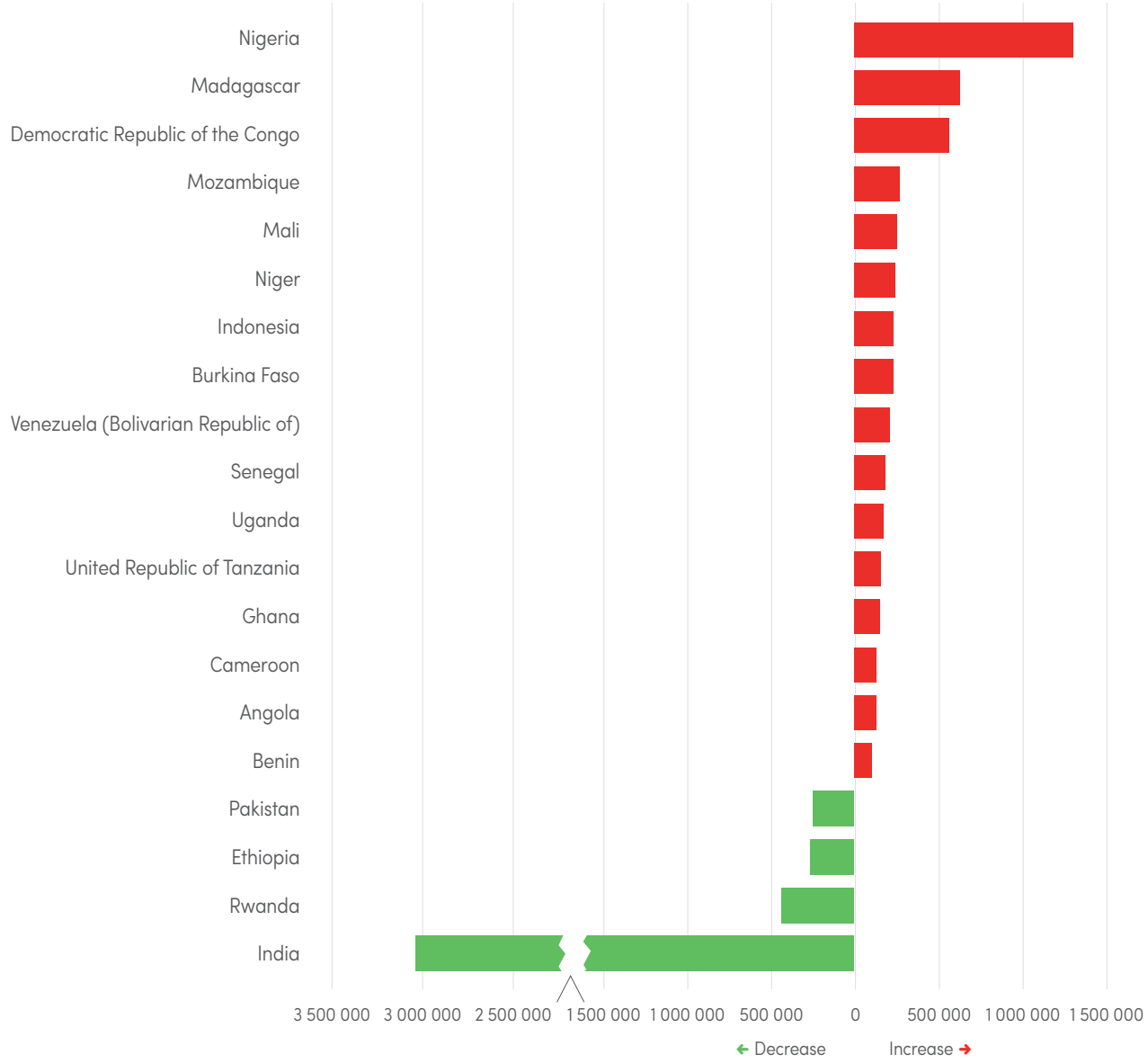


AFR: WHO African Region; AMR: WHO Region of the Americas; EMR: WHO Eastern Mediterranean Region; NMP: national malaria programme; SEAR: WHO South-East Asia Region; WHO: World Health Organization; WPR: WHO Western Pacific Region.

Among the moderate to high burden countries with overall case numbers exceeding 300 000 indigenous cases in 2017, a change of greater than 100 000 cases between 2016 and 2017 occurred in 21 countries (**Fig. 6.4**). Of these, Nigeria, Madagascar and the Democratic Republic of the Congo had the highest estimated increases, all being greater than half a million cases. In contrast, India reported more than 3 million fewer cases (24%) in the same period. For the first time since 2011, Rwanda reported a reduction in cases, with slightly more than 430 000 fewer cases in 2017 compared with 2016, although cases in 2017 still represent a more than 10-fold increase compared with 2011.

FIG. 6.4.

Number of countries in which total malaria cases exceeded 300 000 cases in 2017, and a reduction (green) or an increase (red) of more than 100 000 in malaria cases occurred between 2016 and 2017, by WHO region *Sources: NMP reports and WHO estimates.*

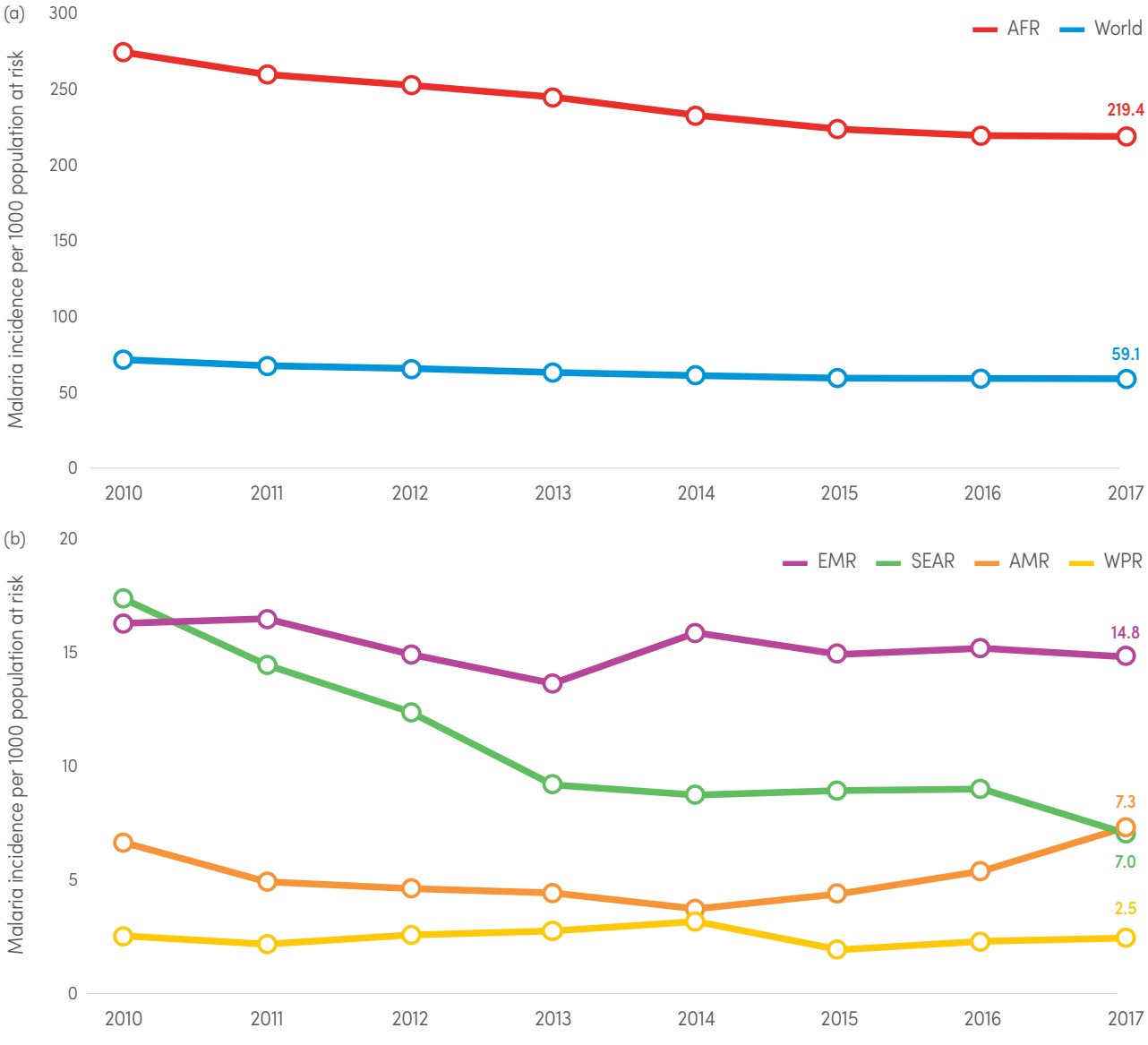


6.2 MALARIA CASE INCIDENCE RATE

The incidence rate (i.e. the number of cases per 1000 population) of malaria globally reduced between 2010 and 2017; it fell from 72 in 2010 to 59 in 2017 (**Fig. 6.5a**). However, from 2014 to 2017, the rate of change slowed dramatically, reducing from 61 in 2014 to 59 in 2015, and remaining at this level in 2016 and 2017. Except in the WHO South-East Asia Region, change in incidence rate has either remained flat or, in the case with the WHO Region of the Americas, increased; this increase was largely due to increases in Brazil, Nicaragua and Venezuela (Bolivarian Republic of) (**Fig. 6.5b**). Within the WHO African Region, incidence rate changed from 278 in 2010, to 219 in both 2016 and 2017.

FIG. 6.5.

Trends in malaria case incidence rate (cases per 1000 population at risk), globally and by WHO region, 2010–2017 The WHO European Region has reported zero indigenous cases since 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; WHO: World Health Organization; WPR: WHO Western Pacific Region.

6.3 ESTIMATED NUMBER OF MALARIA DEATHS AND MORTALITY RATE BY WHO REGION, 2010–2017

Between 2010 and 2017, estimated deaths due to malaria globally declined from 607 000 to 435 000 cases (**Table 6.3**). Estimates of malaria mortality rate (deaths per 100 000 population at risk) show that, compared with 2010, all regions had recorded reductions by 2017, except the WHO Region of the Americas, mainly due to a rapid increase in malaria in Venezuela (Bolivarian Republic of) (**Fig. 6.6** and **Fig. 6.7**). Globally, 266 000 (61%) malaria deaths were estimated to be in children aged under 5 years (**Table 6.3**).

Although the WHO African Region accounted for 93% of all deaths in 2017, it also accounted for 88% of the 172 000 fewer cases reported in 2017 relative to 2010.

TABLE 6.3.

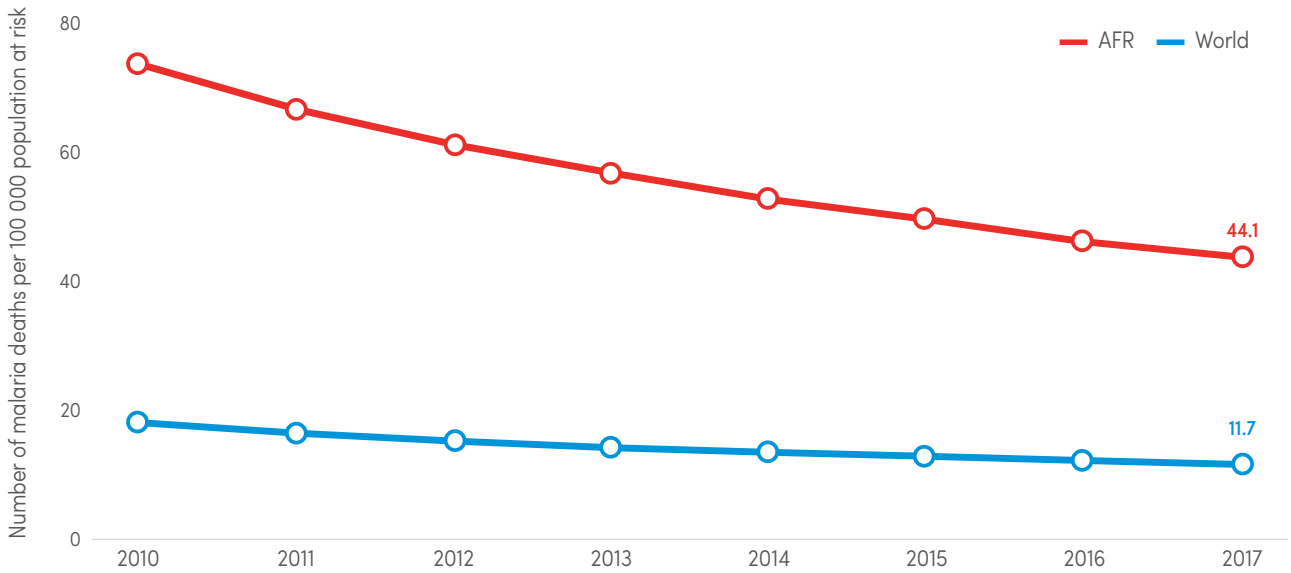
Estimated number of malaria deaths by WHO region, 2010–2017 *Source: WHO estimates.*

	Number of deaths							
	2010	2011	2012	2013	2014	2015	2016	2017
African	555 000	517 000	489 000	467 000	446 000	432 000	413 000	403 000
Americas	480	450	400	400	300	320	460	630
Eastern Mediterranean	8 070	7 280	7 340	6 750	8 520	8 660	8 160	8 300
European	0	0	0	0	0	0	0	0
South-East Asia	39 800	32 800	28 400	21 800	24 100	25 200	25 600	19 700
Western Pacific	3 770	3 340	3 850	4 600	4 420	2 860	3 510	3 620
World	**607 000**	**561 000**	**529 000**	**500 000**	**483 000**	**469 000**	**451 000**	**435 000**
World (children aged under 5 years)	**444 600**	**405 000**	**371 000**	**344 000**	**322 000**	**302 000**	**283 000**	**266 000**

WHO: World Health Organization.

FIG. 6.6.

Trends in malaria mortality rate (deaths per 100 000 population at risk), globally and in the WHO African Region, 2010–2017 *Source: WHO estimates.*



AFR: WHO African Region; WHO: World Health Organization.

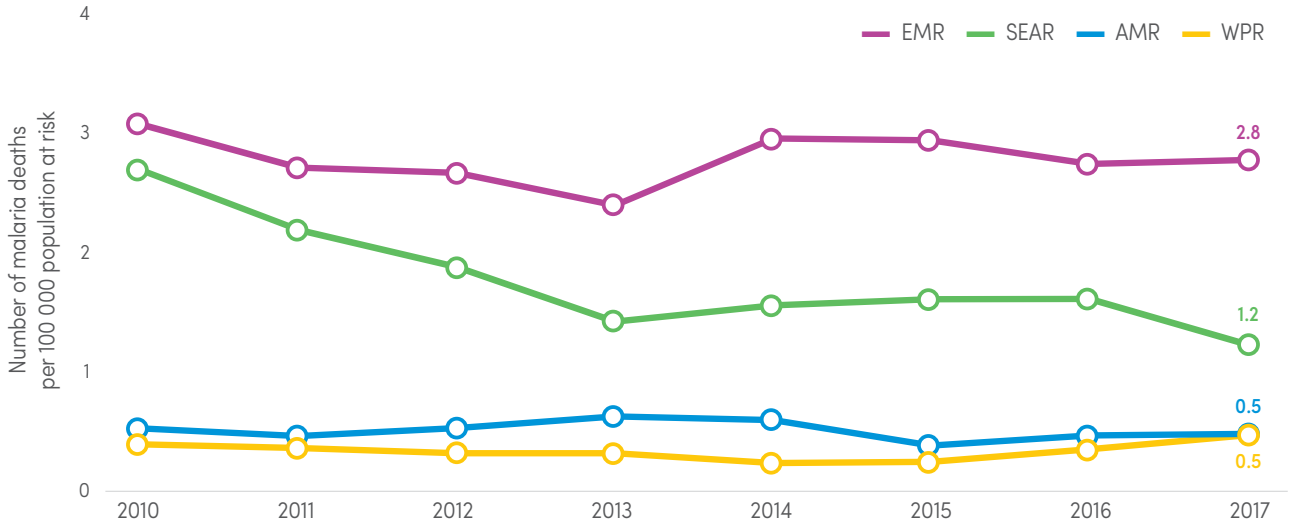
Despite these gains, the rate of reduction of malaria mortality has also slowed since 2015, somewhat similar to the estimated trends in malaria case incidence (**Fig. 6.5**).

Caution should generally be exercised when comparing the estimated trends in case incidence rates to the trend in mortality rates. This is because the two estimates are derived by different processes that are not directly related. Trends in malaria mortality are largely a function of trends in all cause under-5 mortality and may not be sensitive to year on year changes (**Section 6.5**).

Almost 80% of all malaria deaths in 2017 occurred in 17 countries in the WHO African Region and India, and about 53% of all malaria deaths globally were accounted for by Nigeria, Democratic Republic of the Congo, Burkina Faso, United Republic of Tanzania, Sierra Leone, Niger and India (**Fig. 6.8**).

FIG. 6.7.

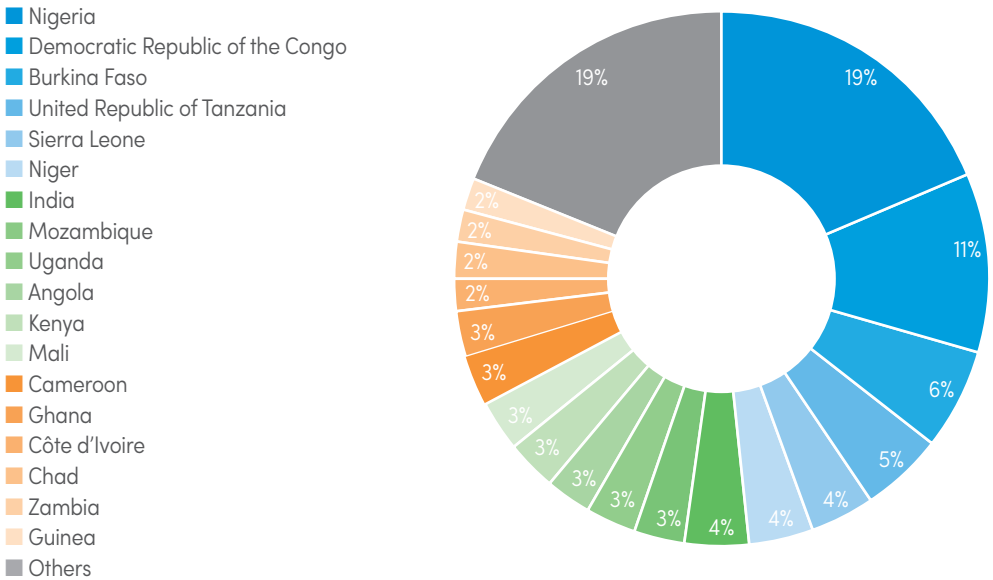
Trends in malaria mortality rate (deaths per 100 000 population at risk) in select WHO regions, 2010–2017 *Source: WHO estimates*.



AMR: WHO Region of the Americas; EMR: WHO Eastern Mediterranean Region; SEAR: WHO South-East Asia Region; WHO: World Health Organization; WPR: WHO Western Pacific Region.

FIG. 6.8.

Percentage of estimated malaria deaths attributable to the 18 countries with nearly 80% of global malaria deaths in 2017 *Source: WHO estimates.*



WHO: World Health Organization.

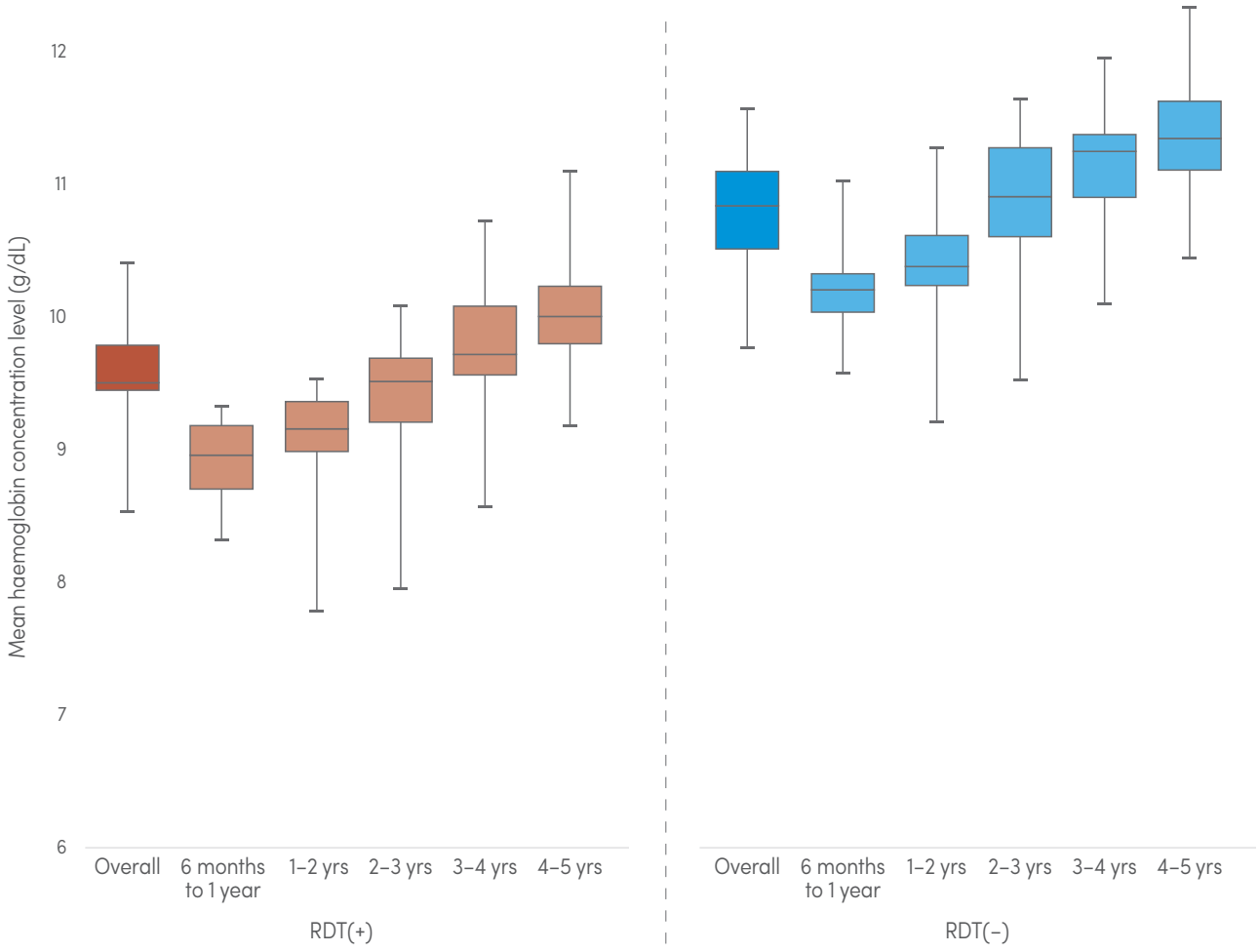
6.4 PREVALENCE OF MALARIA-RELATED ANAEMIA

Anaemia is characterized by a decrease in the number of red blood cells in the blood (or haemoglobin [Hb] concentration) to a level that impairs the normal physiological capacity of the blood to transport oxygen to cells around the body. WHO defines mild anaemia as a Hb of between 10 g/dL and 10.9 g/dL, moderate anaemia as between 7 g/dL and 9.9 g/dL and severe anaemia as below 7 g/dL. Deficiency in iron is thought to be the most common cause of anaemia. Additional important causes of anaemia include infections, other nutritional deficiencies (e.g. in folate, and vitamins B12, A and C), genetic conditions and haemoglobinopathies (e.g. sickle cell disease and thalassaemia) and chronic kidney disease (*23*). Anaemia is highly prevalent globally, and is particularly prevalent in sub-Saharan Africa. Malaria infections cause anaemia through multiple mechanisms (direct destruction of red blood cells, clearance of infected and uninfected red cells by the spleen, and impaired red cell production by bone marrow), and individuals who are anaemic are at a greater risk of mortality, including from malaria. Single or repeated episodes of malaria may result in life-threatening anaemia, metabolic acidosis (*24*) and death. Severe anaemia has been estimated to account for more than half of all childhood deaths from malaria in Africa (*25*). In communities where blood transfusions are not available, anaemia deaths are likely to be a particular problem (*26*).

Pregnant women and children aged under 5 years are most vulnerable to anaemia. In sub-Saharan Africa, iron deficiency and malaria infection often coexist, but

FIG. 6.9.

Hb concentration (g/dL) in children aged under 5 years in sub-Saharan Africa, 2015–2017, by age and malaria infection status *Source: Household surveys.*



Hb: haemoglobin; RDT: rapid diagnostic test.

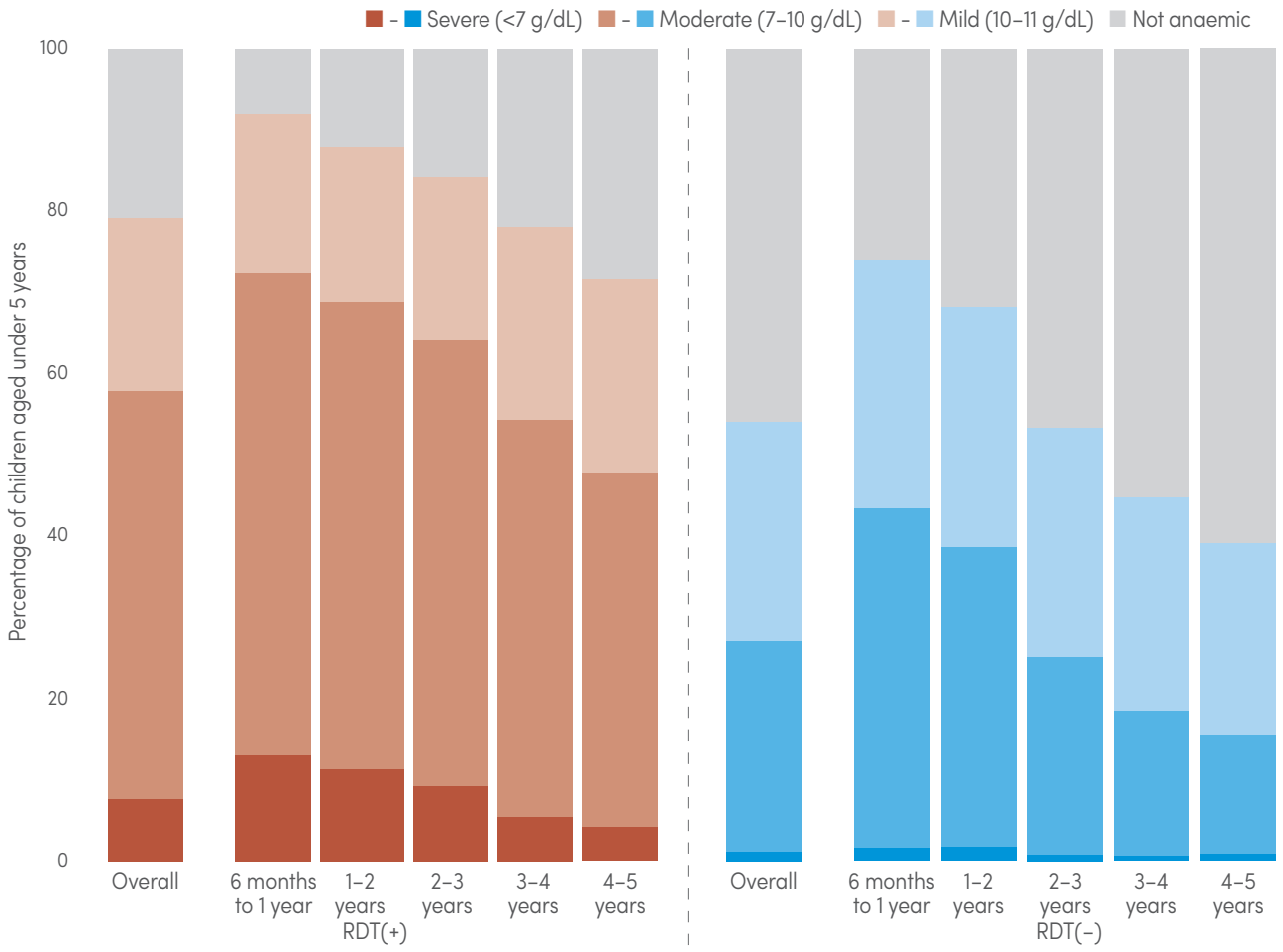
the relationship between them is complex. Even measuring iron status in someone with current or recent past *P. falciparum* malaria infection is complicated by the inflammatory response to malaria infection (*27*).

Anaemia was once a key indicator of progress with malaria control, and was used as part of the evaluation of interventions. Recent years have seen a decline in awareness of the burden of malaria-related anaemia.

Despite its importance as a direct and indirect consequence of malaria infection and disease, the prevalence of anaemia among populations at risk of malaria has not been reported consistently as a metric of malaria transmission and burden. Data from household surveys implemented in 16 high malaria burden countries between 2015 and 2017 were analyzed. The Hb concentration in children aged under 5 years was examined in relation to malaria infection, the results showed a median Hb concentration of 9.4 g/dL among children who were positive for malaria (by RDT) and 10.7 g/dL among those who were negative. Hb concentration increased with age, regardless of malaria infection status, but median concentration was lower in each age group among those who were positive for malaria compared with those who were negative for malaria (**Fig. 6.9**). Based on WHO definitions, the prevalence of any anaemia was 61%, mild anaemia 25%, moderate anaemia 33% and severe anaemia 3%. Of children who tested positive for malaria, the prevalence of any, mild, moderate and severe anaemia was 79%, 21%, 50% and 8%, respectively (**Fig. 6.10**). According to WHO recommendations, up to 13% of these children would qualify for blood transfusion and would probably be at an increased risk of malaria mortality.

FIG. 6.10.

Prevalence of severe anaemia meeting the threshold requiring blood transfusion according to WHO (<7 g/dL) in children aged under 5 years in sub-Saharan Africa, 2015–2017, by age and malaria infection status *Source: Household surveys.*



RDT: rapid diagnostic test; WHO: World Health Organization.

6.5 ESTIMATING MALARIA CASES AND DEATHS

There are some limitations associated with methods used in this report to estimate the burden of malaria cases and deaths. These methods are elaborated in **Annex 1**. Limitations in estimating the burden of malaria and approaches to reducing their impact on trends have been the subject of an Evidence Review Group which was convened in March 2018 by the WHO GMP; the group's findings are detailed in the meeting report (*28*). Proposals made in this report include a roadmap for the assembly of new epidemiological data to improve current methods as well as implementing surveillance systems assessments to allow for the use of the routine data emerging from moderate to high burden countries in sub-Saharan Africa.

In brief, where national routine data are adjusted for treatment seeking, testing and reporting rates, accurate estimation of these parameters are a major concern. As discussed in **Section 5**, these parameters suffer from incomplete reporting, are affected by availability of diagnostic tests whose levels of stock outs is poorly documented and household survey data on treatment seeking that does not sufficiently characterize pathways to care. Currently, malaria cases are estimated using the adjusted routine data in 39 countries that account for 14% of the global burden.

In 30 moderate to high transmission countries in sub-Saharan Africa, which account for 86% of the global burden of malaria cases in 2017, current estimates are derived from a parasite prevalence-to-incidence model (*16*). Malaria parasitological diagnosis and routine reporting have improved considerably in recent years in sub-Saharan Africa; hence, countries are increasingly demanding that data from their routine systems are used for the estimation of their national malaria case burden. This demand is increasing as considerable differences emerge between the cases reported from the public health sector alone and estimates from the parasite prevalence-to-incidence model for the whole population (**Table 6.4**).

An example of differences in estimates can be seen in the data for Nigeria, where the parasite prevalence-to-incidence model estimated 48.4 million cases in 2017. Using the reported data from the public health sector, adjusted for testing and reporting rates, gave an estimate of 25.7 million cases in this sector, representing 53% of the cases estimated using the parasite prevalence-to-incidence model. However, a recent household survey in the country shows that only 25% of children seek treatment for fever in the public health sector, implying that the adjustment of the routine data for treatment seeking outside the public sector results in up to 102 million cases overall. In countries where the ratio of parasite prevalence-to-incidence model exceeds one (e.g. Burundi, Mozambique and Uganda), as shown in **Table 6.4**, the implication is that estimates of cases from the parasite prevalence-to-incidence model for the whole population are less than cases estimated from the public sector alone, after adjusting for testing and reporting rates.

There are some methodological issues that partly explain these differences: the prevalence-to-incidence model estimates fevers epidemiologically attributable to a clinical episode of malaria, whereas the routine data represents infection in individuals who were suspected of having malaria and returned a positive result when tested. Cumulatively, however, in the parasite prevalence-to-incidence model, the most important issues are likely to be due to the limitations of community parasite surveys, and to assumptions made in their predictions in space and time, and their conversion to incidence. These limitations include the temporal latency in parasite prevalence data and the fact that active surveillance data that relate prevalence to incidence come from studies that require treatment of individuals, thereby improving their survival outcomes, introducing study related biases. The main limitations of using the routine data, as discussed previously, relate to completeness and quality of testing and reporting rates, and the interpretation of household survey data on treatment seeking behaviours for fevers.

For most countries where cases are estimated using the parasite prevalence-to-incidence model, malaria deaths are also estimated from a model that initially computes the fraction of deaths in children aged under 5 years due to malaria. The estimation of cause of death fractions uses data from verbal autopsies, with estimates of *P. falciparum* parasite prevalence as a covariate. The estimated deaths among these children are then used to further estimate malaria deaths among persons aged over 5 years (see **Annex 1**). This method accounts for 90% of malaria deaths globally in 2017. The trends in malaria mortality are therefore largely determined by trends in all under-5 mortality (*27*); and in some countries, this leads to a declining trend in deaths despite increases in cases (**Table 6.1** and **Table 6.3**).

TABLE 6.4.

Comparisons of estimated malaria cases (millions) using the parasite rate-to-incidence model (*16*) and the reported data from the routine public health sector in high-burden countries of the WHO African Region, 2017 *Sources: WHO estimates and NMP reports.*

Country	Parasite rate-to-incidence model (population-wide estimate)	Reported cases from the routine system (public health sector)	Reported cases adjusted for reporting and testing rates (public health sector)	Ratio of estimates from the adjusted routine data from the public health sector and the parasite rate-to-incidence model	Proportion of fevers seeking care in the public health sector
Nigeria	48.40	11.64	25.69	0.53	0.25
Democratic Republic of the Congo	24.00	16.79	18.32	0.76	0.29
Mozambique	9.98	9.89	10.45	1.05	0.58
Uganda	9.52	12.83	14.58	1.53	0.37
Niger	7.76	2.76	2.91	0.37	0.51
Ghana	7.57	5.58	9.04	1.19	0.48
Burkina Faso	7.26	10.26	12.24	1.69	0.57
United Republic of Tanzania	6.90	5.60	6.52	0.94	0.48
Cameroon	6.69	1.32	2.38	0.36	0.24
Mali	6.62	2.28	2.40	0.36	0.3
Angola	4.85	3.87	4.95	1.02	0.47
Malawi	4.69	5.82	6.65	1.42	0.53
Guinea	4.63	1.57	1.73	0.37	0.31
Benin	3.87	1.74	1.98	0.51	0.32
Kenya	3.56	3.42	6.22	1.75	0.51
Zambia	3.50	6.10	7.02	2.01	0.69
Côte d'Ivoire	3.31	3.48	3.73	1.12	0.31
Togo	2.98	1.76	1.85	0.62	0.32
Chad	2.75	2.20	2.38	0.86	0.16
Sierra Leone	2.73	2.10	2.27	0.83	0.63
Burundi	2.10	8.45	9.19	4.38	0.56
South Sudan	2.07	1.49	3.65	1.77	0.43
Sudan	1.48	0.72	1.35	0.91	0.46
Central African Republic	1.27	0.38	0.75	0.59	0.27
Congo	1.15	0.13	0.41	0.36	0.41
Liberia	0.92	0.03	0.22	0.42	0.46
Somalia	0.46	0.04	0.05	0.12	0.07
Equatorial Guinea	0.41	0.02	0.02	0.04	0.47
Gabon	0.41	0.04	0.13	0.32	0.43
Guinea-Bissau	0.11	0.09	0.10	0.93	0.48

NMP: national malaria programme; WHO: World Health Organization.

7

MALARIA ELIMINATION AND PREVENTION OF RE-ESTABLISHMENT

The GTS milestone for 2020 is to eliminate malaria from at least 10 countries that were malaria endemic in 2015 (*2*). A country must report zero indigenous cases of malaria for 3 consecutive years before it is considered to have eliminated the disease. Certification of elimination by WHO is the official recognition of a country being free of indigenous malaria cases, based on an independent evaluation verifying interruption of transmission and the country's ability to prevent re-establishment of transmission.

An increasing number of countries are progressing to elimination. Between 2000 and 2017, 19 countries attained zero indigenous cases for 3 years or more (**Table 7.1**); 16 of these countries attained zero indigenous cases since 2007. In 2018, Paraguay was awarded WHO certification of elimination, while Uzbekistan hosted an evaluation team from the Malaria Elimination Certification Panel to determine whether to recommend that Uzbekistan be certified. Algeria formally requested WHO certification of malaria free status in 2017, and Argentina continues to work towards certification.

Of the 16 countries that eliminated malaria between 2007 and 2017, the median number of indigenous cases in the 6 years before achieving zero indigenous cases was 212, while in the 3 years before achieving zero indigenous cases, the median was 24 cases (**Fig. 7.1**). Two countries – Sri Lanka and Turkey – had more than 10 000 cases in 2000: in the 3 years before achieving zero indigenous cases, Sri Lanka had a median of 684 indigenous cases and Turkey had a median of 313 indigenous cases.

TABLE 7.1.

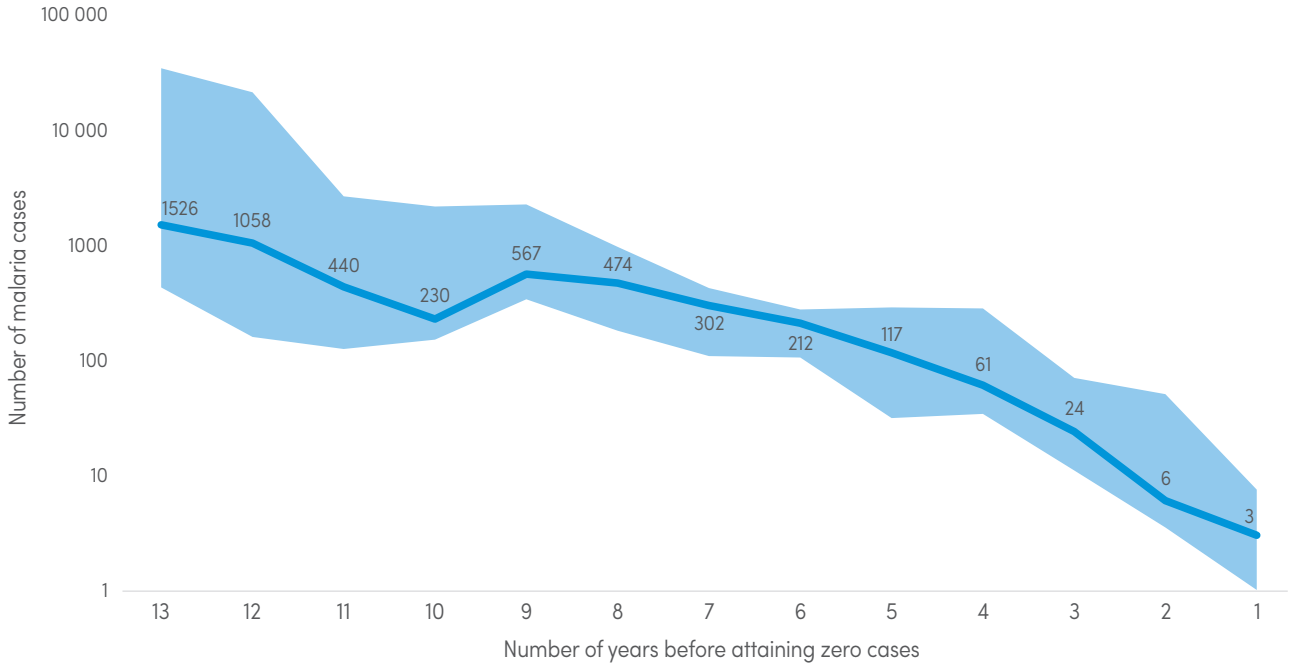
Countries attaining zero indigenous malaria cases since 2000 Countries are shown by the year that they attained 3 consecutive years of zero indigenous cases; countries that have been certified as free of malaria (zero indigenous cases) are shown in green, with the year of certification in brackets. *Source: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

2000	Egypt	United Arab Emirates (2007)		
2001				
2002				
2003				
2004	Kazakhstan			
2005				
2006				
2007	Morocco (2010)	Syrian Arab Republic		
2008	Armenia (2010)			
2009	Turkmenistan (2010)			
2010				
2011	Iraq			
2012	Georgia	Turkey		
2013	Argentina	Kyrgyzstan (2016)	Uzbekistan	Oman[a]
2014	Paraguay (2018)			
2015	Azerbaijan	Sri Lanka (2016)		
2016	Algeria			
2017	Tajikistan			

[a] In the *World malaria report 2017* (*1*), Oman was shown to have attained 3 consecutive years of zero indigenous cases in 2004; however, it registered indigenous cases in 2007, 2008 and 2010, as confirmed by the WHO Regional Office for the Eastern Mediterranean.

FIG. 7.1.

Median number of indigenous malaria cases[a] in the years before attaining zero indigenous cases for 16 countries that eliminated malaria, 2007–2017 *Source: NMP reports.*



NMP: national malaria programme.

[a] Graph is plotted on a logarithmic scale.

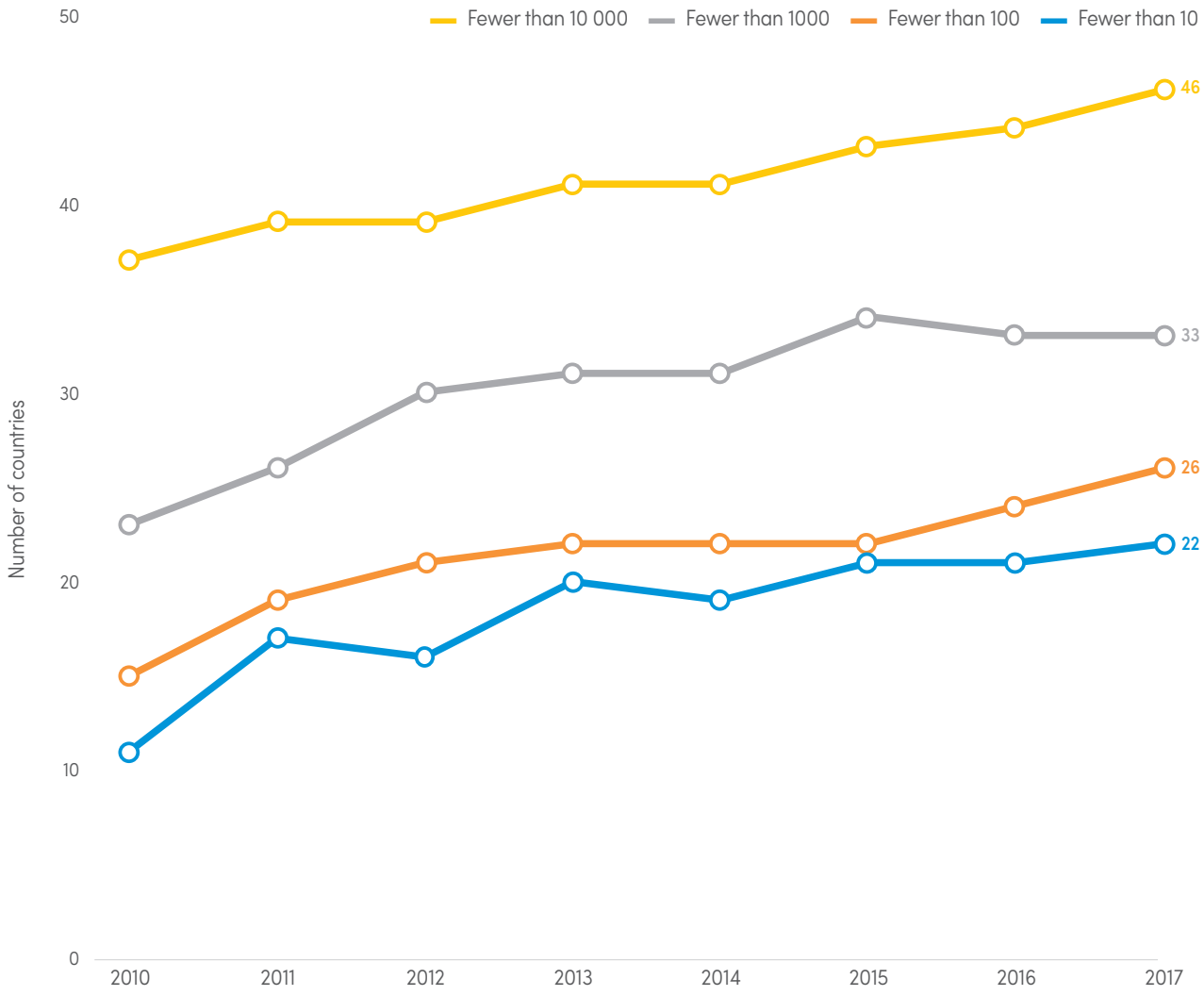
Globally, the number of countries that were malaria endemic in 2000 and reported fewer than 10 000 malaria cases increased from 37 in 2010 to 46 in 2017; in the same period, the number of countries with fewer than 100 indigenous cases increased from 15 to 26 (**Fig. 7.2**). The countries that had reduced their burden to fewer than 10 000 cases in the period 2010–2017 were Bolivia (Plurinational State of), Comoros, Democratic People's Republic of Korea, Guatemala, Honduras, Nepal, Timor-Leste, Vanuatu and Viet Nam.

7.1 E-2020 INITIATIVE

In April 2016, WHO published an assessment of the countries likely to achieve malaria elimination by 2020. The assessment was based on the trend in the number of indigenous malaria cases, the countries' declared malaria elimination objectives and the informed opinions of WHO experts in the field (*29*). A total of 21 countries, across five WHO regions, were identified as being likely to reach zero indigenous cases by 2020 (**Table 7.2**). These countries were termed the "eliminating countries for 2020" (E-2020), and they are the special focus of WHO efforts to accelerate national elimination efforts and monitor progress towards malaria free status. An inaugural meeting of the NMPs of the E-2020 countries, referred to as the Global

FIG. 7.2.

Number of countries that were malaria endemic in 2000 with fewer than 10, 100, 1000 and 10 000 indigenous malaria cases in 2010 and 2017 *Source: NMP reports.*



NMP: national malaria programme.

Forum of malaria-eliminating countries, was organized by WHO in March 2017 in Geneva; the Global Forum was held again in June 2018 in Costa Rica.

In April 2018, WHO established the Malaria Elimination Oversight Committee (MEOC) to help countries to reach their elimination goals. The MEOC attended the 2018 Global Forum to support countries in their attempts to achieve malaria elimination, and produced a series of recommendations to help countries accelerate towards this goal.

In 2017, several countries reported significant progress: for the first time ever, China and El Salvador reported zero indigenous cases, while Algeria maintained its malaria free status and Iran (Islamic Republic of), Malaysia, Republic of Korea, Saudi Arabia, Suriname and Timor-Leste reported important reductions in the number of cases in 2017 compared with 2016. The certification of Paraguay as malaria free was celebrated at the Global Forum, with the certificate presented to the Paraguay Minister of Health by the Regional Director of the WHO Regional Office for the Americas and the Pan American Health Organization.

Of major concern, however, was the considerable rise in cases in Botswana, Comoros and South Africa. Overall, 10 E-2020 countries reported an increase of between three (Belize) and 18 194 (South Africa) cases in 2017 compared with 2016 (**Table 7.2**).

TABLE 7.2.

Trends in indigenous malaria cases in the E-2020 countries *Source: NMP reports.*

WHO region	Country	2010	2011	2012	2013	2014	2015	2016	2017	Change 2016 to 2017
African	Algeria	1	1	55	8	0	0	0	0	0
	Botswana[a]	3 072	678	302	725	2 065	519	1 150	2 989	+1 839
	Cabo Verde	47	7	1	22	26	7	48	423	+375
	Comoros	36 538	24 856	49 840	53 156	2 203	1 300	1 143	3 230	+2 087
	Eswatini	268	549	562	962	711	157	350	724	+374
	South Africa	8 060	9 866	5 629	8 645	11 705	1 157	4 323	22 517	+18 194
Americas	Belize	150	72	33	20	19	9	4	7	+3
	Costa Rica	110	10	6	0	0	0	4	12	+8
	Ecuador	1 888	1 219	544	368	242	618	1 191	1 275	+84
	El Salvador	19	9	13	6	6	2	12	0	-12
	Mexico	1 226	1 124	833	495	656	517	551	736	+185
	Paraguay	18	1	0	0	0	0	0	0	0
	Suriname	1 712	771	356	729	401	81	76	40	-36
Eastern Mediterranean	Iran (Islamic Republic of)	1 847	1 632	756	479	358	167	81	57	-24
	Saudi Arabia	29	69	82	34	30	83	272	177	-95
South-East Asia	Bhutan	526	228		15	19	34	15	11	-4
	Nepal[a]	30 690	24 062	13 227	10 326	4 933	4 084	2 754	3 829	+1 075
	Timor-Leste[a]	103 604	33 063	7 821	1 709	567	141	148	36	-112
Western Pacific	China	4 990	3 367	244	86	56	39	3	0	-3
	Malaysia	5 194	3 954	3 662	2 921	3 147	242	266	85	-181
	Republic of Korea	1 267	505	394	383	557	627	602	436	-166

E-2020: malaria-eliminating countries for 2020; NMP: national malaria programme; WHO: World Health Organization.

[a] Cases for these countries are derived from adjustments of reported data for reporting and testing rates and treatment seeking in different health sectors.

8

RESPONDING TO THREATS TO THE FIGHT AGAINST MALARIA

The GTS (*2*) recognizes challenges in the fight against malaria, including 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. One of WHO's major roles is to bring emerging challenges to the attention of the global community, and to coordinate responses to address these challenges. This section of the report documents these challenges and proposed responses.

8.1 GETTING BACK ON TRACK TOWARDS THE GTS MILESTONES

The *World malaria report 2017* showed that, by 2016, global progress against malaria had stalled and the world was off track to meet the GTS milestones for 2020 (*1, 2*). The *World malaria report 2018* reinforces this message; despite gains in some countries, the analyses show a slight increase in malaria cases in 2017 compared with 2016, suggesting a generally flat progress over the past 3–4 years (**Section 6**). Although many countries continue to reduce the malaria burden, the rate of change has slowed in the highest burden countries; in fact, in some of those countries, malaria cases appear to have risen. Not only is the global trend off track for the GTS morbidity and mortality targets for 2020, but all indications are that these are unlikely to be achieved.

To get back onto a trajectory that will ensure that the global GTS morbidity and mortality milestones for 2025 are achieved, a response is required to change the trend in countries that are off track, while sustaining the momentum in those that are on target. This calls for intensified efforts, especially in the highest burden countries (**Fig. 8.1**). Analysis shows that 11 high-burden countries (Burkina Faso, Cameroon, Democratic Republic of the Congo, Ghana, India, Mali, Mozambique, Niger, Nigeria, Uganda and the United Republic of Tanzania) account for more than 70% of the global malaria cases and deaths. By 2017, 10 of these countries, all of them in sub-Saharan Africa, were not on track to meet the GTS targets (**Fig. 8.1**), whereas India had made impressive gains and was on track, but still accounted for 4% of the global burden of malaria morbidity and 52% of deaths outside of the WHO African Region.

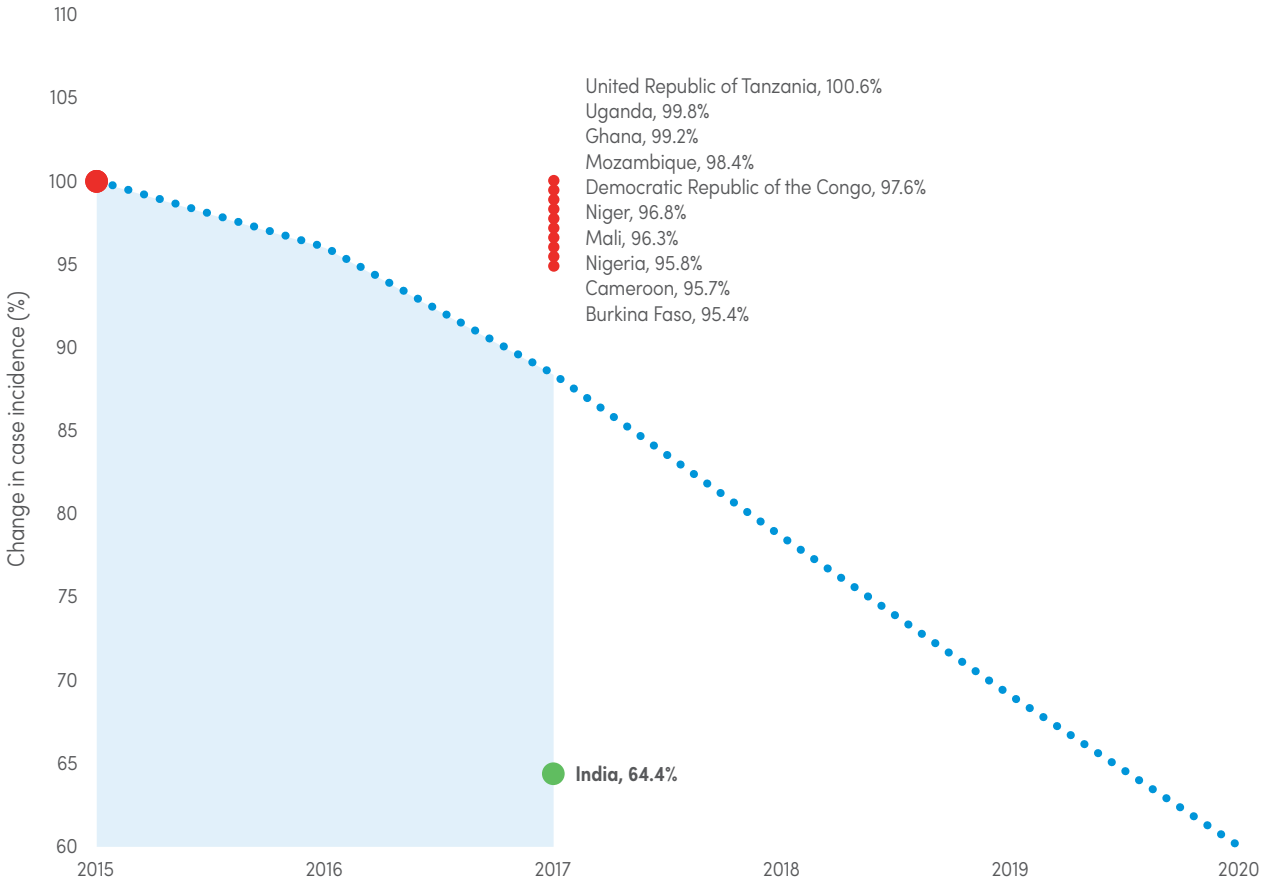
Access to ITNs continued to increase – albeit at a slower rate in the past 3 years (**Fig. 3.1**) – in most of the high-burden countries. However, many of these countries also saw stagnation or reduction in per capita malaria funding (**Fig. 2.6**). In the 10 of the highest burden countries situated in the WHO African Region, funding per capita at risk was below the regional median of US$ 2.55 in 2017.

To get the world back on track for the GTS targets for 2025, in November 2017, WHO and the Roll Back Malaria Partnership to End Malaria (RBM) launched a response plan – *High burden to high impact: getting back on track to end malaria* (*30*) – to accelerate reductions in malaria mortality and morbidity in target high-burden countries, initially focusing on the 11 highest burden countries (*31*). Initial discussion on this approach, led jointly by WHO and the RBM, were held at a high-level roundtable during the 73rd session of the United Nations General Assembly.

The approach has four key response elements: galvanize national and global political attention to

FIG. 8.1.

Expected change in malaria case incidence if on target to meet GTS milestones for 2020 versus estimated change in case incidence between 2015 and 2017 *Source: WHO estimates.*



GTS: *Global technical strategy for malaria 2016–2030*; WHO: World Health Organization.

reduce malaria deaths; drive impact in the country through the strategic use of information; establish best global guidance, policies and strategies suitable for the broad range of contexts; and implement a coordinated country response. WHO will work with NMPs and across the RBM to support the highest burden countries to implement the response. The process of reanalysis of stratification and intervention mixes to inform prioritization has started.

This response plan will also be energized in the political and advocacy space by *Zero Malaria Starts with Me* (*32*). This continent-wide campaign, co-led by the African Union Commission and the RBM, was launched in July 2018.

8.2 PARASITE RESISTANCE – ANTIMALARIAL DRUG EFFICACY AND RESPONSE

WHO recommends ACTs for the treatment of uncomplicated malaria caused by *P. falciparum*. ACTs have been an integral part of the recent success in global malaria control. There is a broad consensus that protecting the efficacy of ACTs for the treatment of malaria is a global health priority. The primary advantage of the combination is that the artemisinin quickly and drastically reduces the majority of malaria parasites, and the partner drug clears the small number of parasites that remain. However, the future efficacy of ACTs is endangered by the emergence of resistance to both artemisinin and the partner drugs.

Artemisinin resistance is defined as delayed parasite clearance following treatment with an artesunate monotherapy or ACT. This represents partial resistance. Artemisinin resistance alone does not necessarily lead to treatment failure. However, reduced efficacy of the artemisinin component places greater demands on the partner drug to clear a larger parasite mass, jeopardizing the future efficacy of the partner drug. It is also possible for partner drug resistance to emerge independently from artemisinin resistance. Unlike artemisinin resistance, the presence of partner drug resistance brings a high risk of treatment failure.

Artemisinin and the partner drug have different roles; hence, the efficacy of both drugs must be monitored independently. Monitoring has been central to tracking the evolution of resistance in the Greater Mekong subregion (GMS), where there is now multidrug *P. falciparum* resistance (i.e. resistance to both artemisinin and partner drugs), leading to treatment failure with several ACTs.

Chloroquine (CQ) remains a first-line treatment for *P. falciparum* malaria in the Dominican Republic, Guatemala, Haiti, Honduras and Nicaragua. Central America and the Caribbean (Mesoamerica) remain the last regions where the presence of resistance has not yet been confirmed. For *P. vivax*, CQ remains an effective first-line treatment in many countries. Countries endemic for vivax malaria recommend either CQ or an ACT for the treatment of uncomplicated *P. vivax*. Most treatment policies also include primaquine (PQ), to eliminate latent liver stage infections and prevent relapse, because it 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. To date, *P. vivax* resistance to artemisinin has not been detected.

8.2.1 Networks for monitoring antimalarial drug efficacy

WHO supports several subregional networks for monitoring antimalarial resistance. Through these networks, WHO offers updates on the global situation of antimalarial drug resistance; it also advises on protocol implementation, microscopy, data analysis and validation, and reporting and publication. The information on therapeutic efficacy generated by the networks is shared among countries, to provide the best possible advice to ministries of health. Network meetings facilitate discussions on changes to the national malaria treatment policy, if needed. The creation of networks facilitates effective management of problems in border areas. Recent network meeting reports provide a summary of the results of drug efficacy and resistance monitoring in the subregions. All meeting reports are available on the GMP website (*33*).

8.2.2 Status of antimalarial drug efficacy (2010–2017): treatment of *P. falciparum*

The WHO global database on antimalarial drug efficacy and resistance contains data on therapeutic efficacy studies 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 GMP website (*34*).

Artemether-lumefantrine

The analysis of artemether-lumefantrine (AL) included 289 studies conducted in 47 countries. The overall efficacy of AL was 98.2%. In the WHO African Region, where more than half of the studies were conducted, the overall efficacy of AL was 98.1%. Treatment failure rates greater than 10% occurred in four of the 159 studies conducted: Malawi (19.5% in 2010), Angola (11.7% in 2013 and 13.6% in 2015) and Gambia (11.9% in 2010). The results of these studies can be considered as outliers, because similar failure rates were not reported afterwards in any of the three countries. In addition, lumefantrine resistance could not be confirmed by molecular marker studies, in vitro tests or blood dosage levels in any of the failures reported. In the WHO Region of the Americas, the overall efficacy of AL was 98.2%. No treatment failures were observed in four of the five studies conducted. A study in Suriname in 2011 detected a 9% treatment failure rate; however, the study had a limited sample size. In the WHO Eastern Mediterranean Region, the overall efficacy of AL in all 28 studies conducted was 99.1%. In the WHO South-East Asia Region, the overall efficacy of AL was 98.5%. Among the 68 studies conducted, three studies observed treatment failures of greater than 10%. One study in Thailand's Ranong Province detected a treatment failure rate of 11.3% in 2012 (n=44). Two studies conducted in Bangladesh observed treatment failure rates of 11.1% in 2013 and 14.3% in 2017, but both studies had sample sizes of fewer than 10 patients. In the WHO Western Pacific Region, the overall efficacy of AL was 96.4%. Among the 25 studies conducted, three studies had treatment failure rates of at least 10%. High treatment failure rates were observed in the southern Lao People's Democratic Republic, with treatment failure rates of 10% (n=20), 14.3% (n=49) and 17.2% (n=29) observed in 2013, 2014 and 2017, respectively.

Artesunate+sulfadoxine-pyrimethamine

The analysis of artesunate+sulfadoxine-pyrimethamine (AS+SP) included 101 studies in eight countries: Afghanistan (3), India (55), Iran (Islamic Republic of) (7), Mali (3), Pakistan (6), Somalia (4), Sudan (18) and Yemen (5). Studies of AS+SP demonstrated an overall efficacy of 97.7%. Treatment failure rates greater than 10% occurred in eight of the 101 studies, in India (12.1%, 17.3% and 21.4% in 2012), Somalia (22.2% in 2011 and 12.3% in 2015), and Sudan (10.8% and 18.1% in 2014, and 16.4% in 2015). India has since changed its treatment policy to AL in the north-eastern part of the country, and Somalia and Sudan have since both changed their treatment policies to AL and dihydroartemisinin-piperaquine (DHA-PPQ).

Artesunate-amodiaquine

The analysis of artesunate-amodiaquine (ASAQ) included 99 studies in 27 countries. Studies of ASAQ demonstrated an overall efficacy of 98%. In the WHO African Region, where 96 studies were conducted, the efficacy was 98.5%. Among the 99 studies, only two studies, both of which were conducted in Cambodia in 2016, detected high treatment failures (13.8% and 22.6%).

Artesunate-mefloquine

The analysis of artesunate-mefloquine (ASMQ) included 42 studies in six countries. Studies of ASMQ demonstrated an overall efficacy of 94.9%. In the WHO African Region, two studies were conducted in Senegal in 2010, both with a high treatment efficacy of 99.5%. In the WHO Region of the Americas, two studies were conducted in Brazil (2010, 2012) and one in Suriname (2013); all three studies observed an overall efficacy of 100%. Among the 23 studies conducted in the WHO South-East Asia Region (Myanmar and Thailand only), the overall efficacy was 91.4%. Although treatment remained 100% effective in Myanmar in 2011 and 2012, high treatment failure rates were observed in seven studies conducted in Thailand between 2010 and 2013 (range: 12.5–49.1%). Thailand changed its treatment policy from ASMQ to DHA-PPQ in 2015. In the WHO Western Pacific Region, 14 studies were conducted in Cambodia; one study in 2010 observed a treatment failure rate of 11.1%, but all subsequent studies conducted during 2011–2017 showed high treatment efficacy (98.3–100%).

Artesunate-pyronaridine

The analysis of artesunate-pyronaridine (ASPY) included 11 studies conducted in four countries (Burkina Faso, Cambodia, Mali and Myanmar). Studies of ASPY demonstrated an overall efficacy of 96.9%. Treatment failure rates exceeded 10% in two studies conducted in western Cambodia in 2014 (10.2% and 18%), while treatment success remained high in eastern Cambodia in 2017 (96.7% and 98.3%).

Dihydroartemisinin-piperaquine

The analysis of DHA-PPQ included 130 studies conducted in 21 countries. Studies of DHA-PPQ demonstrated an overall efficacy of 94.5%. In the WHO African Region, 21 studies conducted in Angola, Democratic Republic of the Congo, Gambia, Guinea-Bissau, Kenya, Malawi, Nigeria, Senegal, Sierra Leone and Zambia demonstrated an overall efficacy of 99.3%. In the WHO Eastern Mediterranean Region, eight studies conducted in Pakistan, Somalia and Sudan showed a treatment efficacy of 99.3%. In the WHO South-East Asia Region, 28 studies conducted in Indonesia, Myanmar and Thailand showed a treatment efficacy of 99%. In the WHO Western Pacific Region, 74 studies were conducted in Cambodia, China, Lao People's Democratic Republic, Papua New Guinea and Viet Nam. The overall treatment efficacy was 90.7%. Treatment failure rates greater than 10% were observed in 19 studies from Cambodia, Lao People's Democratic Republic and Viet Nam. In Cambodia, treatment failure rates exceeded 10% in 13 of the 27 studies conducted; the maximum treatment failure rate was 62.5% in 2014. In 2016, Cambodia changed the first-line treatment policy of DHA-PPQ to ASMQ. In Lao People's Democratic Republic, two studies with treatment failure rates of 13.3% (n=15) and 47.4% (n=19) were observed in 2016. In Viet Nam, treatment failure rates exceeded 10% in four of the 34 studies conducted (range: 25.9–46.3% in 2015–2016). This evidence has prompted discussions of a change in Viet Nam's current treatment policy in areas where DHA-PPQ is failing.

Summary of antimalarial drug efficacy for treatment of *P. falciparum*

In summary, most studies show that the ACTs currently recommended in national malaria treatment policies remain effective, with overall efficacy rates of greater than 95%. Of particular concern, however, are studies that show treatment failure rates of greater than 10% associated with treatments currently recommended in the national treatment policy. Specifically, in Lao People's Democratic Republic, AL remains the first-line treatment; however, high treatment failure rates have been observed, increasing since 2013. In addition, high treatment failure rates have been observed with Viet Nam's first-line treatment, DHA-PPQ. Studies are underway in both countries to review the efficacy of alternative treatments. Consensus meetings will be needed once evidence is available, to decide on and implement new treatment options. Several countries that detected high treatment failure rates have responded by changing their treatment policies, including Cambodia, India (in north-eastern states), Somalia, Sudan and Thailand.

8.2.3 Status of antimalarial drug efficacy (2010–2017): treatment of *P. vivax*

Chloroquine

The analysis included 105 studies of CQ and 20 studies of CQ+PQ. No differences were observed in treatment outcomes; therefore, results were combined for this analysis. The 125 studies were conducted in 21 countries. The overall treatment efficacy was 97.4%. In the WHO African Region, 11 studies were conducted, for an overall treatment efficacy of 94.6%. One study in Ethiopia observed a treatment failure rate of 22% in 2010. In the WHO Region of the Americas, 13 studies were conducted, with an overall treatment efficacy of 97.1%. Studies conducted in Bolivia (Plurinational State of) and Brazil observed treatment failure rates of 10.4% in 2011 and 18.3% in 2012. In three studies from the WHO Eastern Mediterranean Region conducted in Iran (Islamic Republic of) (2) and Pakistan (1), each showed 100% treatment efficacy. In the WHO South-East Asia Region, 71 studies observed an overall efficacy of 98.2%. Among these, two studies from Myanmar showed a high treatment failure rate of 11.9% in 2010, and 21.7% in 2012. One study in Timor-Leste showed a treatment failure rate of 17.5% in 2011. In the WHO Western Pacific Region, 26 studies were conducted, with an overall efficacy of 96.3%. One study from Malaysia observed a treatment failure rate of 61.9% in 2012.

ACTs

The analysis included studies of AL (16), AS+SP (4), ASAQ (3), ASMQ (2), ASPY (2) and DHA-PPQ (12). Studies of AL

demonstrated an overall efficacy of 93.4%. Treatment failure rates greater than 10% were observed in four studies: Ethiopia (11.9% in 2012), Papua New Guinea (35% in 2011), Solomon Islands (31.6% in 2011) and Vanuatu (12.1% in 2013). High treatment failure rates with AL may be explained by the short half-life of lumefantrine, which fails to cover the first relapse. In Sudan, two studies of AS+SP and two studies of AS+SP+PQ were conducted. The recurrent risk of failure was 9.9% for AS+SP alone; however, when PQ was added to the treatment, efficacy rose to 100%. In this case, the failures may be attributed to *P. vivax* resistance to SP. Studies of ASAQ, ASMQ, ASPY and DHA-PPQ all demonstrated high treatment efficacy (99–100%).

8.2.4 Global public health implications of antimalarial drug resistance

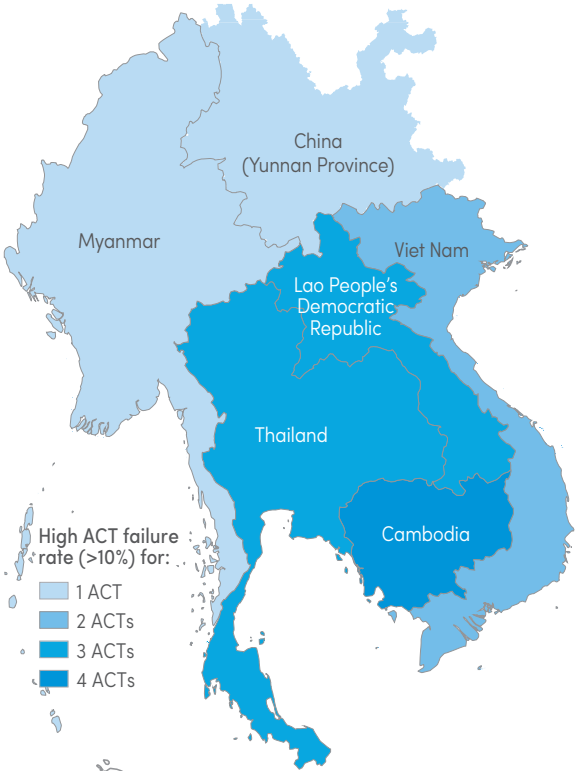
Antimalarial drug resistance is a major threat to malaria control and has important implications for global public health. For example, when CQ resistance emerged in Africa in the 1980s, there were documented increases in hospital admissions and mortality rates, mainly due to severe malaria and increased transmission. Resistance to antimalarial drugs has had a significant impact on the cost of global malaria control, as new drugs have had to be developed to replace those that have become ineffective. In addition, patients whose treatment fails because of infection with a resistant strain require repeated consultations at health facilities for further diagnosis and treatment, resulting in lost work-days, school absence and increased health care costs.

With the implementation of combination therapy, improvements to health systems and surveillance systems to monitor first- and second-line treatment, and the availability of guidelines on policy change, the consequences of the development of resistance to antimalarial medicines may be less severe today than those that were observed with CQ in the 1980s. In the event that parasites develop reduced sensitivity to artemisinin, ACTs will continue to cure patients, provided that the partner drug remains effective. Further, by regularly monitoring the national malaria treatment, and by making prompt changes to national malaria treatment policies following the detection and confirmation of resistance, ministries of health can be actively involved in maintaining the effectiveness of their national treatment policy.

The GMS has long been the epicentre of antimalarial drug resistance, and currently *P. falciparum* resistance to artemisinin is present in five countries of the subregion: Cambodia, Lao People's Democratic Republic, Myanmar, Thailand and Viet Nam (**Fig. 8.2**).

FIG. 8.2.

Number of ACTs with high failure rates in the treatment of *P. falciparum* infections *Source: Data were derived from the WHO global database on antimalarial drug efficacy and resistance* (*34*).



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; GMS: Greater Mekong subregion; WHO: World Health Organization.

During the early 2010s, while containment efforts to stop the spread of resistant parasites were underway, it was discovered that artemisinin resistance had emerged independently in multiple areas, and that resistance to ACT partner drugs had also emerged, threatening the progress achieved in the region to date. In 2014, an assessment of the feasibility of *P. falciparum* elimination in the subregion concluded that elimination was technically and operationally feasible at a reasonable cost. These developments, together with the subregion's impressive reduction in malaria burden in the past decade, led to a shift in strategy focusing on malaria elimination. A strategy for eliminating malaria in the GMS has been developed and is targeting malaria elimination in the GMS by 2030 (*35*).

8.3 VECTOR RESISTANCE TO INSECTICIDES

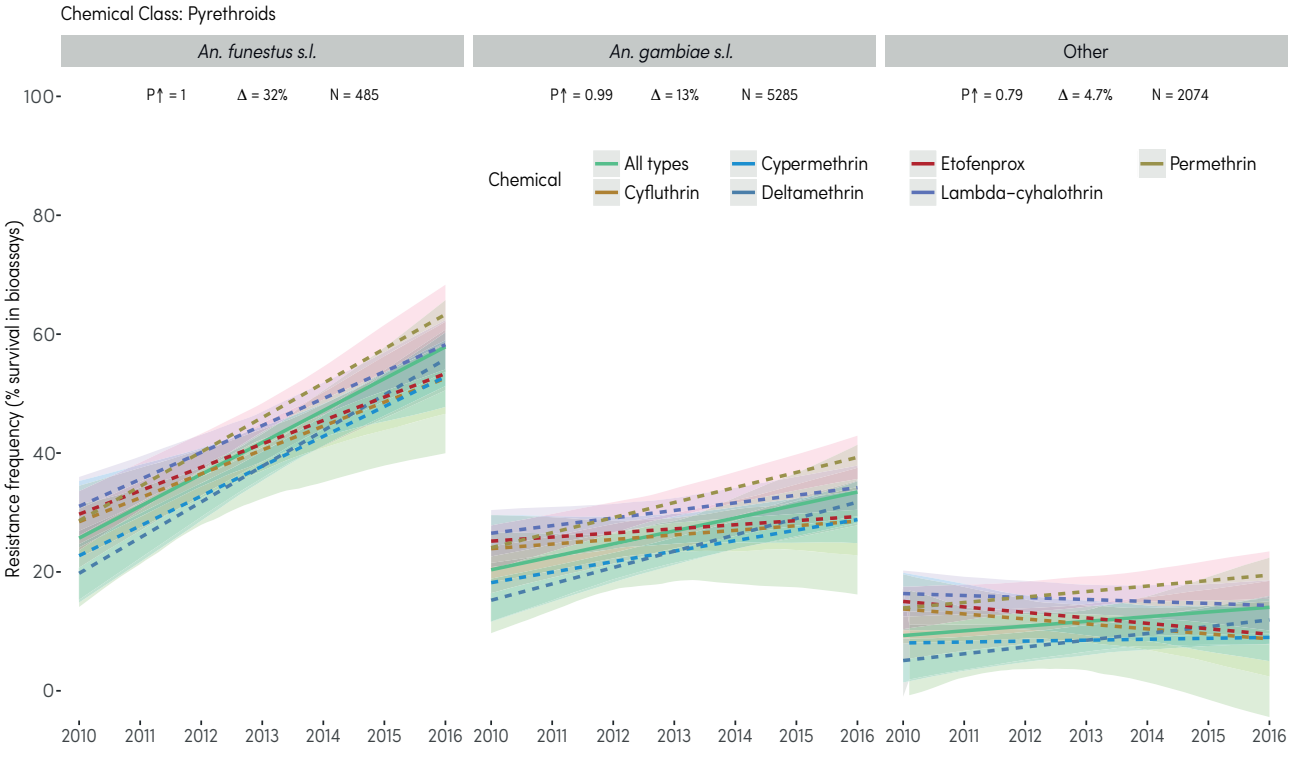
Malaria prevention and control efforts are threatened by resistance of malaria vectors to pyrethroids that are used in all ITNs, and to four insecticide classes commonly used for IRS. The *WHO Global report on insecticide resistance in malaria vectors: 2010–2016* (*36*) (*Global report*), published in 2018, showed that resistance to pyrethroids is common and widespread in major malaria vectors across the five WHO regions with ongoing malaria transmission. Resistance to three other insecticide classes used in IRS – organophosphates, carbamates and organochlorines (i.e. dichlorodiphenyltrichloroethane [DDT]) – was also confirmed across the five regions, with most countries reporting resistance to multiple classes. To date, monitoring of malaria vector resistance to neonicotinoids – a new class of insecticide that became available for IRS in 2017 – has been limited, and no discriminating concentration has been established.

Analysis conducted as part of the *Global report* (*36*) found that pyrethroid resistance frequency (as indicated by median mosquito survival in bioassays) increased between 2010 and 2016. The increase was significant in *Anopheles funestus s.l.* (32%), moderate in *An. gambiae s.l.* (13%) and slight in other malaria vectors (5%) (**Fig. 8.3**).

There was limited information available on resistance intensity and resistance mechanisms. Metabolic and target-site resistance mechanisms were detected across multiple vector species and WHO regions

FIG. 8.3.

Best-fit estimates of pyrethroid resistance frequency in *An. funestus s.l.*, *An. gambiae s.l.* and other malaria vectors for 2010–2016 Dotted lines indicate estimates by individual insecticide, solid lines indicate estimates for all pyrethroid insecticides and shaded areas indicate 95% CI. P↑ values indicate the estimated probability of an increase in resistance frequency between 2010 and 2016, Δ values indicate the change in resistance frequency between 2010 and 2016, and N values show the number of assays considered in the analysis.



An: *Anopheles*; CI: confidence interval.

between 2010 and 2016. However, insufficient testing and reporting precluded comprehensive analyses.

Like previous world malaria reports, the *Global report* (*36*) highlighted that not all malaria endemic countries conducted insecticide resistance monitoring or reported the results of monitoring. For countries that did monitor, this was usually not done every year. More systematic data collection and reporting are needed to inform deployment of vector control interventions.

8.3.1 Update for 2017

From 2010 to 2017, of the 80 malaria endemic countries that reported standard monitoring data, resistance was detected in 68 countries to at least one insecticide in one malaria vector from one collection site. This increase from the figure in last year's world malaria report is a result of improved reporting of historical data, with three countries reporting resistance for the first time in 2017. Of the 68 countries, 22 detected resistance to all four classes, 16 to three classes, 19 to two classes and 11 to one class. Only 12 countries monitored but did not confirm resistance to any class tested. Of the countries that monitored, the percentage that detected resistance to each insecticide class was 82% for organochlorines, 82% for pyrethroids, 63% for carbamates and 50% for organophosphates.

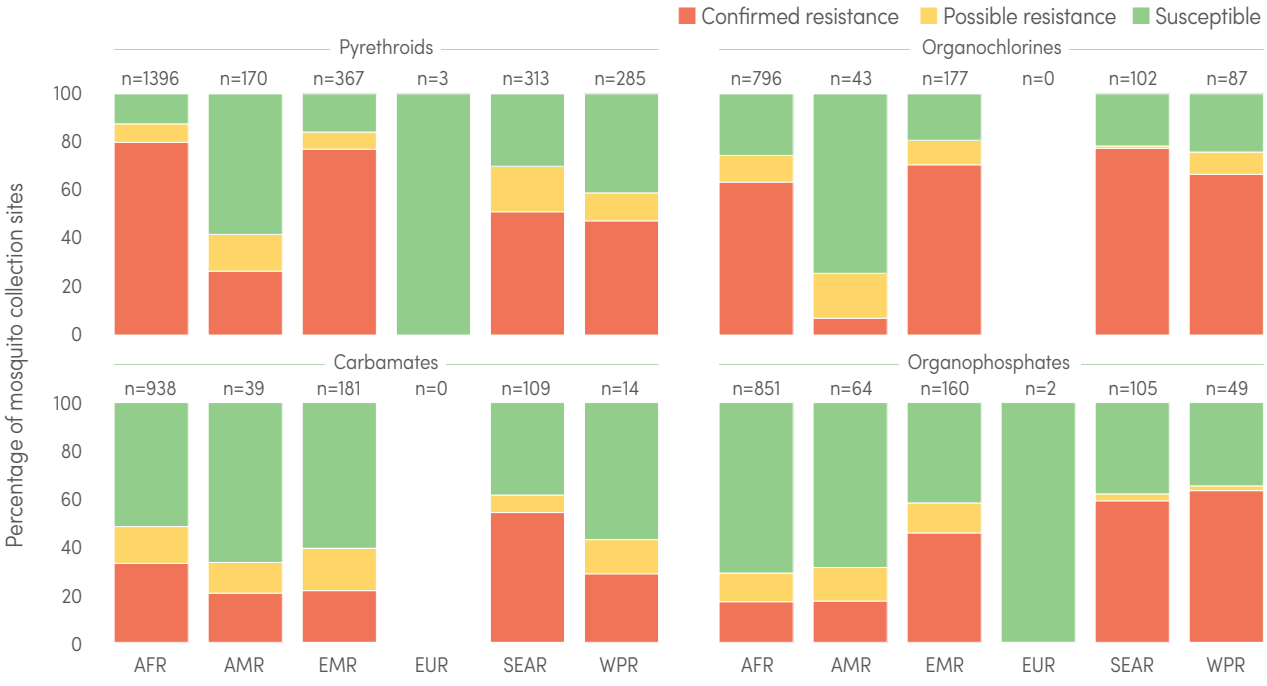
Resistance to these four insecticide classes was detected in vectors present in all WHO regions except for the WHO European Region, although the extent of monitoring and prevalence of confirmed resistance to each insecticide class differed between regions (**Fig. 8.4**). Resistance to pyrethroids was detected in at least one malaria vector in more than two thirds of the sites tested, and was most prevalent in the WHO African and Eastern Mediterranean regions. Resistance to organochlorines was detected for at least one malaria vector in almost two thirds of the sites, and was most prevalent in the WHO South-East Asia Region. Resistance to carbamates and organophosphates was less prevalent and was detected in 33% and 27% of the tested sites, respectively. Prevalence was highest for carbamates in the WHO South-East Asia Region and for organophosphates in the WHO Western Pacific Region.

Further data reported to WHO (e.g. on the mechanisms underpinning vector resistance, and results from intensity concentration and synergist assays) are available via an online mapping tool called Malaria Threats Map,[1] which was released in 2017.

[1] www.who.int/malaria/maps/threats

FIG. 8.4.

Reported insecticide resistance status as a percentage of sites for which monitoring was conducted by WHO region, 2010–2017 Status was based on mosquito mortality where <90% = confirmed resistance, 90–97% = possible resistance, and ≥98% = susceptibility. Numbers above bars indicate the total number of sites for which data were reported (n). *Sources: NMP reports, African Network for Vector Resistance, Liverpool School of Tropical Medicine, MAP, 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; MAP: Malaria Atlas Project; NMP: national malaria programme; SEAR: WHO South-East Asia Region; WHO: World Health Organization; WPR: WHO Western Pacific Region.

8.3.2 Preventing and responding to insecticide resistance

The extent of resistance is not fully known for several reasons: many countries do not carry out routine monitoring, sentinel sites are not representative, or NMPs or partners collect data but do not share or report those data in a timely manner. Therefore, information on insecticide resistance must continue to be gathered and shared to ensure appropriate use in local decision-making processes, and to improve understanding of global insecticide resistance status and implications for malaria vector control. Insecticide resistance monitoring should be conducted in all malaria endemic countries at least once per year. Tests should be conducted with insecticide classes that are either in use or planned for use in vector control.

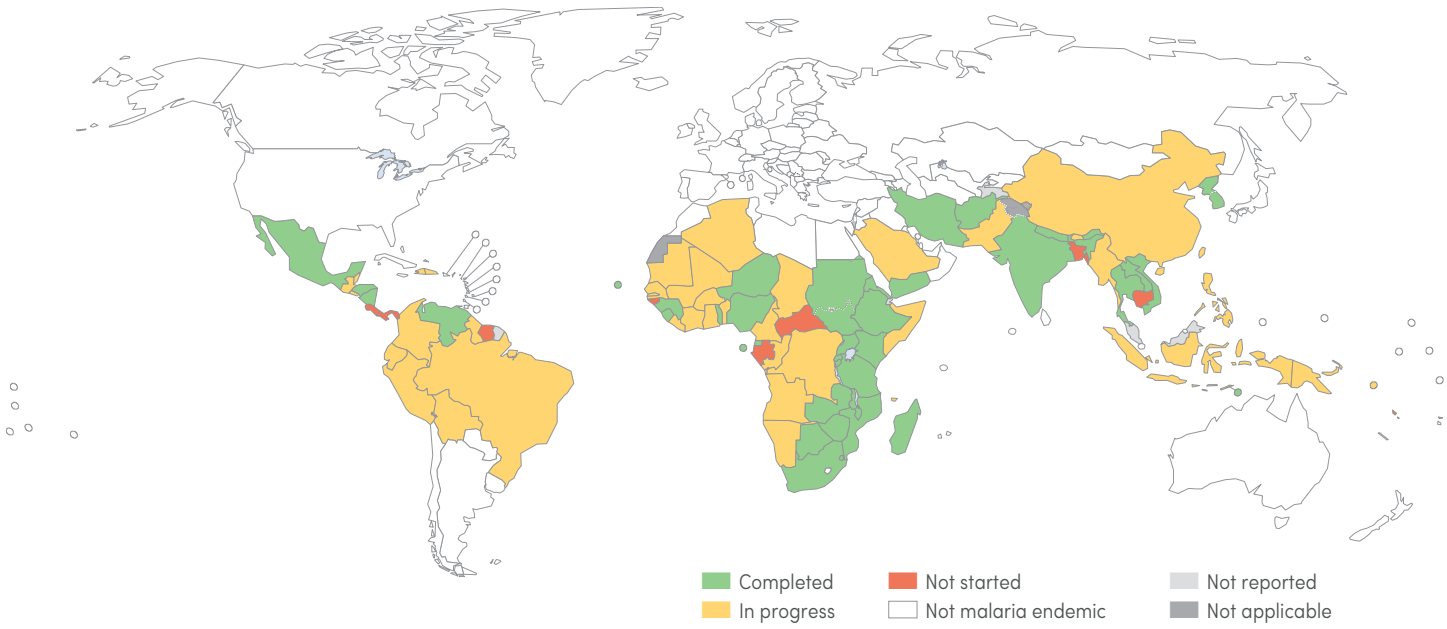
Despite the impact of pyrethroid resistance on the effectiveness of current pyrethroid-based interventions being poorly understood, the likelihood that increasing resistance will reduce the efficacy of these interventions cannot be ignored. Countries should apply good resistance prevention, mitigation and management practices that proactively and appropriately leverage available interventions, without waiting for conclusive evidence of control failure.

Priority actions to guide resistance management include establishing and implementing national insecticide resistance monitoring and management plans, in line with the *WHO Global plan for insecticide resistance management in malaria vectors* (*37*). In 2018, 40 countries reported having completed plans for resistance monitoring and management (**Fig. 8.5**). Although some progress has been made in this regard, further effort is required.

In the face of the overall spread of insecticide resistance in malaria vectors to the four most commonly deployed insecticide classes, new tools are essential to provide alternatives for insecticide resistance management. Where feasible, resistance monitoring should be extended to measure vector susceptibility to those active ingredients anticipated in new tools (e.g. neonicotinoids and pyrroles), to ascertain their utility for disease control and resistance management. To measure vector susceptibility, standard procedures and discriminating concentrations need to be defined; work is currently ongoing to address this need.

FIG. 8.5.

Status of national insecticide resistance monitoring and management plans, as of October 2018 *Sources: NMP reports, African Leaders Malaria Alliance.*



NMP: national malaria programme.

9
CONCLUSION

The *World malaria report 2018* summarizes global progress in the fight against malaria up to the end of 2017, 2 years after the launch of the GTS (*2*) and the SDGs (*5*). The report reinforces the message from the *World malaria report 2017* (*1*) that the world is off track to achieve two critical targets of the GTS: reducing malaria deaths and disease by at least 40% by 2020. Although there has been a substantial reduction in the burden of malaria since 2010, the analysis indicates a stalling of the progress between 2015 and 2017. Thus, in 2017, there were an estimated 219 million malaria cases globally, compared with 214 million cases in 2015 and 239 million cases in 2010. The reduced or reversed progress in countries with the highest malaria burden is one of the main contributors to the stalling of the global progress. For example, in the 10 highest burden countries in Africa, there were an estimated additional 3.5 million malaria cases in 2017 compared with 2016. In 2017, there were an estimated 435 000 deaths from malaria globally, compared with 451 000 estimated deaths in 2016 and 607 000 in 2010. In comparing the trends in cases and deaths, it is important to understand that mortality is estimated through a process that first quantifies all-cause mortality in children aged under 5 years, and then quantifies a malaria cause of death fraction. This approach, overall, results in malaria mortality trends that follow those of children aged under 5 years, and is often insensitive to year on year change in malaria case burden.

Despite the overall stalling of progress, there continue to be promising pockets of progress in countries that carry a high burden of malaria; for example, comparing 2017 with 2016, India saw a 24% drop in cases, Rwanda recorded 430 000 fewer malaria cases, and both Ethiopia and Pakistan marked decreases of more than 240 000 cases. Among countries that have a low burden of malaria, in several countries there has been a quickening pace towards elimination. Thus, in 2017, 46 countries reported fewer than 10 000 malaria cases, an improvement on 44 countries in 2016 and 37 in 2010. The number of countries with fewer than 100 indigenous cases – a strong indicator that elimination is within reach – increased from 15 countries in 2010 to 26 countries in 2017. Among the E-2020 countries, for the first time ever, China and El Salvador reported zero indigenous cases, while Algeria maintained its malaria free status. Iran (Islamic Republic of), Malaysia, Republic of Korea, Saudi Arabia, Suriname and Timor-Leste reported important reductions in the number of cases in 2017 compared with 2016. The certification of Paraguay as malaria free was celebrated at the E-2020 Global Forum in Costa Rica in June 2018. In contrast, the considerable rise in cases in Botswana, Comoros and South Africa is a major concern.

This year's report includes a section on malaria-related anaemia, a condition that, if left untreated, can result in death, especially among vulnerable populations such as pregnant women and children aged under 5 years. Anaemia was once a key indicator of progress in malaria control, and its prevalence was used to evaluate the efficacy of interventions. Recent years have seen a decline in awareness of the burden of malaria-associated anaemia. Despite its importance as a direct and indirect consequence of malaria, the prevalence of anaemia among populations vulnerable to the disease has not been reported consistently as a metric of malaria transmission and burden. Data from household surveys conducted in 16 high-burden countries between 2015 and 2017 show that, among children aged under 5 years, the prevalence of any anaemia was 61%, mild anaemia 25%, moderate anaemia 33% and severe anaemia 3%. Of children who tested positive for malaria, the prevalence of mild, moderate and severe anaemia was 21%, 50% and 8%, respectively.

The unprecedented funding for malaria has been the key catalyst for the progress in the fight against malaria since 2000. In the period 2010–2017, funding for malaria has remained stable and there have been no major annual increases. However, with population growth and the emergence of resilient transmission patterns, funding per capita population at risk has declined over the past 3 years compared with the previous 3 years, especially in the highest burden countries. Overall, funding in malaria in 2017 was 47% of the expected 2020 milestone of US$ 6.6 billion (*8*), with the USA being the largest single international donor for malaria in 2017, providing US$ 1.2 billion (39%). Among the highest burden countries, funding remains below US$ 3 per person at risk, with no discernible change in domestic funding. In the countries where declines in per capita population at risk were seen, reductions occurred in both international and domestic funding.

The use of ITNs has been the most widespread preventive intervention globally, and their distribution continues to increase. In 2017, a total of 220 million ITNs were distributed by NMPs, compared with 144 million in 2010. About 81% of the ITNs distributed in 2017 were in sub-Saharan Africa, where the proportion of population with access to ITNs was 56% in the same year; this represents a small improvement since 2015, suggesting that most of the nets distributed over the past 3 years were used to replace nets that were considered to be older than 3 years. A small increase in the percentage of the population covered by IRS was reported in 2017 compared with 2016, mainly as a result of a slight increase in the WHO African Region. However, 64 million fewer people were protected by IRS in 2017 compared to 2010. WHO's recently released *Global report on insecticide resistance in malaria vectors: 2010–2016* (*36*) showed that resistance to the four commonly used insecticide classes – pyrethroids, organochlorines, carbamates and organophosphates – is widespread in all major malaria vectors across all WHO regions that contain malaria endemic countries. However, 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 across study locations in five countries.

The two main drug-based preventive approaches that are implemented by countries are IPTp and SMC. Since 2012, when WHO introduced the policy of the three recommended doses of SP for IPTp (IPTp3), coverage has increased to 22% in 33 sub-Saharan African countries that reported data. In 2017, a total of 15.7 million children in 12 countries in Africa's Sahel subregion were protected through SMC programmes, although about 13.6 million children who could have benefited from this intervention were not covered, mainly due to a lack of funding. However, overall coverage with four treatments at monthly intervals was 53%, highlighting important challenges in compliance with required dosage, despite wide variation in levels of compliance (e.g. from 88% in Burkina Faso to 45% in Nigeria).

Overall treatment seeking for fevers, reported during household surveys, was low, with only 52% of children aged under 5 years in sub-Saharan Africa seeking treatment from a trained health provider. However, among those who sought treatment in the public health sector, a median of 59% of children aged under 5 years were tested with malaria using RDT or microscopy. Data from NMP reports also show that in the WHO African Region – where, historically, the testing rate was lowest – nearly 82% of all cases suspected to have malaria at public health facilities were tested, predominantly with RDTs. Among children aged under 5 years with fever, just over a half received ACTs and of those who received any antimalarial, about 85% were treated with ACTs. 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 institutionalization have been some of the main bottlenecks increasing the proportion of the population reached through iCCM. Biologically, increasing levels of *pfhrp2* deletions threaten the ability

to diagnose and appropriately treat malaria patients infected with *P. falciparum* parasites. To monitor the prevalence of *hrp2* deletions, WHO published a surveillance protocol (*38*) and has started working with countries to implement field studies. Although the threat of drug resitance remains serious and global vigilance must remain high, the immediate threat is low, and ACTs remain efficacious in most malaria endemic settings.

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 of health information by all sectors, whether public or private. The widespread use of RDTs and the establishment of electronic reporting systems have increased both volume and quality of malaria data reported by countries. In 2017, among 52 moderate to high-burden countries, reporting rates of malaria were 60% or more. In the WHO African Region, 36 out of 46 countries indicated that at least 80% of public health facilities had reported data on malaria through their national health information system. However, national reporting rates submitted by NMPs are likely to overestimate the efficiency of the surveillance system, because few countries have implemented structured surveillance systems assessments. In addition, reporting from the private sector remains low, despite the relatively high usage of this sector in most malaria endemic countries.

Finally, to get the global malaria response back on track, a new country-driven approach – *From high burden to high impact* – will be launched in Mozambique on 19 November 2018, alongside the release of the *World malaria report 2018*. Catalysed by WHO and the RBM, the approach will be led by the 10 highest burden African countries and India, which together account for 70% or more of malaria cases and deaths globally. As part of this effort, WHO will work with NMPs and partners to undertake in-depth country-focused analyses in these 11 countries over the coming year, to understand the determinants of the malaria trends and to develop recommendations for tailored subnational mixes of interventions that will reenergise the fight against malaria.

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Annexes

Annex 1 – Data sources and methods

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. 1.1. Countries with indigenous cases in 2000 and their status by 2017

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

Fig. 2.1. GTS investment targets for the period 2016–2020, and estimated amount invested in 2016 and 2017 (constant 2017 US$)

Resource needs estimates are published in the GTS (*1*). The methodology is described in Patouillard et al. (2017) (*3*).

Fig. 2.2. Funding for malaria control and elimination 2010–2017, by source of funds (constant 2017 US$)

Contributions from governments of endemic countries are estimated as the sum of government contributions reported by NMPs for the world malaria report of the relevant year, plus the estimated costs of patient care delivery services at public health facilities. If NMP contributions were missing for 2017, data reported from previous years were used, after conversion to the equivalent 2017 US$ value. The number of reported malaria cases attending public health facilities was sourced from NMP reports, adjusted for diagnosis and reporting completeness. Between 1% and 3% of uncomplicated reported malaria 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 (Cost effectiveness and strategic planning) unit cost estimates.[1] For each country, WHO-CHOICE 2010 unit cost estimates expressed in national currency were estimated for the period 2011–2017 using the gross domestic product (GDP) annual price deflator published by the World Bank[2] on 28 August 2018 and converted in base year 2010. Country-specific unit cost estimates were then converted from national currency to constant US$ 2017[2] for each year over the period 2010–2017. For each country-year, the number of adjusted reported malaria cases attending public health facilities was then multiplied by the estimated unit costs. In the absence of information on the level of care at which malaria patients attend public facilities, uncertainty around unit cost estimates was handled through probabilistic uncertainty analysis and the mean total cost of patient care service delivery was calculated from 1000 estimations. **Fig. 2.2** excludes household spending on malaria prevention and treatment.

International bilateral funding data were obtained from several sources. Data on annual planned funding from the Government of the United States of America (USA) were sourced from foreignassistance.gov/,[3] with the technical assistance of the Kaiser Family Foundation. Country-level planned funding data were available for the United States Agency for International Development (USAID). For other agencies, such as the US Centers for Disease Control and Prevention (CDC) and the US Department of Defense, country-specific planned funding data were not available; therefore, data on total annual planned funding from each of these two agencies were used for the period 2010–2017.

Disbursements from the Department for International Development (DFID) of the Government of the United Kingdom of Great Britain and Northern Ireland on funding for malaria control were extracted from the DFID management information systems for the year 2017 and converted to US$. These contributions are provisional 2017 estimates of spending on malaria control (purpose code 12262) from DFID management information systems, excluding spending by other departments of the Government of the United Kingdom. This estimate does not capture all spending which may affect malaria outcomes, because the Government of the United Kingdom supports malaria control and elimination through a broader range of interventions than those captured in this report. For the period 2010–2016, annual disbursements from the Government of the United Kingdom and all other donor countries were obtained from the Organisation for Economic Co-operation and Development (OECD) creditor reporting system (CRS) database on aid activity.[4] For each year and each funder, the country-level and regional-level project-type interventions and other technical assistance were extracted. For all donors, except the United Kingdom, the 2016 value converted to constant 2017 US$ was used as the 2017 estimated disbursement.

Annual disbursements from the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) to malaria

[1] http://www.who.int/choice/en/

[2] https://data.worldbank.org/indicator, accessed 28 August 2018

[3] https://foreignassistance.gov/

[4] https://stats.oecd.org/Index.aspx?DataSetCode=CRS1, accessed August 2018

endemic countries for the period 2010–2017 were sourced directly from the Global Fund.

Malaria financing from donors through multilateral agencies was sourced from (i) data on core contributions published by the Global Fund[1] and annual disbursements for malaria grants to malaria endemic countries between 2010 and 2017, as reported by the Global Fund; and (ii) data on the CRS and the Development Assistance Committee (DAC) members' total use of the multilateral system.[2] All funding flows were converted to the equivalent 2017 US$ value.

For (i), the amount of funding contributed by each donor was estimated as the proportion of funding paid by each donor out of the total amount received by the Global Fund in a given year, multiplied by the total amount disbursed by the Global Fund in the same year. Equal contributions were assumed every year by each donor over the 3-year periods for which data were available.

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 to multilateral agencies were not available and were therefore not included.

Fig. 2.3. Funding for malaria control and elimination 2010–2017, by channel (constant 2017 US$)

See methods notes for **Fig. 2.2** for sources of information on funding from governments of malaria endemic countries and on international funding flows.

Fig. 2.4. Funding for malaria control and elimination 2010–2017, by WHO region (constant 2017 US$)

See methods notes for **Fig. 2.2** for sources of information on funding from governments of malaria endemic countries and on international funding flows. The "unspecified" category includes all funding data for which there was no geographical information on the recipient.

Fig. 2.5. Funding for malaria control and elimination 2010–2017, by World Bank 2017 income group and source of funding (constant 2017 US$)

See methods notes for **Fig. 2.2** for sources of information on funding from governments of malaria endemic countries and on international funding flows. Data on income group classification for the 2017 calendar year were sourced from the World Bank.[3]

Fig. 2.6. Percentage change in average funding per person at risk of malaria in the periods 2012–2014 and 2015–2017, in 41 high-burden countries

See methods notes for **Fig. 2.2** for sources of information on funding from governments of malaria endemic countries and on international funding flows; methods notes for **Fig. 2.5** for sources of information on income group classifications; and methods notes for **Table 6.1**. for data on population at risk of malaria.

Fig. 2.7. Funding for malaria-related R&D 2010–2016, by research area (constant US$ 2017)

Data on funding for malaria-related research and development for 2010–2016 were collected directly from 2017 G-FINDER data from Policy Cures Research.[4] All data were converted to constant 2017 US$.

Fig. 2.8. Flows of funding for malaria-related R&D for the period 2010–2016: from sources to research areas (constant US$ 2017)

See methods notes for **Fig. 2.7**.

Fig. 2.9. Number of ITNs delivered by manufacturers and distributed by NMPs, 2010–2017

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 NMP reports were used for the number of ITNs distributed within countries.

Fig. 2.10. Percentage of total ITNs distributed to communities globally in the period 2015–2017, and access to ITNs by population at risk (one ITN for every two people) in 2017 in countries that account for 80% of ITNs distributed globally in the period 2015–2017

Data on the number of ITNs distributed in 2015–2017 and the population at risk in 2017 were used to compute the

[1] https://www.theglobalfund.org/en/government/, accessed 30 June 2018
[2] https://stats.oecd.org/Index.aspx?DataSetCode=CRS1, accessed 1 October 2018
[3] https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups, accessed 30 September 2018
[4] https://gfinder.policycuresresearch.org/PublicSearchTool/, accessed 01 October 2018

ITN per capita by 2017, assuming nets distributed in the past 3 years remained effective.

Fig. 2.11. Number of RDTs sold by manufacturers and distributed by NMPs for use in testing suspected malaria cases, 2010–2017

The numbers of rapid diagnostic tests (RDTs) distributed by WHO region are the annual totals reported as having been distributed by NMPs. 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. 2.12. Malaria patients examined using RDT and microscopy, and percentage of suspected cases tested in health facilities in sub-Saharan Africa, 2010–2017

Data reported by NMPs on the number of tests (RDTs and microscopy) from the public health sector were summed to compute the number of patients examined in this sector. The number of suspected cases was computed as the number of tests plus number of presumed cases. Percentage of suspected cases who were tested was computed as percentage of number of cases examined divided by number of suspected cases.

Fig. 2.13. Number of ACT treatment courses delivered by manufacturers and distributed by NMPs to patients, 2010–2017

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 NMP reports to WHO.

Fig. 2.14. Ratio of ACT treatment courses distributed to diagnostic tests performed (RDTs or microscopy) and test positivity rate, WHO African Region, 2010–2017

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 NMPs 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. Percentage of population at risk with access to an ITN and sleeping under an ITN, and percentage of households with at least one ITN and enough ITNs for all occupants, sub-Saharan Africa, 2010–2017

Estimates of ITN coverage were derived from a model developed by the Malaria Atlas Project (MAP),[1] using a two-stage process. First, we defined a mechanism for estimating net crop (i.e. the total number of ITNs in 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 crop into resulting level 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 NMPs; 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 Eswatini, Namibia, Sao Tome and Principe and South Africa, for which ITNs comprise a small proportion of vector control. Analyses were limited to populations categorized by NMPs as being at risk.

Estimating national net crops through time

As described by Flaxman et al. (*4*), 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 NMP 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

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

(i.e. the maximum number of nets that could be delivered) as the upper end of the range and the NMP-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. (*4*), 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 underdistribution, 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 not only to 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 ($ITN_{use\,all\ ages} = 0.8133 \times ITN\ access_{all\ ages} + 0.0026$, $R^2 = 0.773$). This relationship was applied to MAP'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 ($ITN\ use_{children\ under\ 5} = 0.9327 \times ITN\ access_{children\ under\ 5} + 0.0282$, $R^2 = 0.754$).

Fig. 3.2. Household ITN ownership gap, 2016 and 2017

Household ITN ownership gap was measured as the percentage of households with at least one ITN for every two people among households owning any ITN. For more details, see the methods notes for **Fig. 3.1**.

Fig. 3.3. Percentage of the population at risk protected by IRS by WHO region, 2010–2017

The number of persons protected by indoor residual spraying (IRS) was reported to WHO by NMPs. The total population of each country was taken from the 2017 revision of the *World population prospects* (*5*), and the proportion at risk of malaria was derived from NMP reports.

Fig. 3.4. Main chemical classes used for IRS by national programmes globally, 2010–2017

Data on the type of insecticide used for IRS were reported to WHO by NMPs. 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 2010–2017, this method of imputation was used for an average of 19 countries each year.

Fig. 3.5. Percentage of pregnant women attending ANC at least once and receiving IPTp, by dose, sub-Saharan Africa, 2010–2017

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. (*6*). 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 is not available for the specific year. Among 39 countries with IPTp policy, IPTp1 and IPTp2 dose coverage could be calculated for 35 countries and IPTp3 for 33 countries.

Fig. 3.6. Maps of countries and subnational areas where SMC has been implemented, as of 2017

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

Fig. 3.7. Number of SMC target children and treatments administered in SMC implementation countries in 2017

Data were provided by the SMC Working Group.

Diagnostic testing and treatment

We first selected for inclusion all nationally representative household surveys – demographic and health surveys (DHS) and malaria indicator surveys (MIS) – conducted between 2015 and 2017 (and released before 10 August 2018), for which data on malaria case management were available. Sub-Saharan Africa is the region that carries the highest share of the global malaria burden, and more surveys were available from there than from other regions; hence, only surveys conducted in that region were included in the analyses. Data were only available for children aged between 6 and 59 months because DHS and MIS focus on the most vulnerable population groups. Interviewers ask caregivers whether the child has had fever in the 2 weeks preceding the interview and, if so, where care was sought; whether the child received a finger or heel stick as part of the care; what treatment was received for the fever and when; and, in particular, whether the child received an ACT or other antimalarial medicine. In addition to self-reported data, DHS and MIS also include biomarker testing for malaria, using RDTs that detect the *Plasmodium falciparum* parasite histidine-rich protein 2 (HRP2). Percentages were calculated for each country each year. Median values and interquartile ranges (IQRs) were then calculated using percentages at country level in 3-year overlapping intervals. For cross-sectional analysis over the period 2015–2017, in cases where more than one dataset was available for a country, the most recent survey was used. For trend analysis from 2010–2012 to 2015–2017, all surveys in all countries for all years were included.

The use of household survey data has several limitations. One issue is that, because of difficulty recalling past events, respondents may not provide reliable information, especially on episodes of fever and the identity of prescribed medicines, resulting in a misclassification of drugs. Also, because respondents can choose more than one source of care for one episode of fever, and because the diagnostic test and treatment question is asked broadly and is therefore not linked to any specific source of care, it has been assumed that the diagnostic test and treatment were received in all the selected sources of care. However, in several places, only a low percentage (45%) of febrile children have been brought for care. Data may also be biased by the seasonality of survey data collection because DHS surveys are carried out at various times during the year and MIS surveys are usually timed to correspond with the high malaria transmission season. Another limitation is that DHS and MIS household surveys are done intermittently, or not at all in some countries, resulting in a relatively small number of countries for the region of sub-Saharan Africa or for any one 3-year period when undertaking trend analysis. Countries are also not the same across each 3-year period. In addition, depending on the sample size of the survey, the denominator for some indicators can be small – countries where the number of children in the denominator was less than 10 were excluded from the calculation.

Fig. 4.1. Median percentage of children who had a fever in the 2 weeks preceding the survey, overall and in each age group, sub-Saharan Africa, 2015–2017

Estimates were derived from 19 nationally representative household surveys (DHS and MIS) conducted between 2015 and 2017 in Angola, Burundi, Chad, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, Togo, Uganda, United Republic of Tanzania and Zimbabwe. The numerator was the number of children who had a fever in the 2 weeks preceding the survey, and the denominator was the number of children aged under 5 years.

Fig. 4.2. Disparities in the median percentage of febrile children by wealth quintile, residence, mother's education level and child's gender, sub-Saharan Africa, 2015–2017

Estimates were derived from 19 nationally representative household surveys (DHS and MIS) conducted between 2015 and 2017 in Angola, Burundi, Chad, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, Togo, Uganda, United Republic of Tanzania and Zimbabwe. The numerator was the number of children who had a fever in the 2 weeks preceding the survey, and the denominator was the number of children aged under 5 years, by wealth quintile, residence, mother's education level and gender of the child.

Fig. 4.3. Median percentage of febrile children by treatment seeking behaviour, sub-Saharan Africa, 2015–2017

Estimates were derived from 19 nationally representative household surveys (DHS and MIS) conducted between 2015 and 2017 in Angola, Burundi, Chad, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, Togo, Uganda, United Republic of Tanzania and Zimbabwe. The numerator was the number of febrile children in each health sector where care was sought, and the

denominator was the number of febrile children aged under 5 years. Note that respondents could choose more than one source of care for one episode of fever. Community health worker (CHW) data were based on 13 countries: Burundi, Chad, Ghana, Liberia, Madagascar, Mali, Mozambique, Malawi, Nigeria, Rwanda, Senegal, Togo and Uganda.

Fig. 4.4. Disparities in the median percentage of febrile children brought for care by wealth quintile, residence, mother's education level and child's gender, sub-Saharan Africa, 2015–2017

Estimates were derived from 19 nationally representative household surveys (DHS and MIS) conducted between 2015 and 2017 in Angola, Burundi, Chad, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, Togo, Uganda, United Republic of Tanzania and Zimbabwe. The numerator was the number of febrile children for whom care was sought, and the denominator was the number of febrile children aged under 5 years, by wealth quintile, residence, mother's education level and gender of the child.

Fig. 4.5. Median percentage of febrile children brought for care who received a blood test, overall and in each health sector, sub-Saharan Africa, 2015–2017

Estimates were derived from 18 nationally representative household surveys (DHS and MIS) conducted between 2015 and 2017 in Angola, Burundi, Chad, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, Togo, Uganda, United Republic of Tanzania and Zimbabwe. The numerator was the number of febrile children brought for care who received a blood test and the denominator was the number of febrile children aged under 5 years brought for care in any and in each health sector. CHW data were based on 10 countries: Burundi, Chad, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Togo and Uganda.

Fig. 4.6. Trend in the median percentage of febrile children brought for care who received a blood test in the public sector and the formal private sector, sub-Saharan Africa, 2010–2017

Estimates were derived from 58 nationally representative household surveys (DHS and MIS) conducted between 2010 and 2017 in 30 countries: Angola, Benin, Burkina Faso, Burundi, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of Congo, Gabon, Gambia, Ghana, Guinea, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Togo, Uganda, United Republic of Tanzania, Zambia and Zimbabwe. The numerator was the number of febrile children brought for care who received a blood test and the denominator was the number of febrile children aged under 5 years brought for care in the public and in the formal private sector. CHW data were included in the public sector and pharmacies were included in the formal private sector.

Fig. 4.7. Trend in the median percentage of febrile children brought for care who received a blood test among those who received antimalarial medicine in the public sector and the formal private sector, sub-Saharan Africa, 2010–2017

Estimates were derived from 56 nationally representative household surveys (DHS and MIS) conducted between 2010 and 2017 in 29 countries: Angola, Benin, Burkina Faso, Burundi, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of Congo, Gabon, Gambia, Ghana, Guinea, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Togo, Uganda, United Republic of Tanzania and Zambia. The numerator was the number of febrile children brought for care who received a blood test, and the denominator was the number of febrile children aged under 5 years brought for care in the public and in the formal private sector who received antimalarial medicine. CHW were included in the public sector and pharmacies were included in the formal private sector.

Fig. 4.8. Median percentage of febrile children who received antimalarial medicine, overall and in each health sector, sub-Saharan Africa, 2015–2017

Estimates were derived from 19 nationally representative household surveys (DHS and MIS) conducted between 2015 and 2017 in Angola, Burundi, Chad, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, Togo, Uganda, United Republic of Tanzania and Zimbabwe. The numerator was the number of febrile children who received antimalarial medicines, and the denominator was the number of febrile children aged under 5 years brought for care in any and in each health sector. CHW data were based on 10 countries: Burundi, Chad, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Togo and Uganda.

Fig. 4.9. Trend in the median percentage of febrile children brought for care who received antimalarial medicine in the public sector and the formal private sector, sub-Saharan Africa, 2010–2017

Estimates were derived from 64 nationally representative household surveys (DHS and MIS) conducted between 2010 and 2017 in 32 countries: Angola, Benin, Burkina Faso, Burundi, Cameroon, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of Congo, Ethiopia,

Gabon, Gambia, Ghana, Guinea, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Togo, Uganda, United Republic of Tanzania, Zambia and Zimbabwe. The numerator was the number of febrile children who received antimalarial medicines and the denominator was the number of febrile children aged under 5 years brought for care in the public and in the formal private sector. CHW were included in the public sector and pharmacies were included in the formal private sector.

Fig. 4.10. Median percentage of febrile children who received an ACT among those treated with antimalarial medicine, overall and in each health sector, sub-Saharan Africa, 2015–2017

Estimates were derived from 18 nationally representative household surveys (DHS and MIS) conducted between 2015 and 2017 in Angola, Burundi, Chad, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, Togo, Uganda and United Republic of Tanzania. The numerator was the number of febrile children who received an ACT and the denominator was the number of febrile children aged under 5 years who were treated with antimalarial medicine in any and in each health sector. CHW data were based on 10 countries: Burundi, Chad, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Togo and Uganda.

Fig. 4.11. Median percentage of febrile children brought for care who received an ACT among those treated with antimalarial medicine in the public sector and the formal private sector, sub-Saharan Africa, 2010–2017

Estimates were derived from 54 nationally representative household surveys (DHS and MIS) conducted between 2010 and 2017 in 29 countries: Angola, Benin, Burkina Faso, Burundi, Cameroon, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of Congo, Gabon, Gambia, Ghana, Guinea, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sierra Leone, Togo, Uganda, United Republic of Tanzania and Zambia. The numerator was the number of febrile children who received an ACT, and the denominator was the number of febrile children aged under 5 years brought for care in the public and in the formal private sector who were treated with antimalarial medicine. CHW were included in the public sector and pharmacies were included in the formal private sector.

Table 4.1. Status of iCCM policy and implementation status

A qualitative survey of iCCM status based on a questionnaire developed by WHO-GMP was sent to WHO country offices in AFRO to be completed by NMPs. Data were obtained from 21 high-burden countries as summarized in **Table 4.1**.

Fig. 5.1. Public health sector testing rates and reporting rates in 2017, as well as treatment seeking for fever in children aged under 5 years, in most recent household surveys

Data on treatment seeking was obtained from household surveys that recorded the care-seeking behaviour for children aged under 5 years. Testing rates were computed from NMP reports as the number of tests (RDTs and microscopy) performed in the public health sector divided by the number of suspected cases (tested plus presumed). Reporting rates were as submitted by NMPs to WHO, and were not verified through in-country surveillance system assessments.

Table 6.1. Estimated malaria cases, 2010–2017

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 (*7*), combines data reported by NMPs (reported cases, reporting completeness and likelihood that cases are parasite positive) with data obtained from nationally representative household surveys on health-service use. Briefly:

$$T = (a + (c \times e))/d \times (1+f/g+(1-g-h)/2/g)$$

where:
a is malaria cases confirmed in public sector
b is suspected cases tested
c is presumed cases (not tested but treated as malaria)
d is reporting completeness
e is test positivity rate (malaria positive fraction) = a/b
f is cases in public sector, calculated by $(a + (c \times e))/d$
g is treatment seeking fraction in public sector
h is treatment seeking fraction in private sector
i is fraction not seeking treatment, calculated by $(1-g-h)/2$
j is cases in private sector, calculated by $f \times h/g$
k is cases not in private and not in public, calculated by $f \times i/q$
T is total cases, calculated by $f + j + k$.

To estimate the uncertainty around the number of cases, the test positivity rate (**Fig. 2.14**) was assumed to have a normal distribution centred on the *Test positivity rate* value and standard deviation, defined as $0.244 \times \text{Test positivity rate}^{0.5547}$ and truncated to be in the range 0, 1. *Reporting completeness*, when reported as range or below 80%, was assumed to have one of three

distributions, depending on the value reported by the NMP. If the value was greater than 80% then 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 (*8*). If the reporting completeness was reported as a value and was greater than 80%, a beta distribution was assumed with a mean value of the reported value (maximum of 95%) and confidence intervals (CIs) of 5% round the mean value. The fraction of children for whom care was sought in the *public sector* and in the *private sector* (**Fig. 4.3**) 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% CIs divided by 4. The fraction for whom care was *not sought* was assumed to have a rectangular distribution, with the lower limit being 0 and the upper limit calculated as 1 minus the proportion that sought care in public or private sector.

Values for the fractions seeking care were linearly interpolated between the years that had 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 for any year in the country, a mixture of the distribution of the region for that year. Confidence intervals were obtained from 10 000 drawns of the convoluted distributions. The data were analysed using the R statistical software (*9*). Method 1 was used for Afghanistan, Bangladesh, Bolivia (Plurinational State of), Botswana, Brazil, Cambodia, Colombia, Dominican Republic, Eritrea, Ethiopia, French Guiana, Gambia, Guatemala, Guyana, Haiti, Honduras, India, Indonesia, Lao People's Democratic Republic, Madagascar, Mauritania, Mayotte, Myanmar, Namibia, Nepal, Nicaragua, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Rwanda, Senegal, Solomon Islands, Timor-Leste, 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, estimated as the ratio of the test positivity rate in the active case detection over the test positivity rate for the passive and case detection. This factor was assumed to have a normal distribution, with mean value and standard deviation calculated from the values reported in 2010. Bangladesh, Bolivia, Botswana, Brazil, Cabo Verde, Colombia, Dominican Republic, French Guiana, Guatemala, Guyana, Haiti, Honduras, Myanmar (since 2013), Rwanda, Suriname and Venezuela (Bolivarian Republic of) report cases from the private and public sector together; therefore, no adjustment for private sector seeking treatment was made.

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 *P. 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 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 (*10*). 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 was 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 were 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 and countries in prevention of reintroduction, the number of indigenous cases registered by the NMPs are reported without further

[1] For methods used by MAP to develop maps, see www.map.ox.ac.uk/making-maps/.

adjustments. The countries in this category were Algeria, Argentina, Armenia, Azerbaijan, Belize, Bhutan, Cabo Verde, China, Comoros, Costa Rica, Democratic People's Republic of Korea, Ecuador, Egypt, El Salvador, Eswatini, Georgia, Iran (Islamic Republic of), Iraq, Kazakhstan, Kyrgyzstan, Malaysia, Mexico, Morocco, Oman, Paraguay, Republic of Korea, Sao Tome and Principe, Saudi Arabia, South Africa, Sri Lanka, Suriname, Syrian Arab Republic, Tajikistan, Thailand, Turkey, Turkmenistan, United Arab Emirates and Uzbekistan.

The number of malaria cases caused by *P. vivax* in each country was estimated by multiplying the country's reported proportion of vivax cases, computed as 1-*P. falciparum*, 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% above or below 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 the population at high, low or no risk of malaria was provided by NMPs. 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, 2017

See methods notes for **Table 6.1**.

Fig. 6.1. Estimated malaria cases (millions) by WHO region, 2017

See methods notes for **Table 6.1**.

Fig. 6.2. Estimated country share of (a) total malaria cases and (b) vivax malaria cases, 2017

See methods notes for **Table 6.1**.

Fig. 6.3. Number of countries and areas where a reduction (green) or an increase (red) of more than 20% in malaria cases has occurred between 2016 and 2017, by WHO region

See methods notes for **Table 6.1**.

Fig. 6.4. Number of countries in which total malaria cases exceeded 300 000 cases in 2017, and a reduction (green) or an increase (red) of more than 100 000 malaria cases occurred between 2016 and 2017, by WHO region

Estimated cases were used to select countries with more than 300 000 cases in 2017 (an arbitrary threshold for moderate to high burden) in which there was a reduction or an increase of more than 100 000 cases between 2016 and 2017.

Fig. 6.5. Trends in malaria case incidence rate (cases per 1000 population at risk), globally and by WHO region, 2010–2017

See methods notes for **Table 6.1**.

Table 6.3. Estimated number of malaria deaths by WHO region, 2010–2017

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 (*11–13*) and rates from unpublished data from Indonesia, 2004–2009 (Dr Ric Price, Menzies School of Health Research, Australia, personal communication [November 2014]). The proportion of deaths then follows 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. (*14*), 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 aged under 5 years was estimated as: $Proportion\ of\ deaths_{under\ 5} = -0.2288 \times Mortality_{overall}^{2} + 0.823 \times Mortality_{overall} + 0.2239$, where the $Mortality_{overall}$ is the number of estimated deaths over the population at risk per 1000 (see **Annex 3.F** for national estimates of population at risk). Countries and areas where this method was used were Afghanistan, Armenia, Azerbaijan, Bangladesh, Bolivia (Plurinational State of), Botswana, Cambodia, Comoros, Djibouti, Dominican Republic, Eritrea, Eswatini, 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, 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 WHO Maternal and Child Health Epidemiology Estimation Group (MCEE) to estimate causes of death in children aged 1–59 months (*15*). 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 (*16*), 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 the 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 number of indigenous malaria deaths registered by the NMPs 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. 6.6. Trends in malaria mortality rate (deaths per 100 000 population at risk), globally and in the WHO African Region, 2010–2017

See methods notes for **Table 6.3**.

Fig. 6.7. Trends in malaria mortality rate (deaths per 100 000 population at risk) in select WHO regions, 2010–2017

See methods notes for **Table 6.3**.

Fig. 6.8. Percentage of estimated malaria deaths attributable to the 18 countries with nearly 80% of global malaria deaths in 2017

See methods notes for **Table 6.3**.

Fig. 6.9. Hb concentration (g/dL) in children aged under 5 years in sub-Saharan Africa, 2015–2017, by age and malaria infection status

Estimates were derived from 16 nationally representative household surveys (DHS and MIS) conducted between 2015 and 2017 in Angola, Burundi, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, Togo, Uganda and United Republic of Tanzania. Mean haemoglobin (Hb) concentration level in g/dL adjusted for age and altitude were calculated for each country, by malaria infection status and age. Biologically implausible Hb values (<25 g/L or >200 g/L) were excluded. The minimum, first quartile, median, third quartile and maximum were then calculated using means at country level, to generate statistics at the regional level. The methods notes for **Section 4** provide more details about the limitations related to the use of DHS and MIS data.

Fig. 6.10. Prevalence of severe anaemia meeting the threshold requiring blood transfusion according to WHO (<7 g/dL) in children aged under 5 years in sub-Saharan Africa, 2015–2017, by age and malaria infection status

Estimates were derived from 16 nationally representative household surveys (DHS and MIS) conducted between 2015 and 2017 in Angola, Burundi, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, Togo, Uganda and United Republic of Tanzania. The numerator was the number of children in each category: not anaemic (Hb >11 g/dL), mild anaemia (Hb 10–11 g/dL), moderate anaemia (Hb 7–10 g/dL) and severe anaemia (Hb <7 g/dL), and the denominator was the number of children aged under 5 years. The methods notes for **Section 4** provide more details about the limitations related to the use of DHS and MIS data.

Table 6.4. Comparisons of estimated malaria cases (millions) using the parasite rate-to-incidence model and the reported data from the routine public health sector in high-burden countries of the WHO African Region, 2017

Data were derived from NMP reports; see also the methods notes for **Table 6.1**.

Annex 1 – Data sources and methods

Table 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 NMPs.

Fig. 7.1. Median number of indigenous malaria cases in the years before attaining zero indigenous cases for 16 countries that eliminated malaria, 2007–2017

For 16 countries that attained zero indigenous cases for 3 consecutive years between 2007 and 2017, the number of NMP-reported indigenous cases was tabulated according to the number of years preceding the attainment of zero cases. These 16 countries are: Algeria, Argentina, Armenia, Azerbaijan, Egypt, Georgia, Iraq, Kyrgyzstan, Morocco, Oman, Paraguay, Sri Lanka, Syrian Arab Republic, Turkey, Turkmenistan and Uzbekistan. 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 it would be if cases from all years were included (because some increases are excluded). In some earlier years where data on indigenous case 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).

Fig. 7.2. Number of countries that were malaria endemic in 2000 with fewer than 10, 100, 1000 and 10 000 indigenous malaria cases in 2010 and 2017

For the 16 countries that attained zero indigenous cases for 3 consecutive years between 2000 and 2017, the number of NMP-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 7.2. Trends in indigenous malaria cases in the E-2020 countries

Data were derived from NMP reports.

Fig. 8.1. Expected change in malaria case incidence if on target to meet GTS milestones for 2020 versus estimated change in case incidence between 2015 and 2017

Using 2015 as the GTS (*1*) baseline, percentage change in malaria incidence rate (cases per 1000 population at risk) required to achieve the 2020 target of 40% reduction in case incidence was computed as the reference line. Using the estimated case incidence rate at 2015 as the actual country baseline, progress was plotted for each country, to determine its location on the reference line.

Fig. 8.2. Number of ACTs with high failure rates in the treatment of *P. falciparum* infections

Data were derived from the WHO global database on antimalarial drug efficacy and resistance (*17*).

Fig. 8.3. Best-fit estimates of pyrethroid resistance frequency in *An. funestus s.l.*, *An. gambiae s.l.* and other malaria vectors for 2010–2016

Pyrethroid resistance frequency is defined as the proportion of surviving mosquitoes in discriminating concentration bioassays with a pyrethroid insecticide. Estimates were generated through bootstrapping methods, using the data collated from submissions to WHO by NMPs, the African Network for Vector Resistance, Liverpool School of Tropical Medicine, MAP and the US President's Malaria Initiative, and extracted from other scientific publications. Further details are included in the WHO *Global report on insecticide resistance in malaria vectors: 2010–2016* (*18*).

Fig. 8.4. Reported insecticide resistance status as a percentage of sites for which monitoring was conducted by WHO region, 2010–2017

Insecticide resistance monitoring results were collated from data submissions to WHO by NMPs, the African Network for Vector Resistance, Liverpool School of Tropical Medicine, MAP 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. Where multiple insecticide classes or types, mosquito species or time points were tested at an individual site, the highest resistance status was considered.

Fig. 8.5. Status of national insecticide resistance monitoring and management plans, as of October 2018

The status of the plans was reported to WHO by NMPs and the African Leaders Malaria Alliance.

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Annex 2 - A. Regional profile: West Africa

Epidemiology

Population at risk: 374 million

Parasites: *P. falciparum* (almost 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 (US$), 2010–2017

534.3 million (2010), 546.5 million (2015), 746.4 million (2017); increase 2010–2017: 40%

Proportion of domestic source* in 2017: 11%

Regional funding mechanisms: Senegal River Basin Development Organization (OMVS): Guinea, Mali, Mauritania and Senegal

[a] Domestic source excludes patient service delivery costs and out-of-pocket expenditure.

Interventions, 2010–2017

Countries with ≥80% coverage with either LLIN or IRS in 2017: none

Countries with ≥50% coverage with either LLIN or IRS in 2017: Burkina Faso, Côte d'Ivoire, Ghana, Guinea, Guinea-Bissau, Mali, Niger, Senegal, Sierra Leone and Togo

Countries with IPTp3 or more in 2017: Benin, Burkina Faso, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Senegal, Sierra Leone and Togo

Countries with >30% IPTp3 or more in 2017: Burkina Faso, Côte d'Ivoire, Ghana, Senegal and Togo

Percentage of suspected cases tested (reported): 44% (2010), 71% (2015), 81% (2017)

Percentage of cases potentially treated with ACT: 96% (2010), 100% (2015), 66% (2017)

Reported cases and deaths, 2010–2017

Total presumed and confirmed cases: 29.1 million (2010), 52.0 million (2015), 57.9 million (2017); increase 2010–2017: 99%; increase 2015–2017: 11%

Total confirmed cases: 6.9 million (2010), 32.7 million (2015), 41.1 million (2017); increase 2010–2017: 495%; increase 2015–2017: 26%

Total deaths: 39 000 (2010), 21 600 (2015), 18 400 (2017); decrease 2010–2017: 53%; increase 2015–2017: 15%

Children aged under 5 years, presumed and confirmed cases: 11.9 million (2010), 21.0 million (2015), 23.2 million (2017); increase 2010–2017: 94%

Children aged under 5 years, deaths: 214 000 (2010), 22 100 (2015), 20 200 (2017); decrease 2010–2017: 91%

Estimated cases and deaths, 2010–2017

Cases: 116.1 million (2010), 102.0 million (2015), 104.2 million (2017); decrease 2010–2017: 10%

Deaths: 320 000 (2010), 231 000 (2015), 205 000 (2017); decrease 2010–2017: 36%

Acceleration to elimination

Countries with nationwide elimination programme: Algeria and Cabo Verde

Zero local cases for 3 consecutive years (2015, 2016 and 2017): Algeria

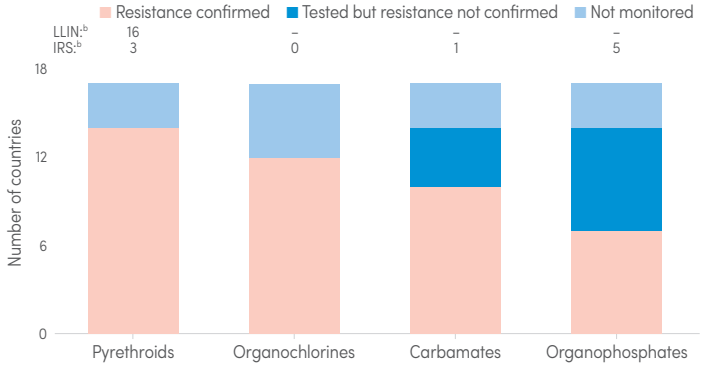
Certification in progress: Algeria

Therapeutic efficacy tests (clinical and parasitological failure, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	25 (IQR)	75 (IQR)
AL	2010–2018	54	0.0	0.0	11.9	0.0	2.3
AS–AQ	2010–2016	36	0.0	0.0	3.8	0.0	1.8
DHA–PPQ	2010–2016	8	0.0	0.0	0.9	0.0	0.0

AL: artemether-lumefantrine; AS-AQ: artesunate-amodiaquine; DHA-PPQ: dihydroartemisinin-piperaquine; IQR: interquartile range.

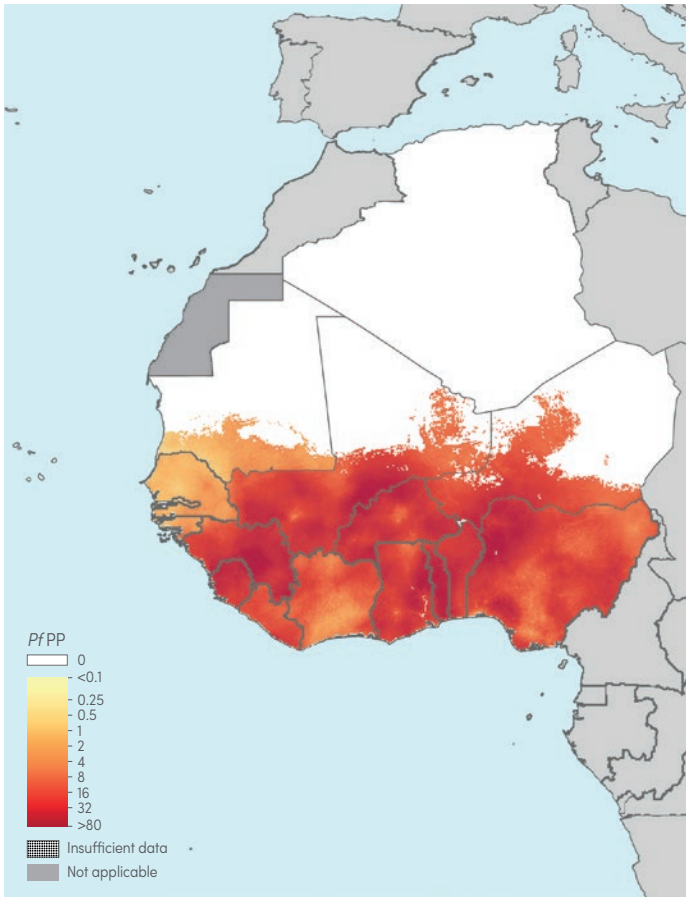
Status of insecticide resistance[a] per insecticide class (2010–2017) and use of each class for malaria vector control (2017)



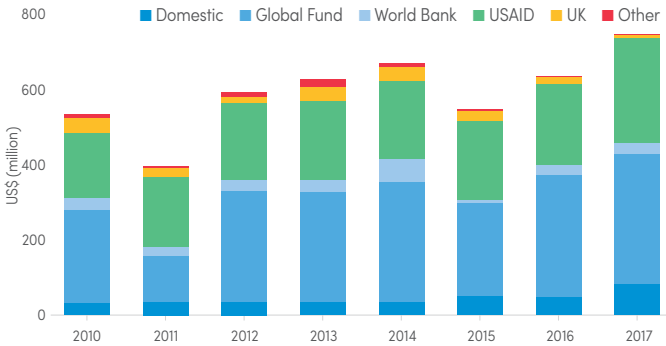
[a] Resistance is considered confirmed when it was detected to at least one insecticide in the class, in at least one malaria vector from one collection site.

[b] Number of countries that used insecticide class for malaria vector control (2017).

A. *P. falciparum* parasite prevalence (*Pf* PP), 2017

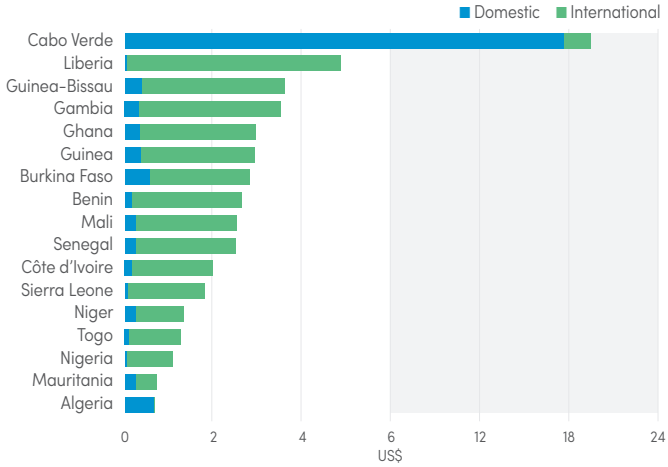


B. Malaria funding* by source, 2010–2017



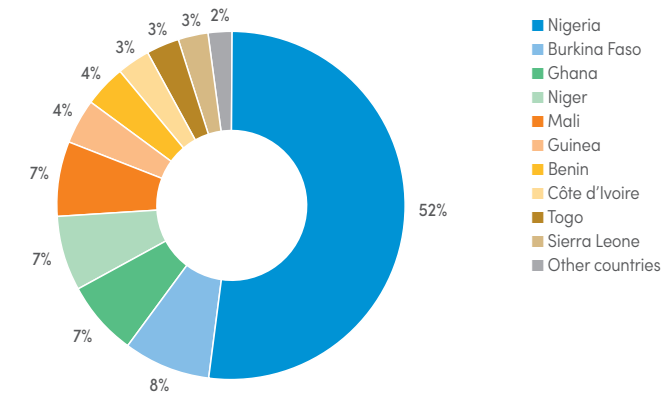
Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; USAID: United States Agency for International Development; UK: United Kingdom of Great Britain and Northern Ireland.
* Excludes patient service delivery costs and out-of-pocket expenditure.

C. Malaria funding* per person at risk, average 2015–2017

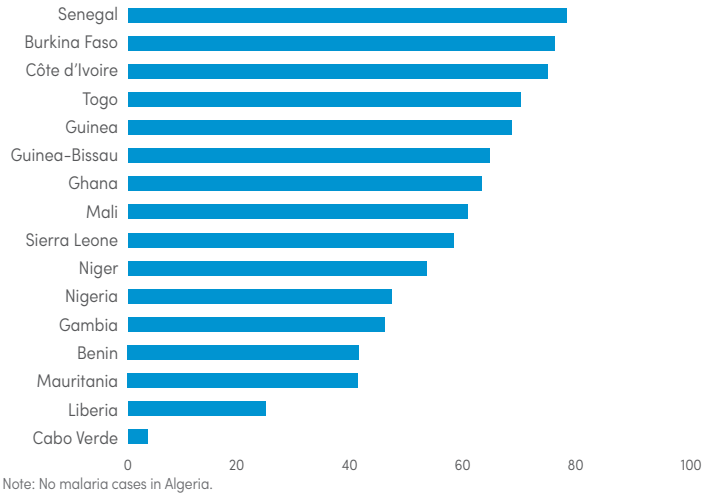


* Excludes costs related to health staff, costs at subnational level and out-of-pocket expenditure.

D. Share of estimated malaria cases, 2017

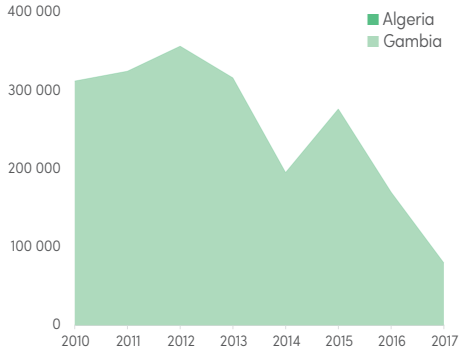


E. Percentage of population with access to either LLINs or IRS, 2017

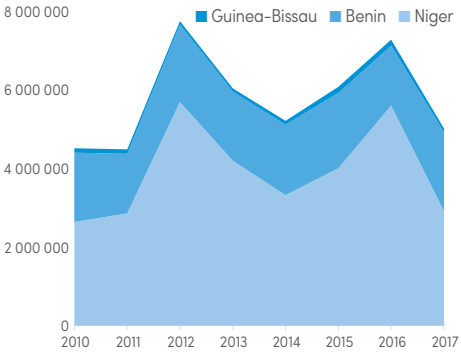


Note: No malaria cases in Algeria.

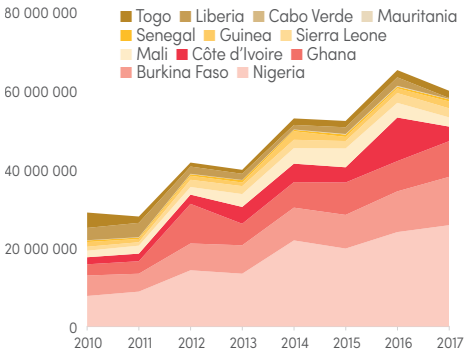
F. Countries projected to reduce case incidence by ≥40% by 2020



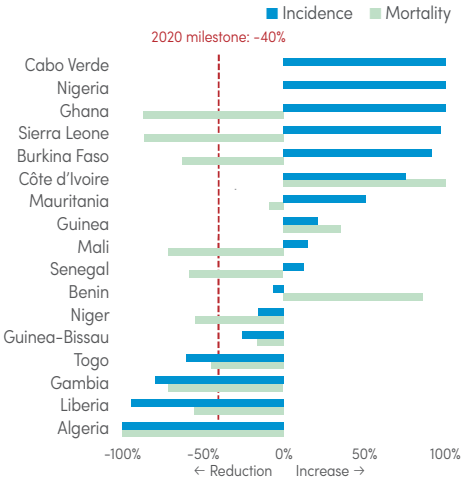
G. Countries projected to reduce case incidence by <40% by 2020



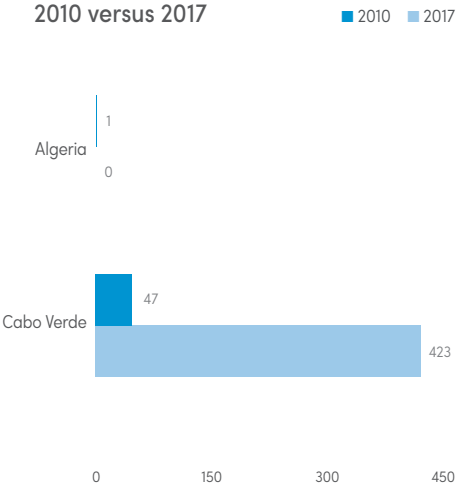
H. Countries with increase in case incidence, 2010–2017



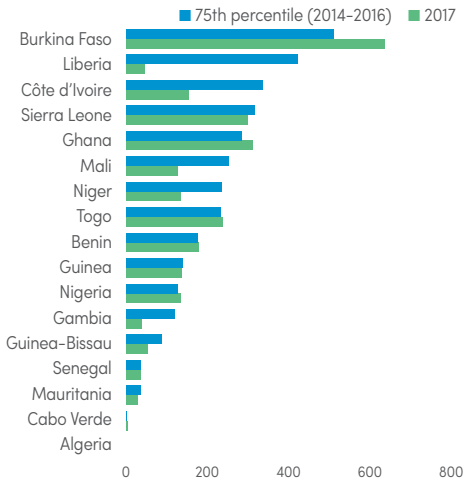
Ia. Change in reported malaria incidence and mortality rates, 2010–2017



Ib. Reported indigenous cases in countries with nationwide elimination activities, 2010 versus 2017



J. Incidence in 2017 compared to 75th percentile of 2014–2016



KEY MESSAGES

- About 374 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 nearly 104 million estimated cases and in the public health sector 41 million confirmed cases and 18 400 malaria deaths were reported. The estimated number of deaths in the subregion was about 205 000. Five countries accounted for over 80% of the estimated cases: Nigeria (52%), Burkina Faso (8%), and Ghana, Mali and Niger (each 7%).
- Algeria, with zero indigenous cases since 2014, is in the process of certification for elimination by WHO. Despite Senegal's progress in malaria reduction in recent years, the country saw an increase in 2017. The Gambia is on target for a more than 40% reduction by 2020, while Benin, Guinea-Bissau and Niger are projected to achieve 20–40% reductions. Cabo Verde reported an increase in indigenous cases, from seven cases in 2015, to 48 in 2016 to 423 in 2017 (a nearly ninefold increase compared with 2016). Overall, 12 countries have reported an increase in cases.
- In line with the Nouakchott Declaration and the new Sahel Malaria Elimination Initiative (SaME), eight ministers of the Sahelian countries (Burkina Faso, Cabo Verde, Chad, the Gambia, Mali, Mauritania, Niger and Senegal) committed on 31 August 2018 to accelerate implementation, with the aim of eliminating malaria by 2030. In addition to Cabo Verde as an eliminating country, the Gambia, Mauritania, Niger and Senegal are reorienting their programmes towards malaria subnational elimination.
- Vector resistance to pyrethroids was confirmed in most of the countries, and resistance to organochlorines and carbamates was confirmed in more than half of the countries. Algeria, the Gambia and Guinea-Bissau have not reported standard resistance monitoring to any of the four insecticide classes.
- Challenges include inadequate political commitment and leadership, weak malaria programme management, insufficient 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: 174 million

Parasites: *P. falciparum* (100%)

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

Funding (US$), 2010–2017

240.2 million (2010), 357.8 million (2015), 349.4 million (2017); increase 2010–2017: 45%

Proportion of domestic source* in 2017: 6%

Regional funding mechanisms: none

* Domestic source excludes patient service delivery costs and out-of-pocket expenditure.

Interventions, 2010–2017

Countries with ≥80% coverage with either LLIN or IRS in 2017: Sao Tome and Principe

Countries with ≥50% coverage with either LLIN or IRS in 2017: Burundi, Cameroon, Central African Republic and Democratic Republic of the Congo

Countries with IPTp3 or more in 2017: Angola, Burundi, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of the Congo and Gabon

Countries with >30% IPTp3 or more in 2017: Burundi, Cameroon and Democratic Republic of the Congo

Percentage of suspected cases tested (reported): 41% (2010), 92% (2015), 93% (2017)

Percentage of cases potentially treated with ACT: 98% (2010), 73% (2015), 81% (2017)

Reported cases and deaths, 2010–2017

Total presumed and confirmed cases: 20.4 million (2010), 25.4 million (2015), 34.1 million (2017); increase 2010–2017: 67%; increase 2015–2017: 34%

Total confirmed cases: 6.3 million (2010), 22.2 million (2015), 30.4 million (2017); increase 2010–2017: 383%; increase 2015–2017: 37%

Total deaths: 40 400 (2010), 58 200 (2015), 55 300 (2017); increase 2010–2017: 37%; decrease 2015–2017: 5%

Children aged under 5 years, presumed and confirmed cases: 9.1 million (2010), 11.3 million (2015), 15.4 million (2017); increase 2010–2017: 69%

Children aged under 5 years, deaths: 26 000 (2010), 37 100 (2015), 34 700 (2017); increase 2010–2017: 33%

Estimated cases and deaths, 2010–2017

Cases: 41.0 million (2010), 43.9 million (2015), 45.5 million (2017); increase 2010–2017: 11%

Deaths: 117 700 (2010), 94 100 (2015), 92 300 (2017); decrease 2010–2017: 22%

Acceleration to elimination

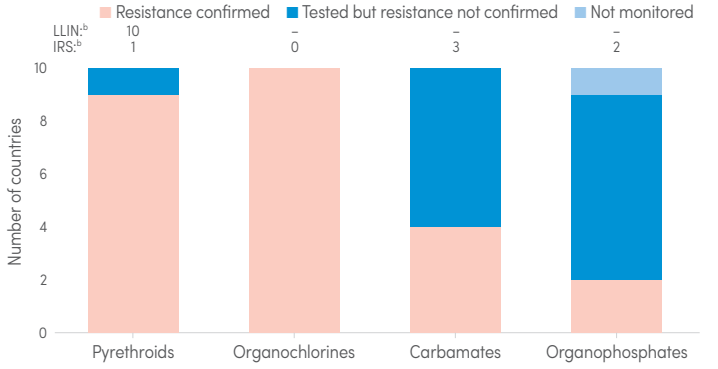
Countries with subnational elimination programme: Sao Tome and Principe

Therapeutic efficacy tests (clinical and parasitological failure, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	25 (IQR)	75 (IQR)
AL	2010–2018	25	0.0	2.1	13.6	0.0	3.6
AS-AQ	2010–2017	27	0.0	1.1	7.7	0.0	3.8

AL: artemether-lumefantrine; AS-AQ: artesunate-amodiaquine; IQR: interquartile range.

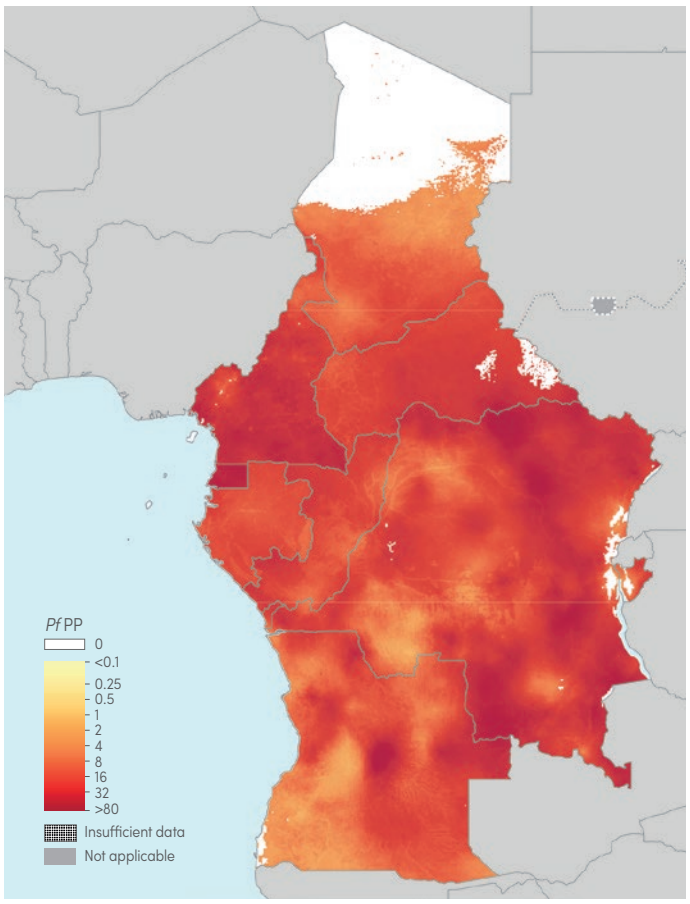
Status of insecticide resistance[a] per insecticide class (2010–2017) and use of each class for malaria vector control (2017)



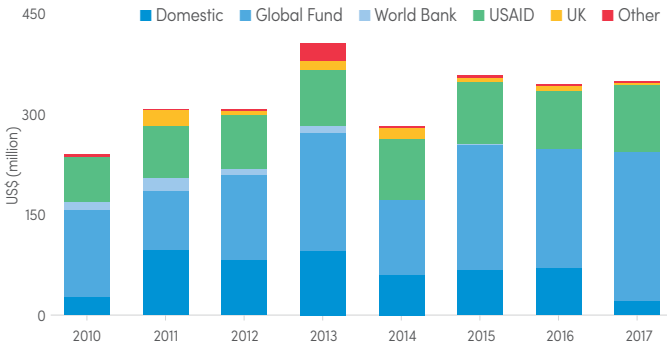
[a] Resistance is considered confirmed when it was detected to at least one insecticide in the class, in at least one malaria vector from one collection site.

[b] Number of countries that used insecticide class for malaria vector control (2017).

A. *P. falciparum* parasite prevalence (*Pf* PP), 2017



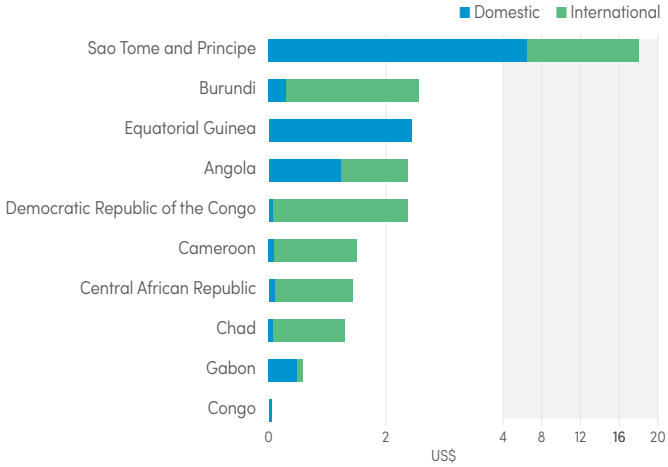
B. Malaria funding* by source, 2010–2017



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

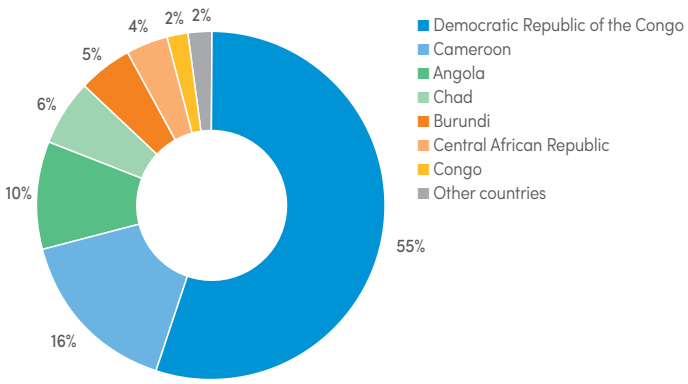
* Excludes patient service delivery costs and out-of-pocket expenditure.

C. Malaria funding* per person at risk, average 2015–2017

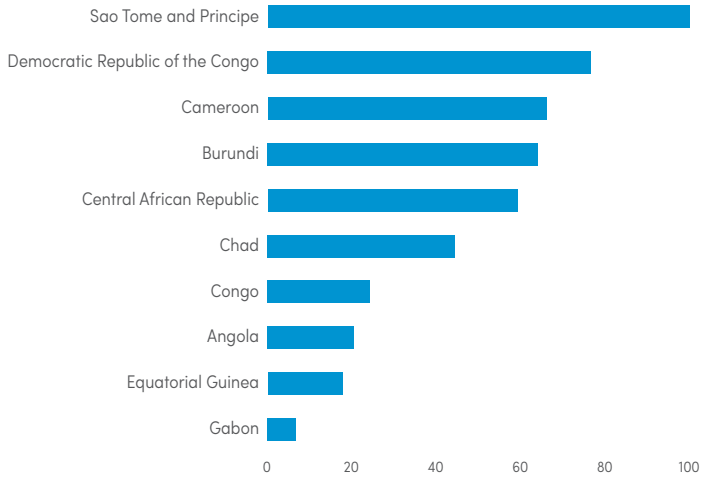


* Excludes costs related to health staff, costs at subnational level and out-of-pocket expenditure.

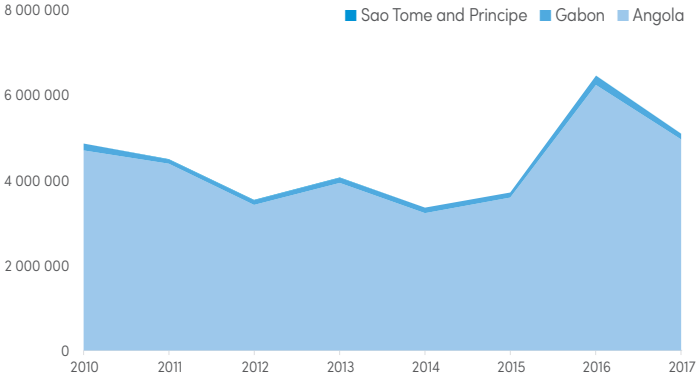
D. Share of estimated malaria cases, 2017



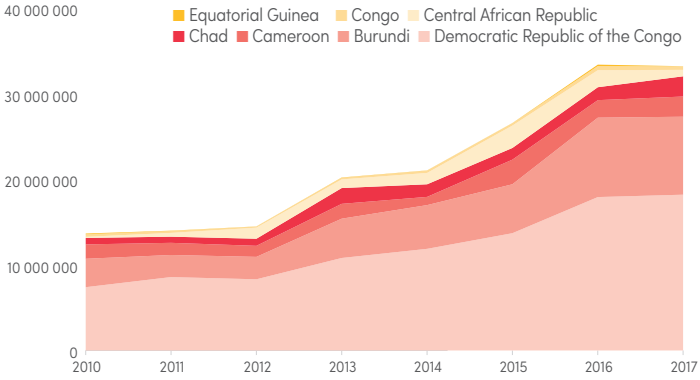
E. Percentage of population with access to either LLINs or IRS, 2017



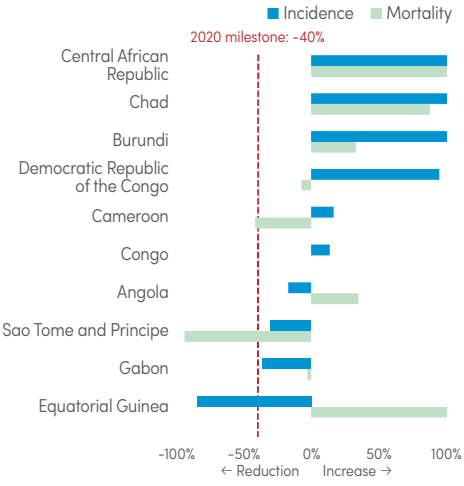
F. Countries projected to reduce case incidence by <40% by 2020



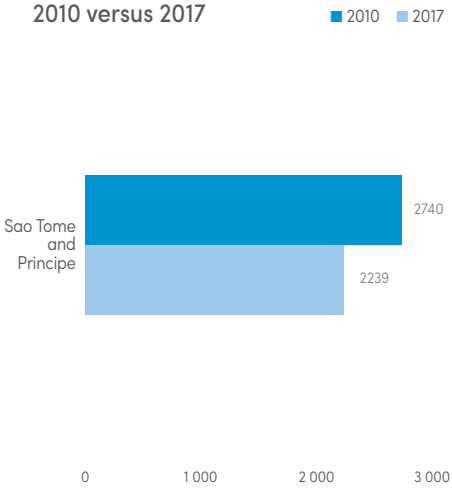
G. Countries with increase in case incidence, 2010–2017



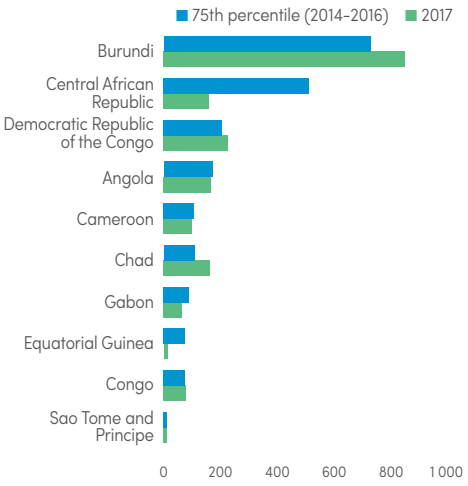
Ha. Change in reported malaria incidence and mortality rates, 2010–2017



Hb. Reported indigenous cases in countries with nationwide elimination activities, 2010 versus 2017



I. Incidence in 2017 compared to 75th percentile of 2014–2016



KEY MESSAGES

- About 174 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 the highlands of eastern Congo, Burundi, Cameroon and northern Chad.
- In 2017, the subregion had 45 million estimated cases and 92 300 estimated deaths. In the public sector, 30 million confirmed cases and 55 000 malaria deaths were reported. The Democratic Republic of the Congo accounted for 55% of estimated cases, followed by Cameroon (16%), Angola (10%), Chad (6%) and Burundi (5%). Seven countries saw an increase in cases between 2010 and 2017. Chad and Gabon had an increase of nearly 50% in reported cases between 2016 and 2017. Burundi saw a 7% decrease in reported confirmed cases during the same period – a sign of reversal of the resurgence. The increases in cases may be due to multiple factors, including improved reporting.
- Angola, Gabon and Sao Tome and Principe are on track for a 20–40% reduction in incidence by 2020. Sao Tome and Principe reported only one malaria death in 2017 after reporting zero deaths since 2014. Cameroon and the Democratic Republic of the Congo conducted LLIN mass campaigns in 2016, but the Congo, Equatorial Guinea and Gabon have failed to do this for the past 5 years, owing to a shortage of funding.
- Vector resistance to organochlorines was confirmed in all countries, and to pyrethroids in all countries except Sao Tome and Principe.
- Challenges include weak health systems, insufficient domestic and international funding, and frequent malaria outbreaks. The Congo, Equatorial Guinea and Gabon are no longer eligible for support from the Global Fund but domestic investments have so far not bridged the funding gap.

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

Epidemiology

Population at risk: 407 million

Parasites: *P. falciparum* (89%) and *P. vivax* (11%)

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

Funding (US$), 2010–2017

727.3 million (2010), 708.7 million (2015), 820.3 million (2017); increase 2010–2017: 13%

Proportion of domestic source* in 2017: 7%

Regional funding mechanisms: none

[a] Domestic source excludes patient service delivery costs and out-of-pocket expenditure.

Interventions, 2010–2017

Countries with ≥80% coverage with either LLIN or IRS in 2017: United Republic of Tanzania (mainland)

Countries with ≥50% coverage with either LLIN or IRS in 2017: Ethiopia, Kenya, Malawi, Rwanda, South Sudan, United Republic of Tanzania, Zambia and Zimbabwe

Countries with IPTp3 or more in 2017: Madagascar, South Sudan, United Republic of Tanzania (mainland) and Zambia

Countries with >30% IPTp3 or more in 2017: South Sudan, United Republic of Tanzania (mainland) and Zambia

Percentage of suspected cases tested (reported): 30% (2010), 80% (2015), 91% (2017)

Percentage of cases potentially treated with ACT: 100% (2010), 100% (2015), 100% (2017)

Reported cases and deaths, 2010–2017

Total presumed and confirmed cases: 53.2 million (2010), 56.2 million (2015), 58.9 million (2017); increase 2010–2017: 11%; increase 2015–2017: 5%

Total confirmed cases: 13.5 million (2010), 34.0 million (2015), 45.6 million (2017); increase 2010–2017: 238%; increase 2015–2017: 34%

Total deaths: 70 700 (2010), 38 300 (2015), 20 100 (2017); decrease 2010–2017: 72%; decrease 2015–2017: 48%

Children aged under 5 years, presumed and confirmed cases: 21.6 million (2010), 17.6 million (2015), 20.0 million (2017); decrease 2010–2017: 7%

Children aged under 5 years, deaths: 25 300 (2010), 10 400 (2015), 11 600 (2017); decrease 2010–2017: 54%

Estimated cases and deaths, 2010–2017

Cases: 49.1 million (2010), 47.8 million (2015), 50.6 million (2017); increase 2010–2017: 3%

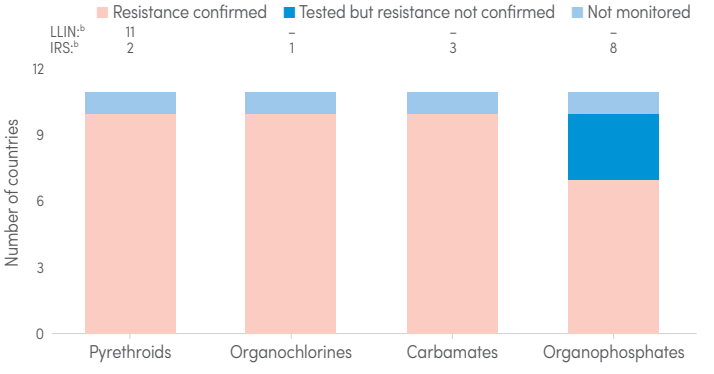
Deaths: 116 000 (2010), 105 400 (2015), 103 600 (2017); decrease 2010–2017: 11%

Therapeutic efficacy tests (clinical and parasitological failure, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	25 (IQR)	75 (IQR)
AL	2010–2016	62	0.0	1.4	19.5	0.0	3.6
AS-AQ	2011–2016	14	0.0	0.0	2.0	0.0	1.2

AL: artemether-lumefantrine; AS-AQ: artesunate-amodiaquine; IQR: interquartile range.

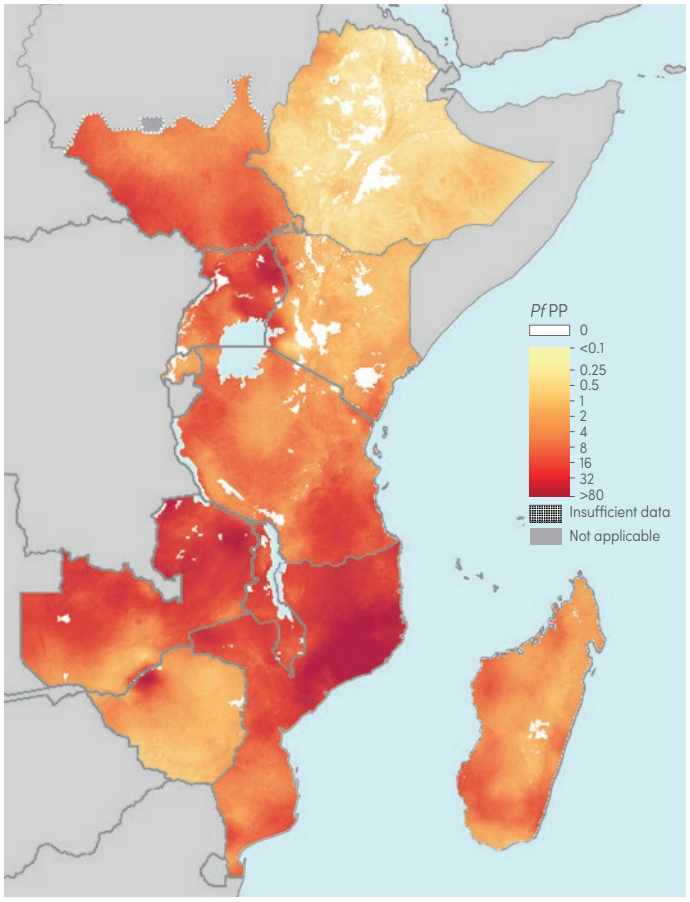
Status of insecticide resistance[a] per insecticide class (2010–2017) and use of each class for malaria vector control (2017)



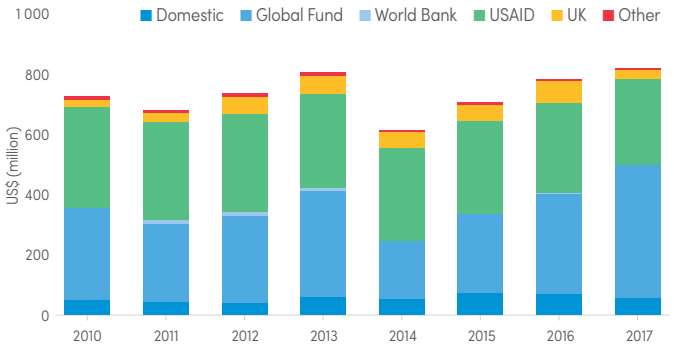
[a] Resistance is considered confirmed when it was detected to at least one insecticide in the class, in at least one malaria vector from one collection site.

[b] Number of countries that used insecticide class for malaria vector control (2017).

A. *P. falciparum* parasite prevalence (*Pf* PP), 2017

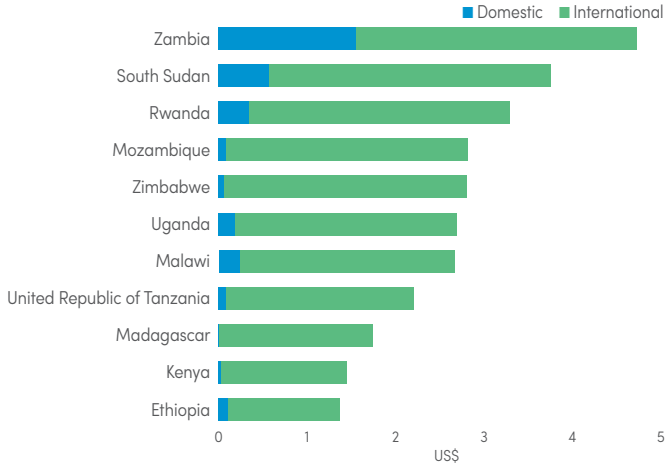


B. Malaria funding* by source, 2010–2017



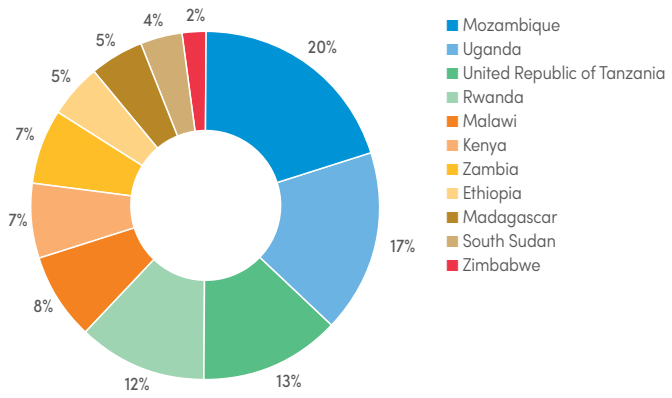
Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; USAID: United States Agency for International Development; UK: United Kingdom of Great Britain and Northern Ireland.
* Excludes patient service delivery costs and out-of-pocket expenditure.

C. Malaria funding* per person at risk, average 2015–2017

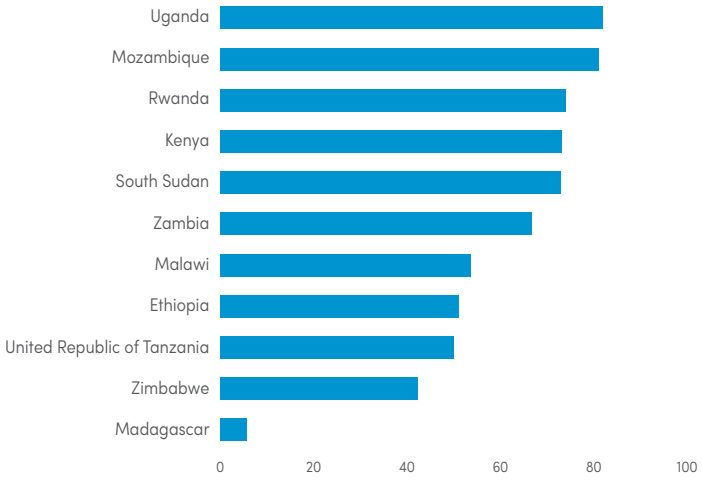


* Excludes costs related to health staff, costs at subnational level and out-of-pocket expenditure.

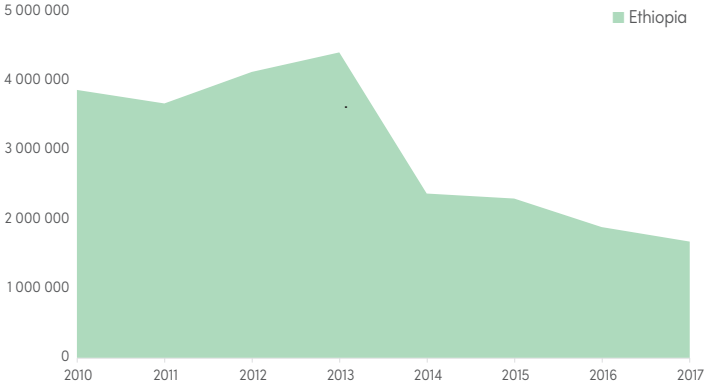
D. Share of estimated malaria cases, 2017



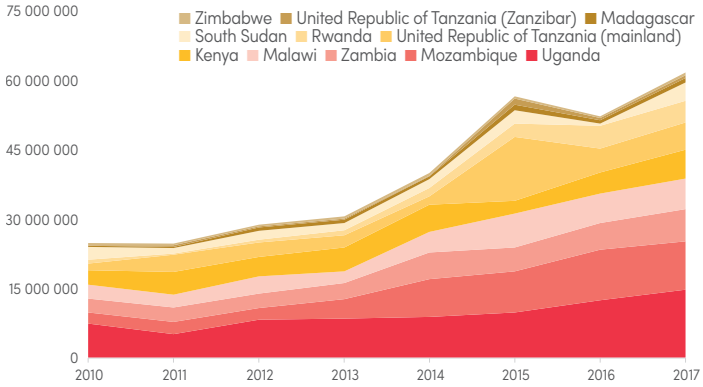
E. Percentage of population with access to either LLINs or IRS, 2017



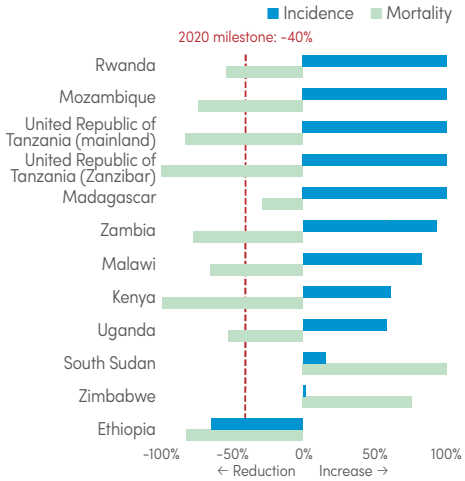
F. Countries projected to reduce case incidence by ≥40% by 2020



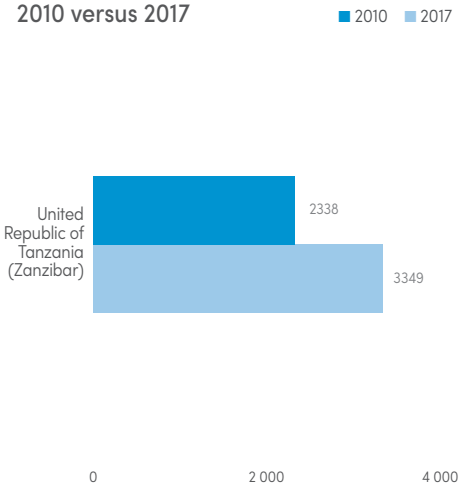
G. Countries with increase in case incidence, 2010–2017



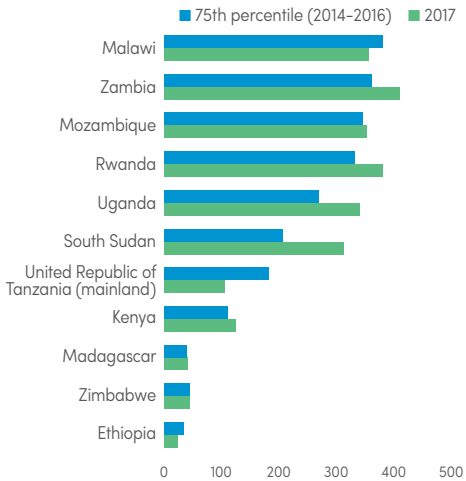
H. Change in reported malaria incidence and mortality rates, 2010–2017



I. Reported indigenous cases in countries with nationwide elimination activities, 2010 versus 2017



J. Incidence in 2017 compared to 75th percentile of 2014–2016



KEY MESSAGES

- About 407 million people in the 11 countries are at high risk. Malaria transmission is almost exclusively due to *P. falciparum* (except in Ethiopia), and it is highly seasonal in Ethiopia, Madagascar and Zimbabwe, and in coastal and highland areas of Kenya. Malaria transmission is stable in most of Malawi, Mozambique, South Sudan, Uganda, United Republic of Tanzania and Zambia.
- The subregion had nearly 51 million estimated malaria cases, and in the public health sector 46 million reported confirmed cases and 20 000 reported deaths in 2017. Estimated deaths decreased from 116 000 in 2010 to 104 000 in 2017. Three countries accounted for nearly 50% of estimated cases: Mozambique (20%), Uganda (17%) and United Republic of Tanzania (13%).
- Ethiopia is on track for a 40% reduction in incidence by 2020, whereas all other countries reported a substantial increase in cases during the period 2016–2017. Cases in Rwanda increased from 640 000 in 2010 to 3.4 million in 2016, but decreased to nearly 1.9 million in 2017 (45% since 2016). Zanzibar (United Republic of Tanzania) also reported a 33% decrease in cases (from 5015 to 3349) between 2016 and 2017. Madagascar and Uganda reported an increase of 70% and 25%, respectively, during the period 2016–2017. Causes of such increases can include inadequate vector control, climatic factors and improved reporting. In all the countries except Madagascar and Zimbabwe, more than 50% of the population had access to an LLIN in 2016.
- Vector resistance to pyrethroids, organochlorines and carbamates was confirmed in all countries except South Sudan, which did not report resistance monitoring. Resistance to organophosphates was confirmed in more than two thirds of the countries.
- Challenges include frequent epidemics, emergencies and inadequate response (South Sudan), 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 million

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

Vectors: *An. funestus, An.gambiae s.s.* and *An. gambiae*

Funding (US$), 2010–2017

66.1 million (2010), 24.9 million (2015), 38.7 million (2017); decrease 2010–2017: 41%

Proportion of domestic source* in 2017: 47%

Regional funding mechanisms: Southern Africa Malaria Elimination Eight Initiative

* Domestic source excludes patient service delivery costs and out-of-pocket expenditure.

Interventions, 2010–2017

Countries with ≥80% coverage with either LLIN or IRS in 2017: Botswana

Countries with ≥50% coverage with either LLIN or IRS in 2017: Comoros, Eritrea and Namibia

Countries with IPTp3 or more in 2017: Comoros

Countries with >30% IPTp3 or more in 2017: none

Percentage of suspected cases tested (reported): 79% (2010), 98% (2015), 100% (2017)

Percentage of cases potentially treated with ACT: 100% (2010), 100% (2015), 100% (2017)

Reported cases and deaths, 2010–2017

Total presumed and confirmed cases: 205 300 (2010), 48 000 (2015), 132 500 (2017); decrease 2010–2017: 35%; increase 2015–2017: 176%

Total confirmed cases: 82 400 (2010), 33 900 (2015), 112 700 (2017); increase 2010–2017: 37%; increase 2015–2017: 233%

Total deaths: 242 (2010), 178 (2015), 453 (2017); increase 2010–2017: 87%; increase 2015–2017: 154%

Children aged under 5 years, presumed and confirmed cases: 56 400 (2010), 7300 (2015), 16 500 (2017); decrease 2010–2017: 71%

Children aged under 5 years, deaths: 37 (2010), 16 (2015), 31 (2017); decrease 2010–2017: 16%

Estimated cases and deaths, 2010–2017

Cases: 134 000 (2010), 87 400 (2015), 235 000 (2017); increase 2010–2017: 75%

Deaths: 347 (2010), 294 (2015), 741 (2017); increase 2010–2017: 114%

Acceleration to elimination

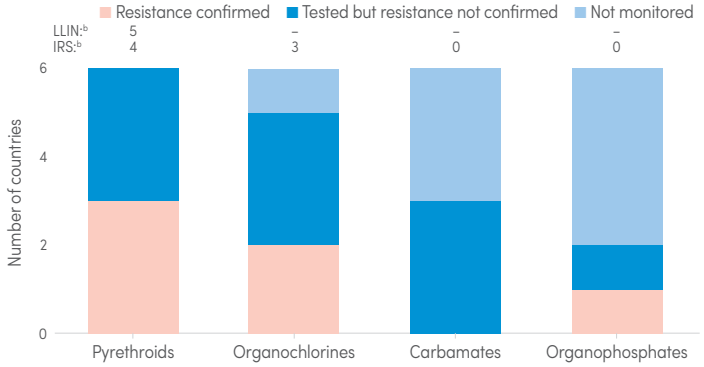
Countries with nationwide elimination programme: Botswana, Eswatini, Namibia and South Africa

Therapeutic efficacy tests (clinical and parasitological failure, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	25 (IQR)	75 (IQR)
AL	2011–2017	18	0.0	0.0	2.5	0.0	0.0
AS-AQ	2010–2016	18	0.0	2.35	7.9	0.0	5.2

AL: artemether-lumefantrine; AS-AQ: artesunate-amodiaquine; IQR: interquartile range.

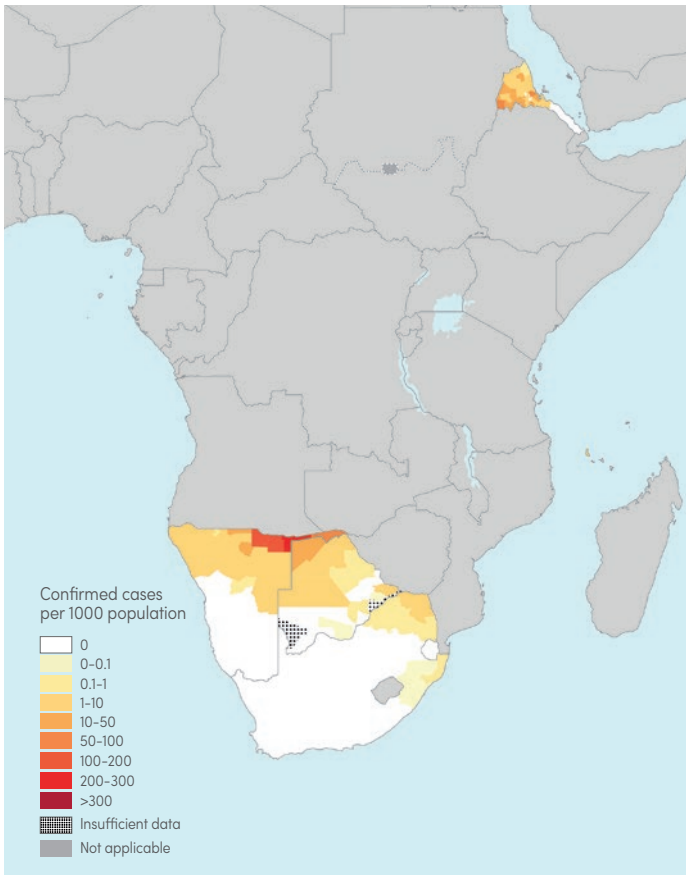
Status of insecticide resistance[a] per insecticide class (2010–2017) and use of each class for malaria vector control (2017)



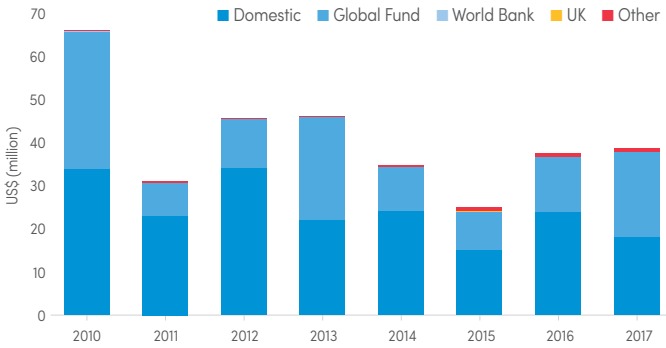
[a] Resistance is considered confirmed when it was detected to at least one insecticide in the class, in at least one malaria vector from one collection site.

[b] Number of countries that used insecticide class for malaria vector control (2017).

A. Confirmed malaria cases per 1000 population, 2017



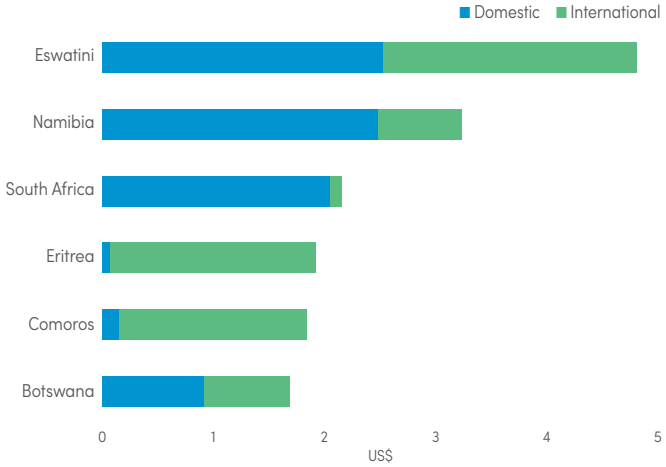
B. Malaria funding* by source, 2010–2017



Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; UK: United Kingdom of Great Britain and Northern Ireland.

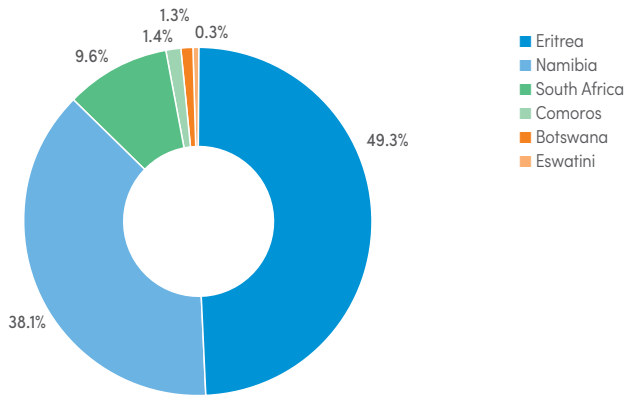
* Excludes patient service delivery costs and out-of-pocket expenditure.

C. Malaria funding* per person at risk, average 2015–2017

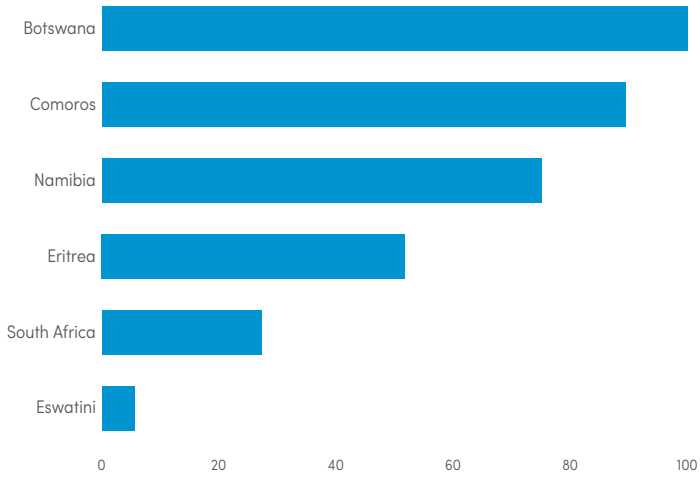


* Excludes costs related to health staff, costs at subnational level and out-of-pocket expenditure.

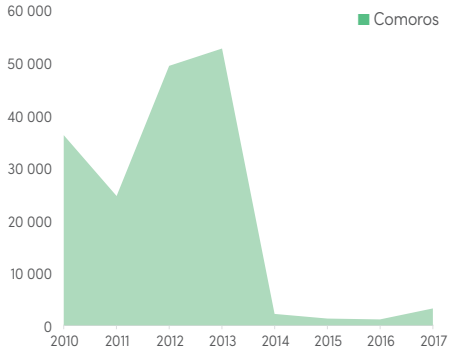
D. Share of estimated malaria cases, 2017



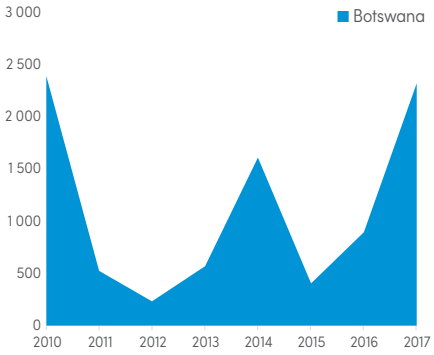
E. Percentage of population with access to either LLINs or IRS, 2017



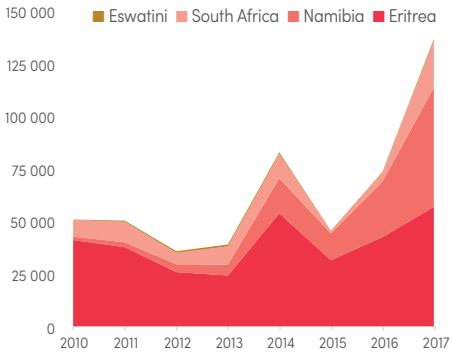
F. Countries projected to reduce case incidence by ≥40% by 2020



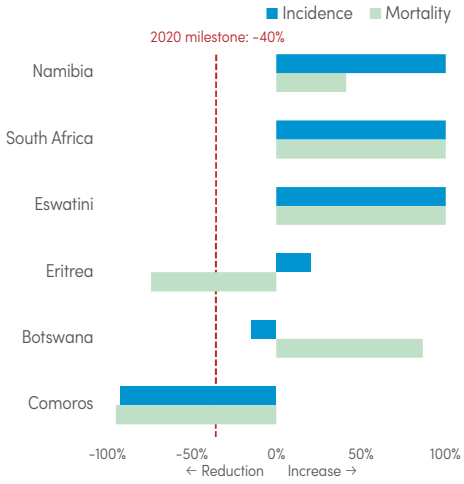
G. Countries projected to reduce case incidence by <40% by 2020



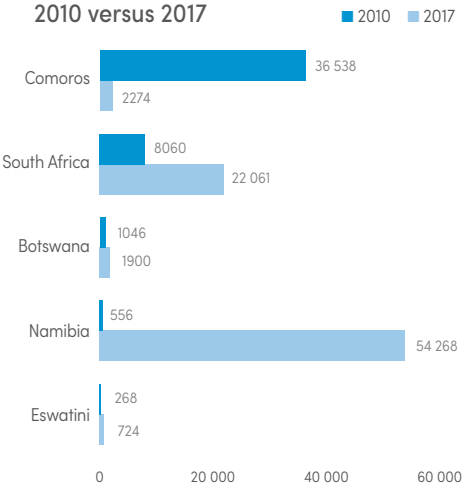
H. Countries with increase in case incidence, 2010–2017



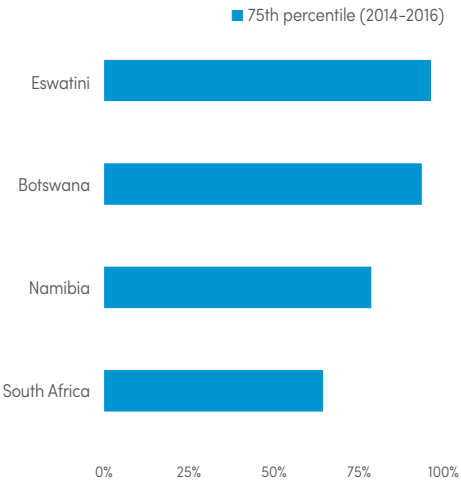
Ia. Change in reported malaria incidence and mortality rates, 2010–2017



Ib. Reported indigenous cases in countries with nationwide elimination activities, 2010 versus 2017



J. Incidence in 2017 compared to 75th percentile of 2014–2016



KEY MESSAGES

- About 15 million people in the six countries are at high risk of malaria. Malaria transmission is focal, highly seasonal and almost exclusively due to *P. falciparum* (except in Eritrea).
- The subregion had nearly 235 000 estimated malaria cases, 113 000 reported confirmed cases and 453 reported deaths in 2017. The four frontline countries of the Elimination-8 (E8) initiative in southern Africa (Botswana, Eswatini, Namibia and South Africa) accounted for 50% of cases. Comoros and Eritrea are included in this category because of their very low transmission (although they are not part of the E8 initiative).
- Comoros is on track for a more than 40% reduction in incidence by 2020, and Botswana is on track for a 20–40% reduction. Eritrea, Eswatini, Namibia and South Africa are not on track due to increases in cases in recent years. Cases in Namibia increased significantly, from only 556 cases in 2010 to 54 268 in 2017. During 2016 and 2017 alone, the number of cases in South Africa increased more than fivefold (4323 to 22 061), and more than doubled in Eswatini and Namibia. Eritrea also saw an increase in cases by 30%. The reported confirmed numbers increased from 126 in 2016 to 453 in 2017.. There are multiple reasons for the increase in cases, improve diagnosis and reporting, inadequate vector control and climatic factors.
- Vector resistance to pyrethroids was confirmed in half of the countries. There are significant gaps in standard resistance monitoring for organochlorines, carbamates and organophosphates.
- Challenges include inadequate coverage of vector control, importation of cases from neighbouring countries and resurgence during the past 3 years.

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

Epidemiology

Population at risk: 138 million

Parasites: *P. vivax* (75.6%), *P. falciparum* and mixed (24.3%), and other (<0.1%)

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

Funding (US$), 2010–2017

247.6 million (2010), 197.1 million (2015), 251.0 million (2017); increase 2010–2017: 1%

Proportion of domestic source* in 2017: 27%

Regional funding mechanisms: Meso-America

* Domestic source excludes patient service delivery costs and out-of-pocket expenditure

Interventions, 2010–2017

Countries with ≥50% coverage with either LLINs or IRS in 2017: Bolivia (Plurinational State of), Dominican Republic, Ecuador, Guatemala, Guyana, Mexico, Nicaragua and Suriname

Number of RDTs distributed: 83 700 (2010), 533 900 (2015), 933 300 (2017)

Number of ACT courses distributed: 148 400 (2010), 209 400 (2015), 129 300 (2017)

Number of any antimalarial treatment courses distributed: 1.251 million (2010), 669 000 (2015), 832 000 (2017)

Reported cases and deaths, 2010–2017

Total presumed and confirmed cases: 677 200 (2010), 450 100 (2015), 773 500 (2017); increase 2010–2017: 14%; increase 2015–2017: 72%

Total confirmed cases: 677 200 (2010), 450 100 (2015), 773 500 (2017); increase 2010–2017: 14%; increase 2015–2017: 72%

Total deaths: 190 (2010), 98 (2015), 87 (2017); decrease 2010–2017: 54%; decrease 2015–2017: 11%

Estimated cases and deaths, 2010–2017

Cases: 813 500 (2010), 573 200 (2015), 975 700 (2017); increase 2010–2017: 20%

Deaths: 475 (2010), 316 (2015), 625 (2017); increase 2010–2017: 32%

Acceleration to elimination

Countries with nationwide elimination programme: Argentina, Belize, Costa Rica, Ecuador, El Salvador, Mexico and Suriname

Zero local cases for 3 consecutive years (2015, 2016 and 2017): Argentina

Zero local cases in 2017: Argentina, El Salvador and Paraguay

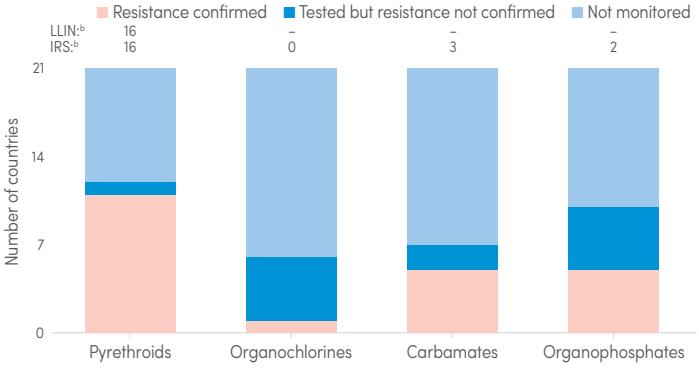
Certification in progress: Argentina

Therapeutic efficacy tests (clinical and parasitological failure, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	25 (IQR)	75 (IQR)
AL	2011–2016	6	0.0	0.0	9.0	0.0	4.5
AS-MQ	2010–2014	2	0.0	0.0	0.0	0.0	0.0

AL: artemether-lumefantrine; AS-MQ: artesunate-mefloquine; IQR: interquartile range.

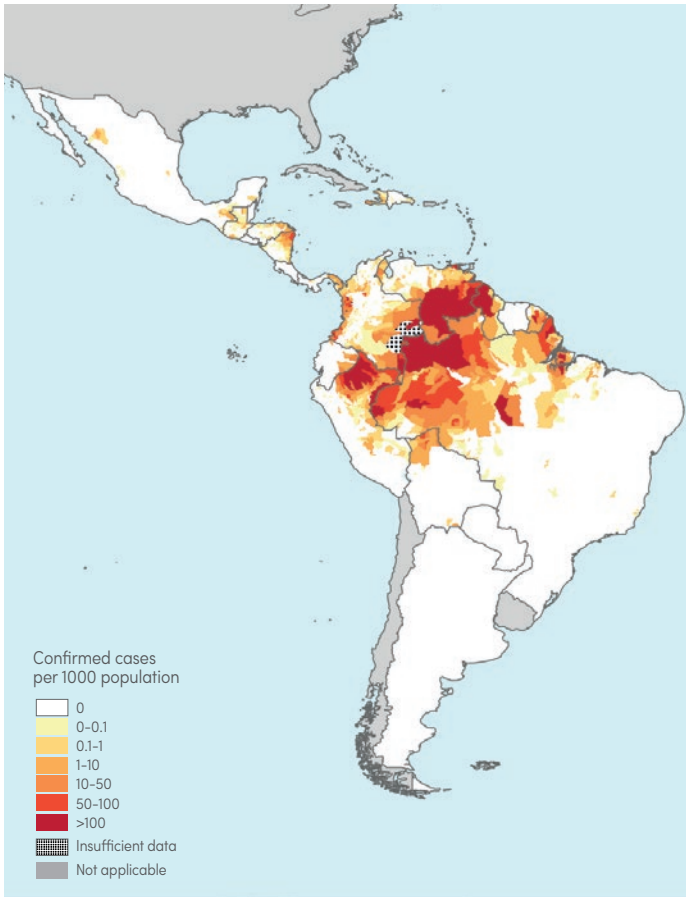
Status of insecticide resistance[a] per insecticide class (2010–2017) and use of each class for malaria vector control (2017)



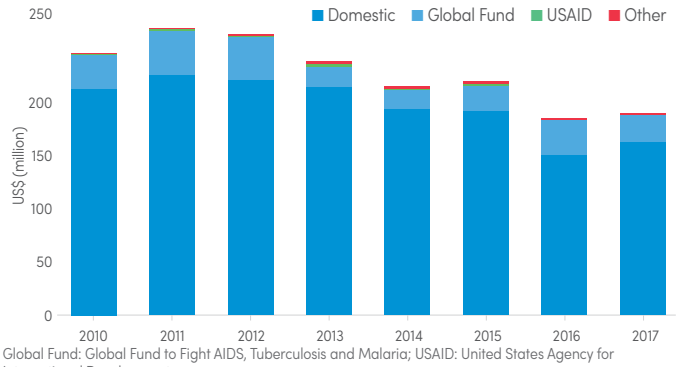
[a] Resistance is considered confirmed when it was detected to at least one insecticide in the class, in at least one malaria vector from one collection site.

[b] Number of countries that used insecticide class for malaria vector control (2017).

A. Confirmed malaria cases per 1000 population, 2017



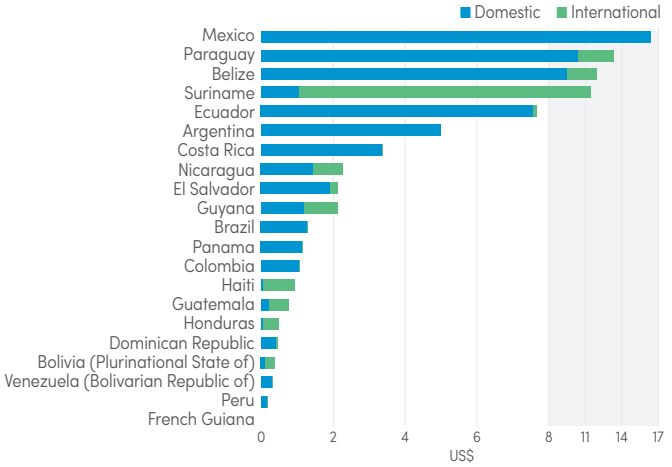
B. Malaria funding* by source, 2010–2017



Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; USAID: United States Agency for International Development.

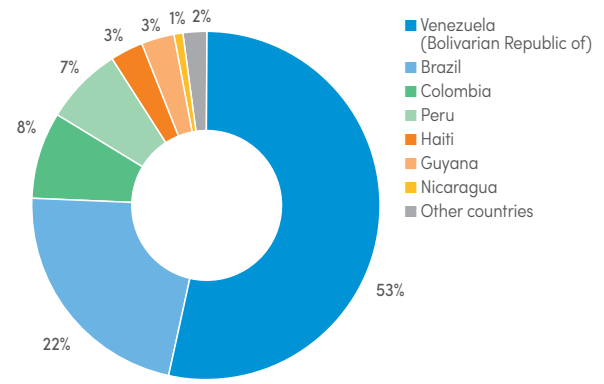
* Excludes patient service delivery costs and out-of-pocket expenditure.

C. Malaria funding* per person at risk, average 2015–2017

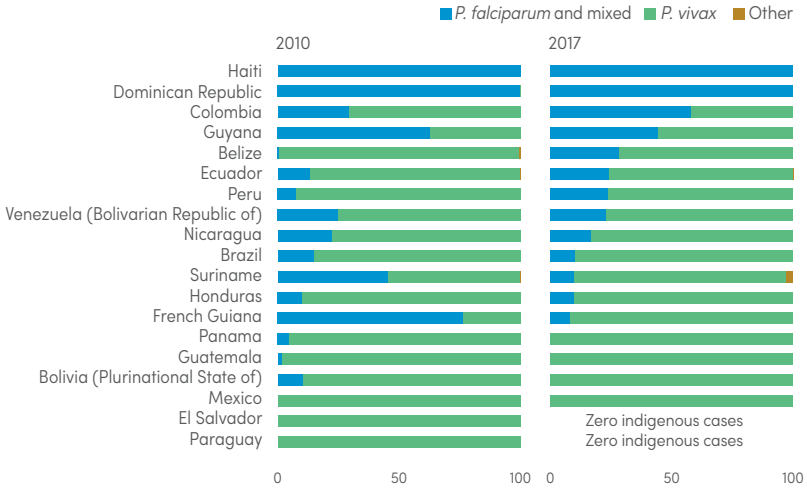


* Excludes costs related to health staff, costs at subnational level and out-of-pocket expenditure.

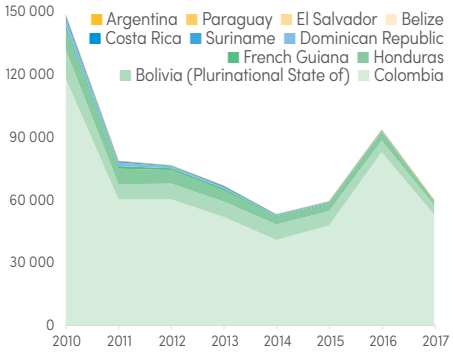
D. Share of estimated malaria cases, 2017



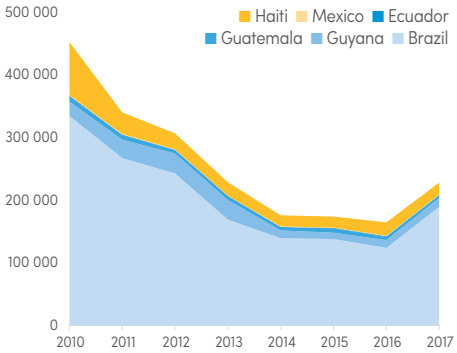
E. Percentage of *Plasmodium* species from indigenous cases, 2010 and 2017



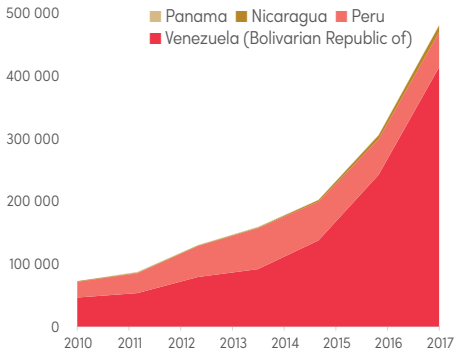
F. Countries and areas projected to reduce case incidence by ≥40% by 2020



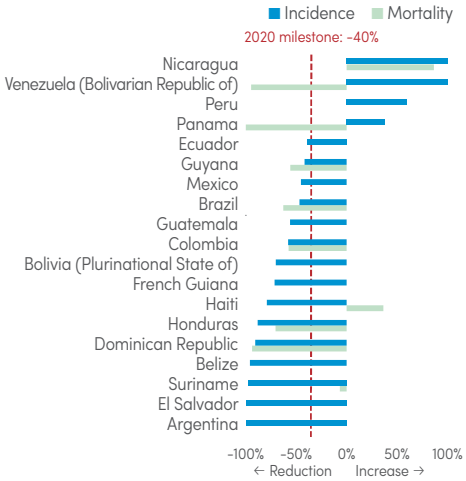
G. Countries projected to reduce case incidence by <40% by 2020



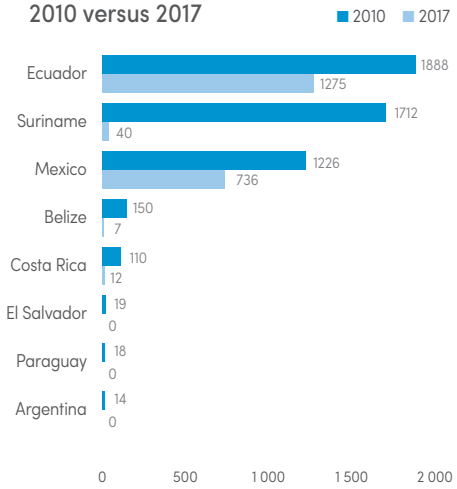
H. Countries with increase in case incidence, 2010–2017



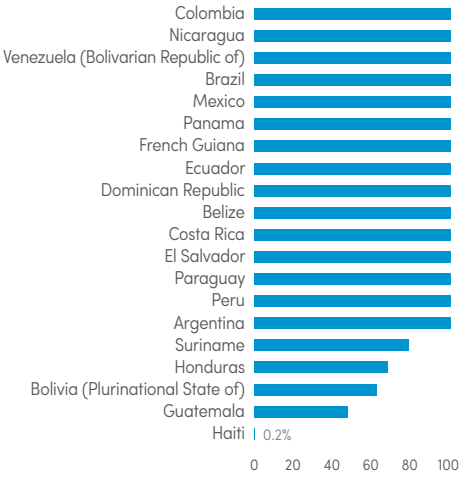
Ia. Change in reported malaria incidence and mortality rates, 2010–2017



Ib. Reported indigenous cases in countries with nationwide elimination activities, 2010 versus 2017



J. Percentage of total confirmed cases investigated, 2017



Note: Countries with no reported case investigation: Guyana.

KEY MESSAGES

- The region continues to make significant progress. Eleven out of the 17 endemic countries are on target to achieve a more than 40% reduction in reported case incidence by 2020, while six (Brazil, Ecuador, Guatemala, Guyana, Haiti and Mexico) are on target to achieve a 20–40% reduction. Four countries (Nicaragua, Panama, Peru and Venezuela [Bolivarian Republic of]) saw increases in incidence in 2017 compared with 2010. Despite the overall progress, 10 countries saw some increase in cases between 2016 and 2017. Cases in French Guiana have more than doubled, largely because of increased detection, while Nicaragua and Venezuela (Bolivarian Republic of) have seen a more than 70% increase in cases between 2016 and 2017 alone. Venezuela (Bolivarian Republic of) accounted for 53% of reported cases, followed by Brazil (25%).
- Nevertheless, transmission in countries is focal; in particular, in Choco in Colombia, Loreto in Peru and Bolivar in Venezuela (Bolivarian Republic of). One third of all cases in the region in 2017 were from five municipalities. Increases in other countries in 2017 are attributed to improved surveillance and focal outbreaks.
- El Salvador and Mexico reported zero local *P. falciparum* cases for more than 3 years, Belize for over 2 years and Bolivia for 1 year (2017). The reported cases due to *P. falciparum* were less than 10% in Brazil, French Guiana, Honduras and Suriname. Coverage of IRS and ITNs has declined in general, owing to the focal nature of the interventions and decreased funding in the region, although Ecuador reported high IRS coverage in 2017.
- Paraguay was awarded malaria free certification by WHO in 2018, and Argentina is in the process of certification. Nine countries in Central America and Hispaniola are taking part in the subregional initiative to eliminate malaria by 2020. El Salvador reported zero local cases for the first time in 2017, Belize reported fewer than 10 cases and Costa Rica reported 25 cases. Efforts are underway to enhance access to diagnosis and treatment, investigation of cases and adequate response.
- Vector resistance to pyrethroids was confirmed in half of the countries. There are significant gaps in standard resistance monitoring for all the four commonly used insecticide classes.

Annex 2 - F. Regional profile: Eastern Mediterranean Region

Epidemiology

Population at risk: 299 million

Parasites: *P. falciparum* and mixed (64%) and *P. vivax* (36%)

Vectors: *An. arabiensis, An. culicifacies, An. d'thali, An. fluviatilis, An. funestus, An. hyrcanus, An. labranchiae, An. maculipennis s.s., An. pulcherrimus, An. sacharovi, An. sergentii, An. stephensi, An. subpictus* and *An. superpictus*

Funding (US$), 2010–2017

124.9 million (2010), 154.7 million (2015), 134.8 million (2017); increase 2010–2017: 8%

Proportion of domestic source* in 2017: 57%

Regional funding mechanisms: none

* Domestic source excludes patient service delivery costs and out-of-pocket expenditure.

Interventions, 2010–2017

Countries with ≥50% coverage with either LLINs or IRS in 2017: Sudan

Number of RDTs distributed: 2.046 million (2010), 6.085 million (2015), 6.529 million (2017)

Number of ACT courses distributed: 2.567 million (2010), 3.176 million (2015), 946 000 (2017)

Reported cases and deaths, 2010–2017

Total presumed and confirmed cases: 6.369 million (2010), 5.402 million (2015), 4.113 million (2017); decrease 2010–2017: 35%; decrease 2015–2017: 24%

Total confirmed cases: 1.165 million (2010), 999 200 (2015), 1.462 million (2017); increase 2010–2017: 25%; increase 2015–2017: 46%

Total deaths: 1143 (2010), 1016 (2015), 1627 (2017); increase 2010–2017: 42%; increase 2015–2017: 60%

Estimated cases and deaths, 2010–2017

Cases: 4.255 million (2010), 4.377 million (2015), 4.410 million (2017); increase 2010–2017: 4%

Deaths: 8070 (2010), 8660 (2015), 8300 (2017); increase 2010–2017: 3%

Acceleration to elimination

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

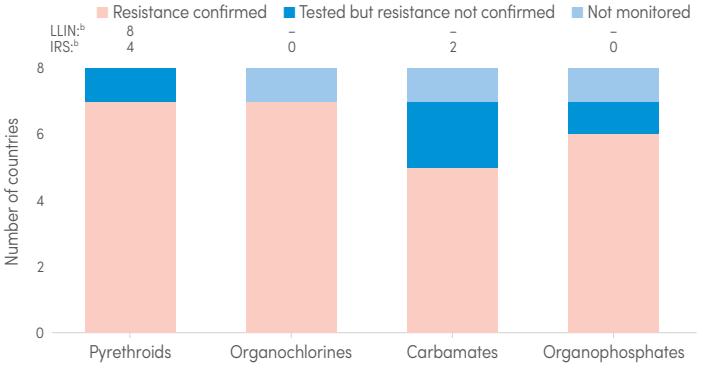
Certified as malaria free since 2010: Morocco

Therapeutic efficacy tests (clinical and parasitological failure, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	25 (IQR)	75 (IQR)
AL	2010–2018	28	0.0	0.0	3.3	0.0	1.7
AS+SP	2010–2017	43	0.0	1.0	22.2	0.0	4.4
DHA-PPQ	2010–2016	6	0.0	0.5	2.5	0.0	2.2

AL: artemether-lumefantrine; AS-SP: artesunate-sulfadoxine-pyrimethamine; DHA-PPQ: dihydroartemisinin-piperaquine; IQR: interquartile range.

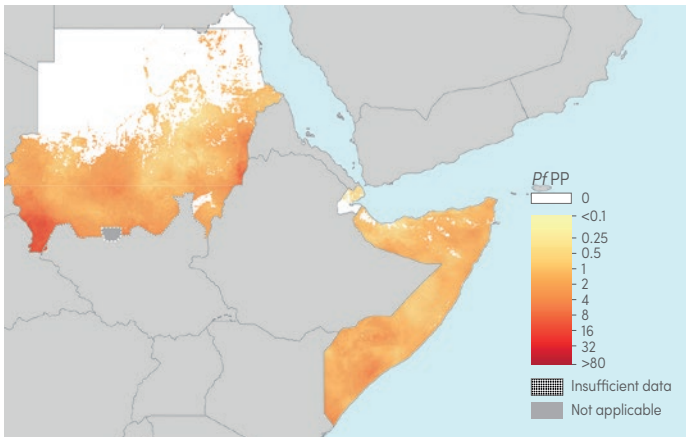
Status of insecticide resistance[a] per insecticide class (2010–2017) and use of each class for malaria vector control (2017)

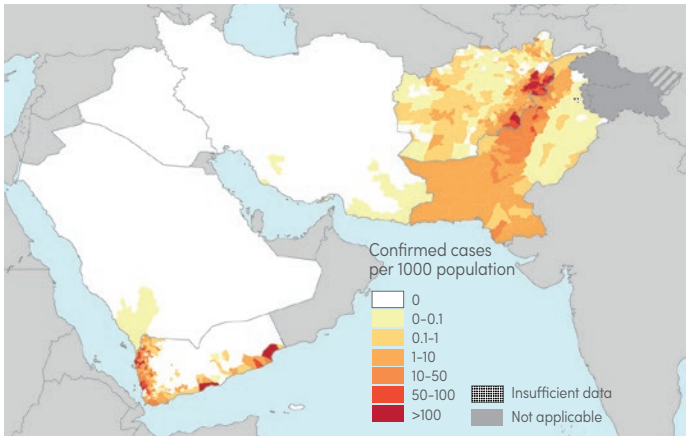


[a] Resistance is considered confirmed when it was detected to at least one insecticide in the class, in at least one malaria vector from one collection site.

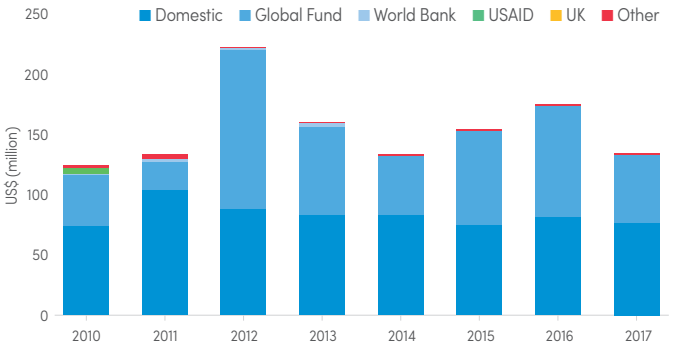
[b] Number of countries that used insecticide class for malaria vector control (2017).

A. *P. falciparum* parasite prevalence (*Pf* PP)/confirmed malaria cases per 1000 population, 2017





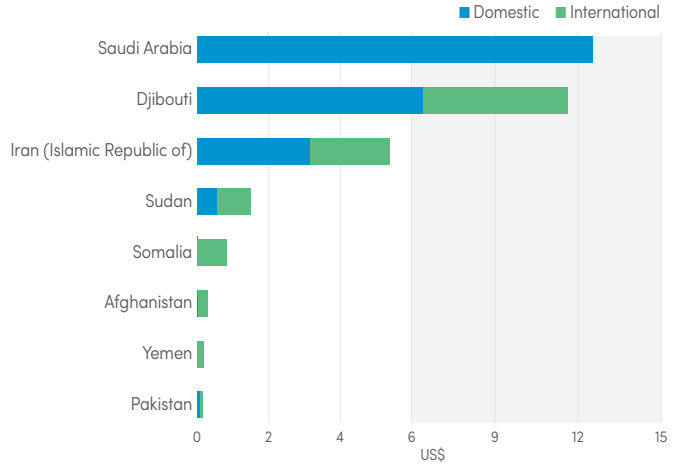
B. Malaria funding* by source, 2010–2017



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

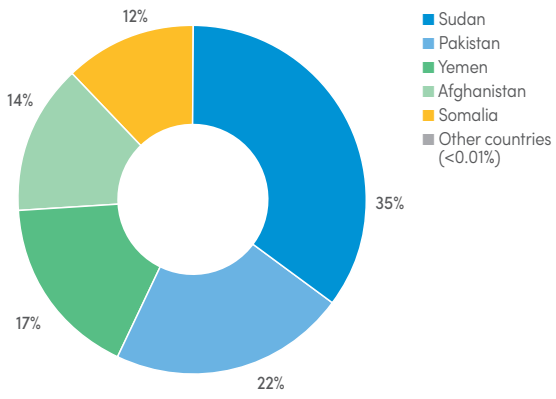
* Excludes patient service delivery costs and out-of-pocket expenditure.

C. Malaria funding* per person at risk, average 2015–2017

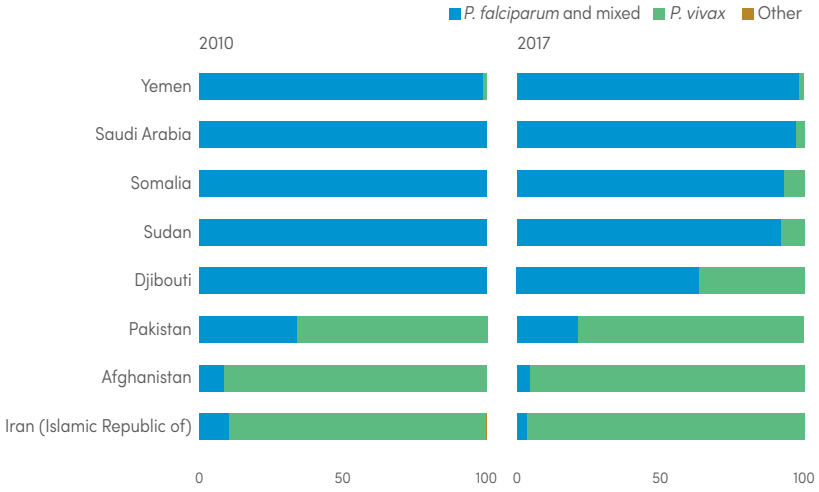


* Excludes costs related to health staff, costs at subnational level and out-of-pocket expenditure.

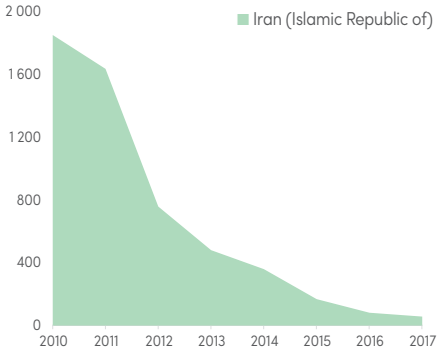
D. Share of estimated malaria cases, 2017



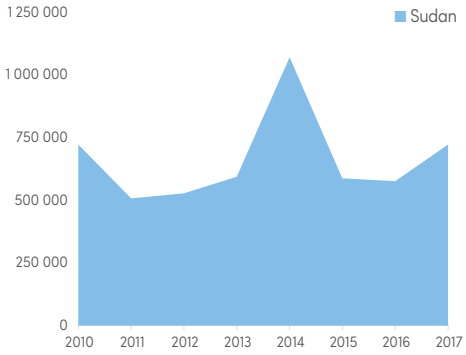
E. Percentage of *Plasmodium* species from indigenous cases, 2010 and 2017



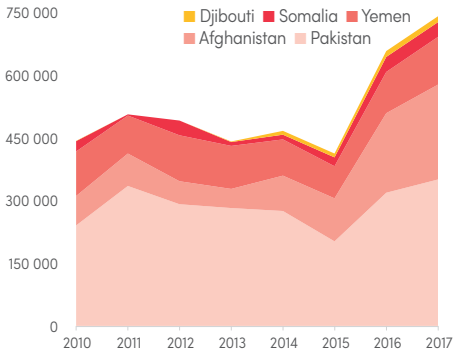
F. Countries projected to reduce case incidence by ≥40% by 2020



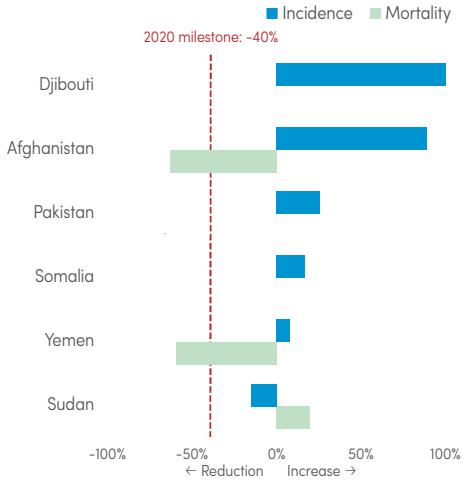
G. Countries projected to reduce case incidence by <40% by 2020



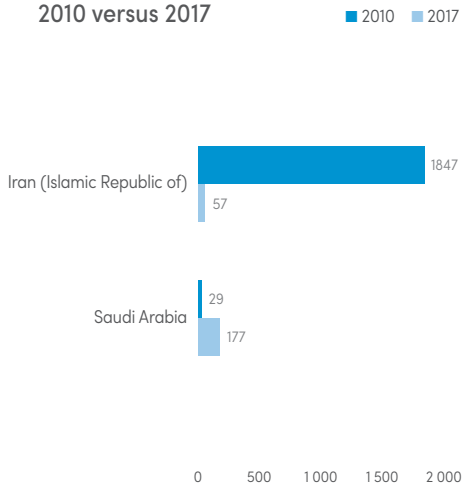
H. Countries with increase in case incidence, 2010–2017



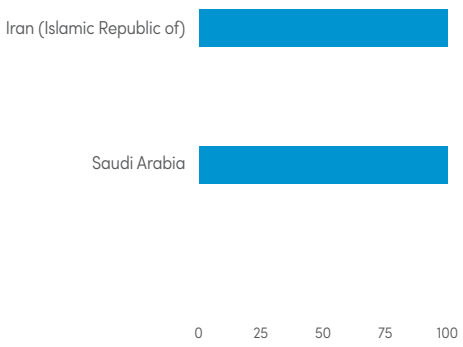
Ia. Change in reported malaria incidence and mortality rates, 2010–2017



Ib. Reported indigenous cases in countries with nationwide elimination activities, 2010 versus 2017



J. Percentage of total confirmed cases investigated, 2017



Note: Countries with no reported case investigation: Guyana.

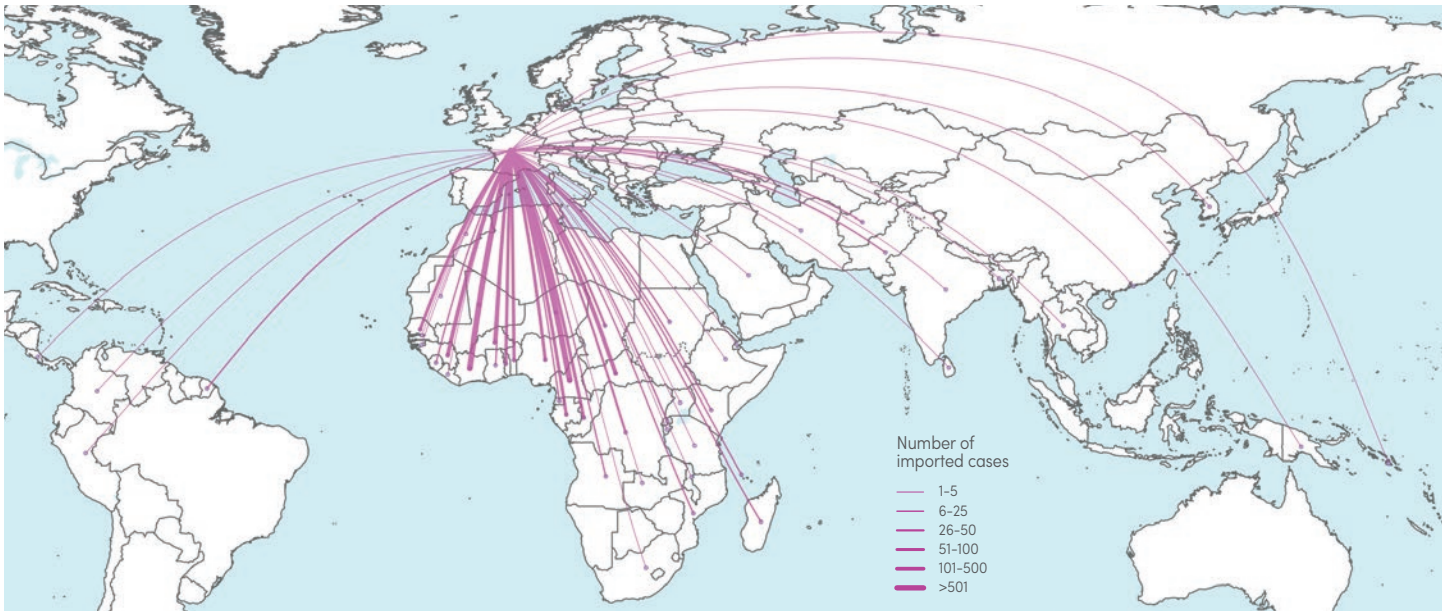
KEY MESSAGES

- Fourteen countries in the region are free of indigenous malaria and are at the stage of prevention of re-establishment. There are eight malaria endemic countries in the region. Estimated malaria incidence in the region has declined since 2010, but increased in 2016 and 2017. In 2017, the region reported a total of 4.1 million cases (presumed and confirmed), of which nearly 1.5 million were confirmed. Iran (Islamic Republic of) and Saudi Arabia are targeting elimination by 2020. The number of indigenous cases in Iran (Islamic Republic of) declined from 1847 to 57 between 2010 and 2017. In Saudi Arabia, the number of indigenous malaria cases remained below 100 between 2010 and 2015, but rose to 177 in 2017, mainly due to population movement and the conflict in Yemen. However, between 2016 and 2017, Saudi Arabia saw a 35% decrease in indigenous cases. These countries undertake continued vigilance in the general health service, and provide 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 in incidence by 2020, despite an increase in the past 3 years. Afghanistan, Djibouti, Pakistan, Somalia and Yemen saw increases in cases between 2010 and 2017, mainly starting from 2014.
- Vector resistance to pyrethroids and organochlorines was confirmed in all countries except Saudi Arabia. Resistance to organophosphates and carbamates was confirmed in most of the countries.
- Challenges include low coverage of essential interventions (below universal target) in most endemic countries, inadequate funding and dependency on external resources, difficult operational environments and population displacements, availability of skilled technical staff (particularly at subnational level), and weak surveillance and health information system. These challenges may have led to an overall increase in cases during the period 2014–2017 in some countries of the region.

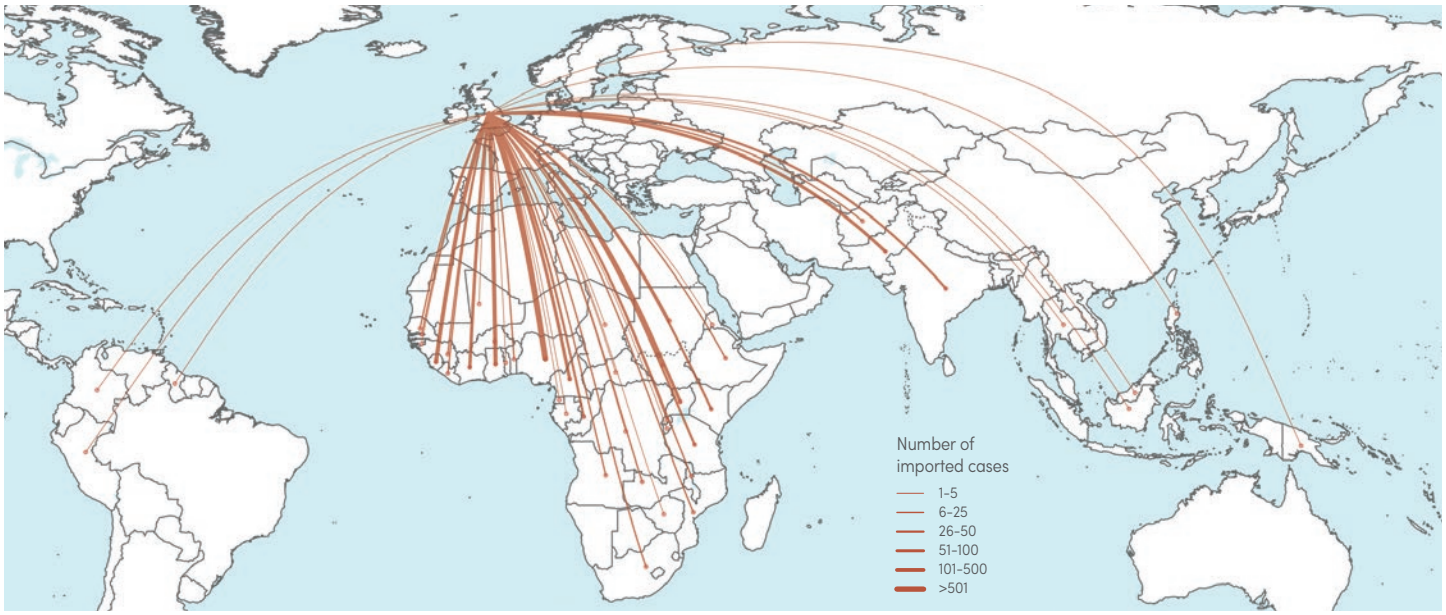
Annex 2 – G. Regional profile: European Region

A. Origin of infection in the three European countries with highest number of imported malaria cases, 2017

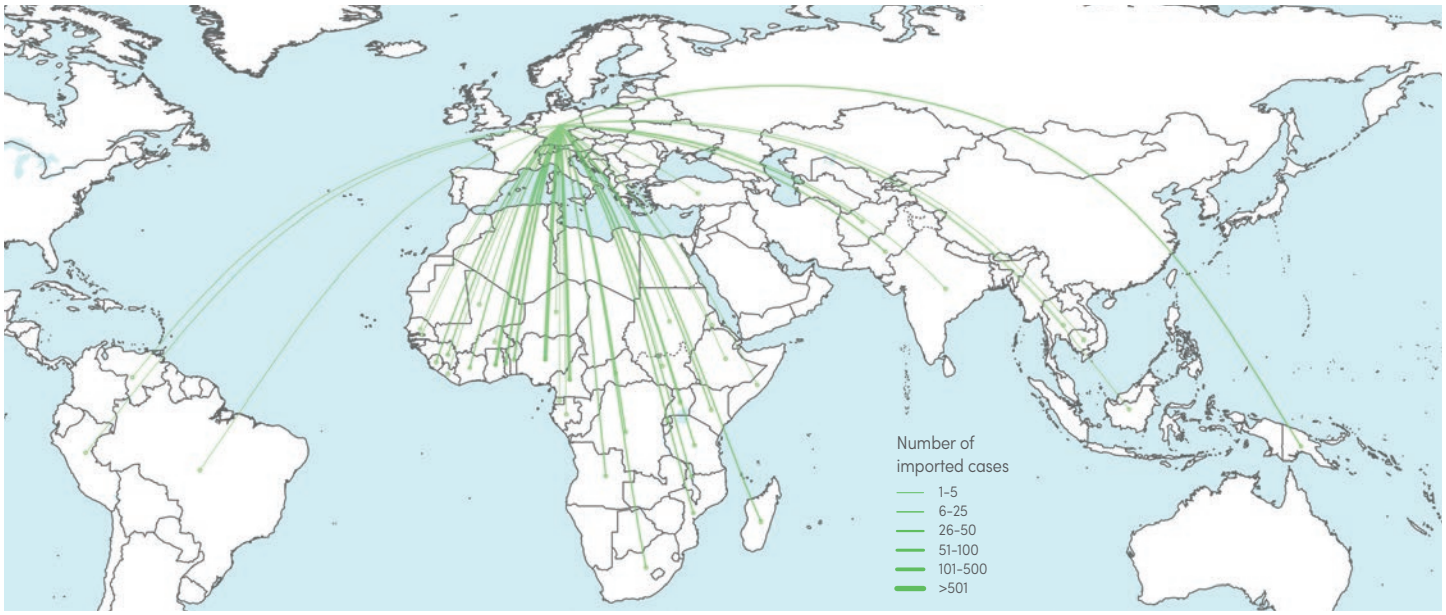
1. France



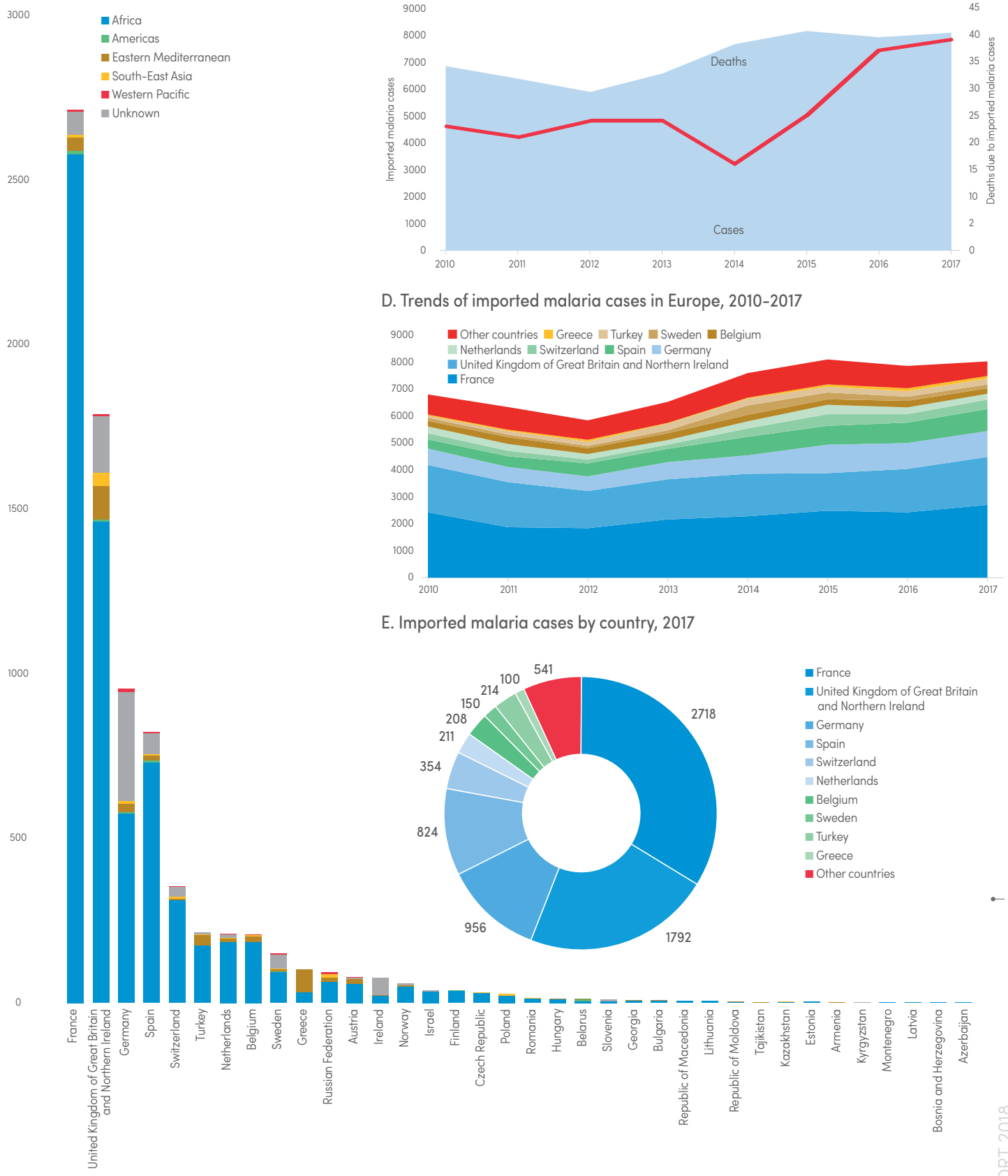
2. United Kingdom of Great Britain and Northern Ireland



3. Germany



B. Regional source of infection by country, 2017



C. Imported malaria cases and associated deaths in Europe, 2010-2017

D. Trends of imported malaria cases in Europe, 2010-2017

E. Imported malaria cases by country, 2017

KEY MESSAGES

- In 2017 and for the third consecutive year, the WHO European Region has not reported any indigenous malaria cases.
- The WHO European Region is subject to the continual importation of malaria cases from other regions. Over 8000 malaria cases have been imported to the WHO European Region in 2017 from all other regions, 83% of which from the WHO African Region. This underscores the need to sustain vigilance in the health services and epidemiological surveillance in all countries of the WHO European Region.
- The countries having signed the Ashgabat Statement *Preventing re-establishment of malaria transmission in the WHO European Region* in 2017 are showing full commitment to maintain their malaria free status and are undertaking the necessary processes to be certified as malaria free. Certification of malaria elimination of Uzbekistan is ongoing and is expected to be finalized by the end of 2018.
- The vast experience of the WHO European Region in containing a regional epidemic, eliminating malaria and preventing its re-establishment should serve as a valuable example for the planning and implementation of such interventions around the world.

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

Epidemiology

Population at risk: 1.6 billion

Parasites: *P. falciparum* and mixed (62%), *P. vivax* (37%) and other (<1%)

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*

Funding (US$), 2010–2017

208.6 million (2010), 141.4 million (2015), 145.2 million (2017); decrease 2010–2017: 30%

Proportion of domestic source* in 2017: 56%

Regional funding mechanisms: Malaria Elimination in the Greater Mekong Region (MME): Myanmar and Thailand

* Domestic source excludes patient service delivery costs and out-of-pocket expenditure.

Interventions, 2010–2017

Countries with ≥50% coverage with either LLIN or IRS in 2017: All countries except India

Number of RDTs distributed: 11.4 million (2010), 23.5 million (2015), 5.9 million (2017)

Number of ACT courses distributed: 3.476 million (2010), 2.819 million (2015), 812 000 (2017)

Reported cases and deaths, 2010–2017

Total presumed and confirmed cases: 4.887 million (2010), 1.651 million (2015), 1.244 million (2017); decrease 2010–2017: 75%; decrease 2015–2017: 25%

Total confirmed cases: 2.676 million (2010), 1.618 million (2015), 1.233 million (2017); decrease 2010–2017: 54%; decrease 2015–2017: 24%

Total deaths: 2421 (2010), 620 (2015), 299 (2017); decrease 2010–2017: 88%; decrease 2015–2017: 52%

Estimated cases and deaths, 2010–2017

Cases: 25.5 million (2010), 14.0 million (2015), 11.3 million (2017); decrease 2010–2017: 56%

Deaths: 39 800 (2010), 25 200 (2015), 19 700 (2017); decrease 2010–2017: 50%

Acceleration to elimination

Countries with nationwide elimination programme: Bhutan, Democratic People's Republic of Korea, Nepal and Timor-Leste

Countries with subnational elimination programme: India, Indonesia, Myanmar and Thailand

Certified as malaria free since 2010: Maldives and Sri Lanka

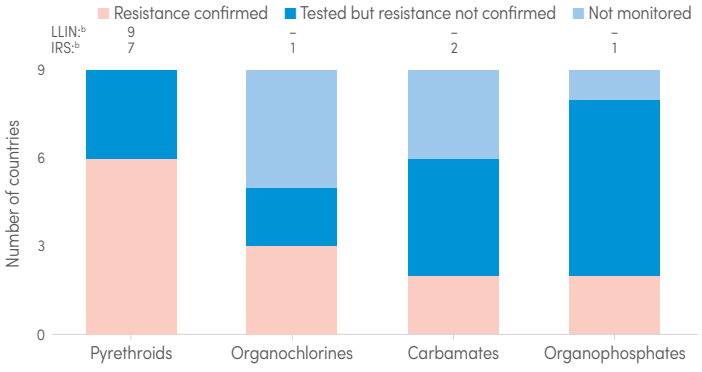
Therapeutic efficacy tests (clinical and parasitological failure, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	25 (IQR)	75 (IQR)
AL	2010–2018	70	0.0	0.0	14.3	0.0	2.0
AS+SP	2010–2017	55	0.0	0.0	21.4	0.0	1.4
AS-MQ	2010–2016	23	0.0	2.1	49.1	0.0	15.6
DHA-PPQ	2010–2017	24	0.0	0.0	5.9	0.0	2.0

AL: artemether-lumefantrine; AS-MQ: artesunate-mefloquine; AS+SP: artesunate-sulfadoxine-pyrimethamine; DHA-PPQ: dihydroartemisinin-piperaquine; IQR: interquartile range.

[b] Number of countries that used insecticide class for malaria vector control (2017).

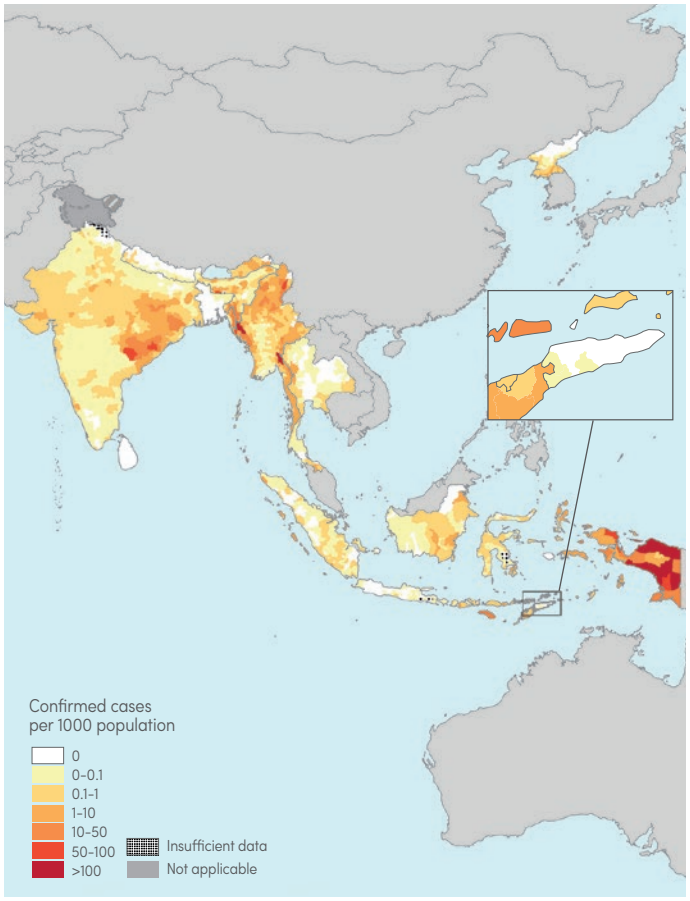
Status of insecticide resistance[a] per insecticide class (2010–2017) and use of each class for malaria vector control (2017)



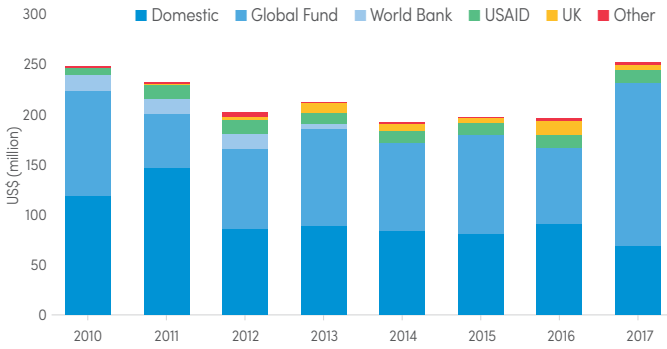
[a] Resistance is considered confirmed when it was detected to at least one insecticide in the class, in at least one malaria vector from one collection site.

[b] Number of countries that used insecticide class for malaria vector control (2017).

A. Confirmed malaria cases per 1000 population, 2017



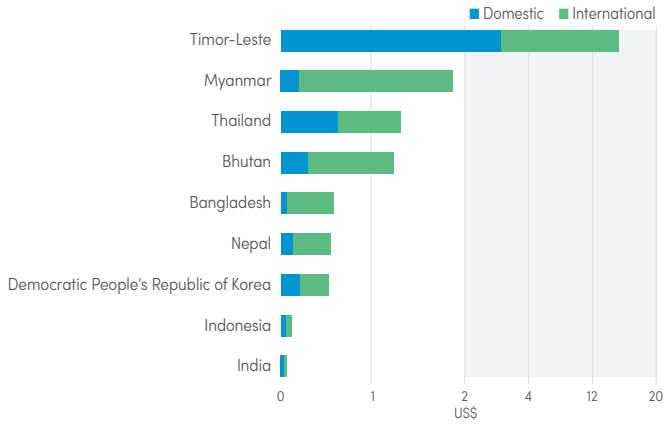
B. Malaria funding* by source, 2010–2017



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

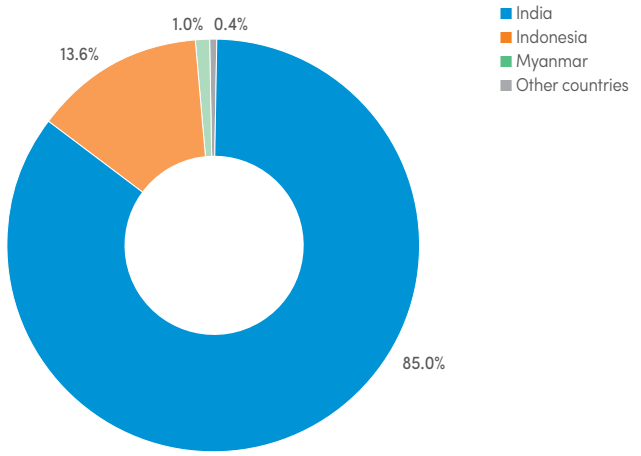
* Excludes patient service delivery costs and out-of-pocket expenditure.

C. Malaria funding* per person at risk, average 2015–2017

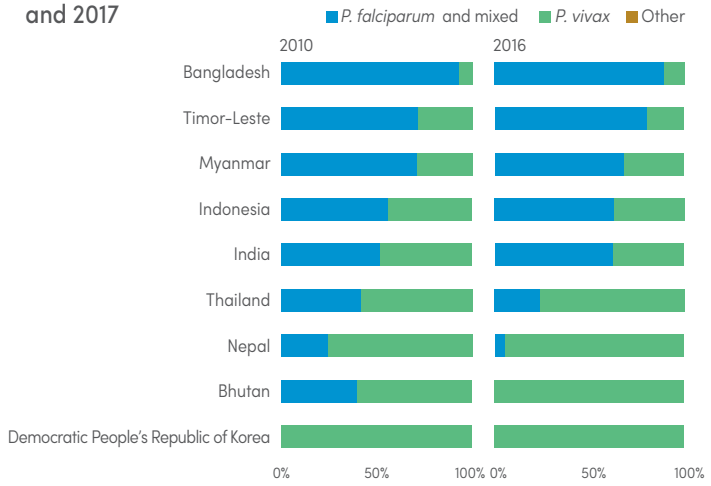


* Excludes costs related to health staff, costs at sub-national level and out-of-pocket expenditure.

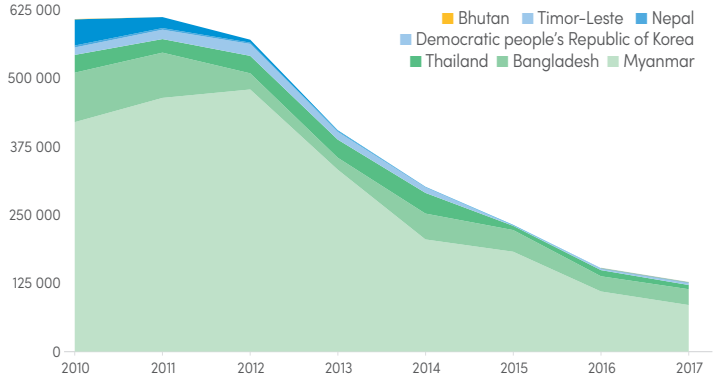
D. Share of estimated malaria cases, 2017



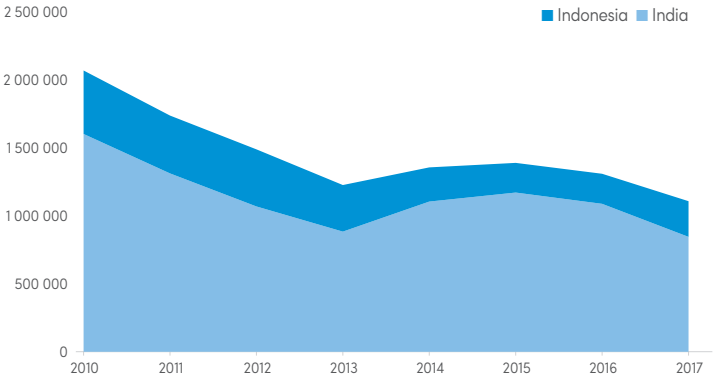
E. Percentage of *Plasmodium* species from indigenous cases, 2010 and 2017



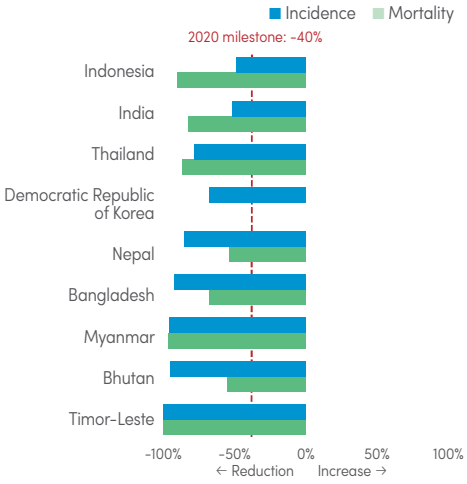
F. Countries projected to reduce case incidence by ≥40% by 2020



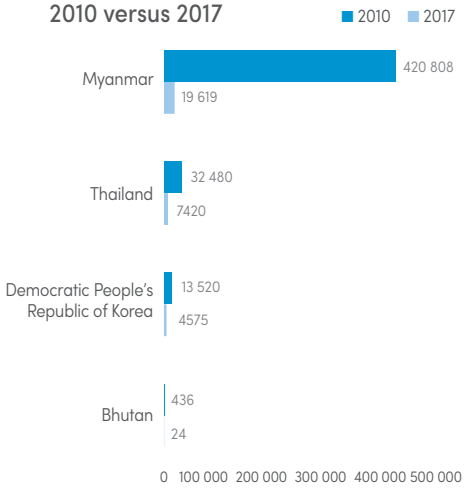
G. Countries projected to reduce case incidence by <40% by 2020



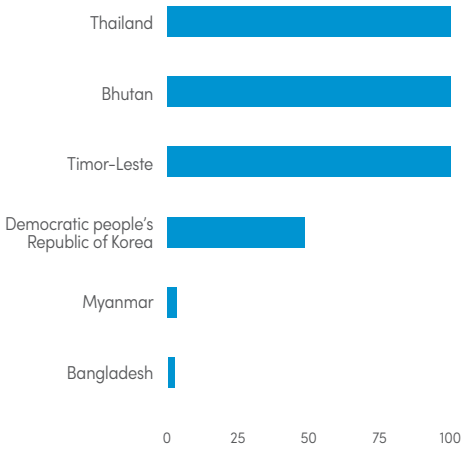
Ha. Change in reported malaria incidence and mortality rates, 2010–2017



H b. Reported indigenous cases in countries with nationwide elimination activities, 2010 versus 2017



I. Percentage of total confirmed cases investigated, 2017



Note: Countries with no case investigation: India, Indonesia and Nepal

KEY MESSAGES

- Malaria is endemic in nine out of 11 countries of the region, accounting for nearly 70% of the burden outside the WHO African Region. Nearly 62% of the cases are due to *P. falciparum*. India and Indonesia accounted for 68% and 21% of the reported cases and 65% and 16% of malaria deaths, respectively. In spite of being the highest burden country of the region, India showed a 22 % decline in reported cases within a year.
- Seven out of the nine countries are on target to achieve a more than 40% reduction in case incidence by 2020, and India and Indonesia are on track for a 20–40% reduction. Cases in Timor-Leste continued to decrease, from 94 to only 16 cases between 2016 and 2017 (83% reduction). Bhutan reported only 11 indigenous and 13 introduced cases in 2017.
- Malaria deaths in the region decreased from 2421 in 2010 to 299 in 2017 (88% reduction). Bhutan had reported zero deaths since 2003 but had one death in 2017. Timor-Leste reported zero deaths for the past 3 years (i.e. since 2015).
- Maldives and Sri Lanka, certified as malaria free in 2015 and 2016, respectively, maintained their malaria free status. All countries in the region have strategic plans that aim for malaria elimination by 2030 (although Bhutan is aiming for 2018).
- Vector resistance to pyrethroids was confirmed in a third of the countries. Resistance to organophosphates was confirmed in less than a third of the countries. There are significant gaps in standard resistance monitoring for organochlorines and carbamates.
- Challenges include decreased funding, multiple artemisinin-based combination therapy failures in the countries of the GMS and vector resistance to pyrethroids. Efforts are underway to improve reporting from private sector and nongovernmental organizations, and case-based surveillance to accelerate elimination.

Annex 2 - I. Regional profile: Western Pacific Region

Epidemiology

Population at risk: 753 million

Parasites: *P. falciparum* and mixed (71%), *P. vivax* (28%) and other (<1%)

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*

Funding (US$), 2010–2017

218.0 million (2010), 194.2 million (2015), 168.1 million (2017); decrease 2010–2017: 23%

Proportion of domestic source* in 2017: 85%

Regional funding mechanisms: Mekong Malaria Elimination (MME) Initiative in the Greater Mekong subregion: Cambodia, China (Yunnan), Lao People's Democratic Republic and Viet Nam (supported by RAI2 Global Fund)

* Domestic source excludes patient service delivery costs and out-of-pocket expenditure.

Interventions, 2010–2017

Countries with ≥50% coverage with either LLIN or IRS in 2017: All countries except Republic of Korea and Viet Nam

Number of RDTs distributed: 1.628 million (2010), 2.512 million (2015), 3.471 million (2017)

Number of ACT courses distributed: 591 300 (2010), 1.284 million (2015), 1.344 million (2017)

Reported cases and deaths, 2010–2017

Total presumed and confirmed cases: 1.654 million (2010), 708 400 (2015), 1.032 million (2017); decrease 2010–2017: 38%; increase 2015–2017: 46%

Total confirmed cases: 259 500 (2010), 410 700 (2015), 602 100 (2017); increase 2010–2017: 132%; increase 2015–2017: 47%

Total deaths: 910 (2010), 235 (2015), 335 (2017); decrease 2010–2017: 63%; increase 2015–2017: 43%

Estimated cases and deaths, 2010–2017

Cases: 1.838 million (2010), 1.451 million (2015), 1.857 million (2017); increase 2010–2017: 1%

Deaths: 3769 (2010), 2853 (2015), 3617 (2017); decrease 2010–2017: 4%

Acceleration to elimination

Countries with nationwide elimination programme: Cambodia, China, Lao People's Democratic Republic, Malaysia, Republic of Korea and Viet Nam

Countries with subnational elimination programme: Philippines

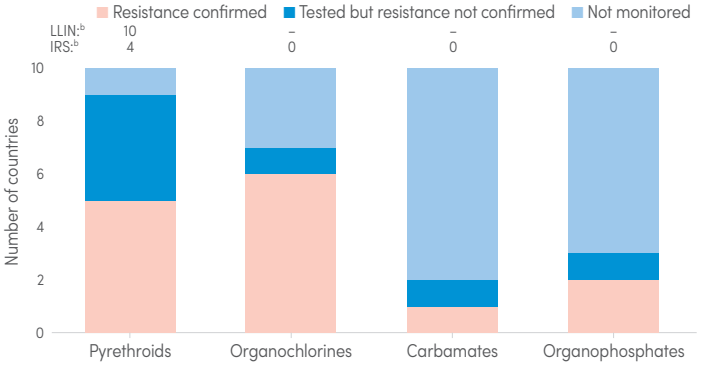
Zero local cases in 2017: China

Therapeutic efficacy tests (clinical and parasitological failure, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	25 (IQR)	75 (IQR)
AL	2010–2017	25	0.0	1.1	17.2	0.0	5.8
AS-MQ	2010–2018	14	0.0	0.0	11.1	0.0	0.6
AS-PY	2014–2018	5	0.0	3.3	18.0	0.9	14.1
DHA-PPQ	2010–2017	70	0.0	1.7	62.5	0.0	13.3

AL: artemether-lumefantrine; AS-MQ: artesunate-mefloquine; AS-PY: artesunate-pyronaridine; DHA-PPQ: dihydroartemisinin-piperaquine; IQR: interquartile range.

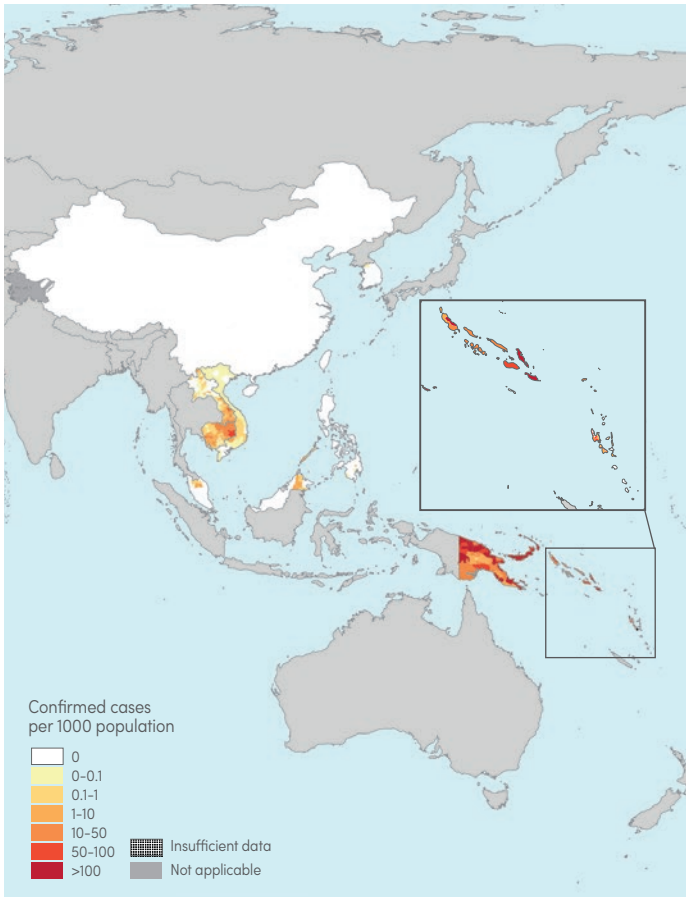
Status of insecticide resistance[a] per insecticide class (2010–2017) and use of each class for malaria vector control (2017)



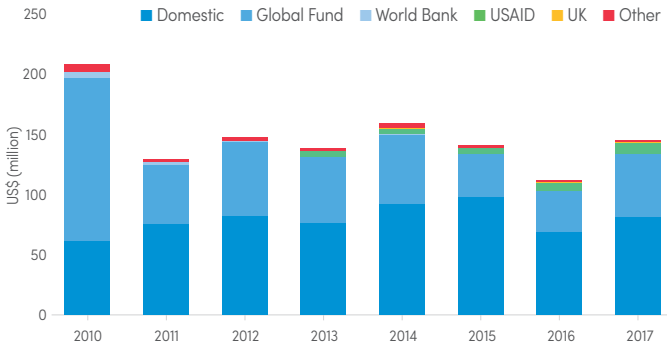
[a] Resistance is considered confirmed when it was detected to at least one insecticide in the class, in at least one malaria vector from one collection site.

[b] Number of countries that used insecticide class for malaria vector control (2017).

A. Confirmed malaria cases per 1000 population, 2017



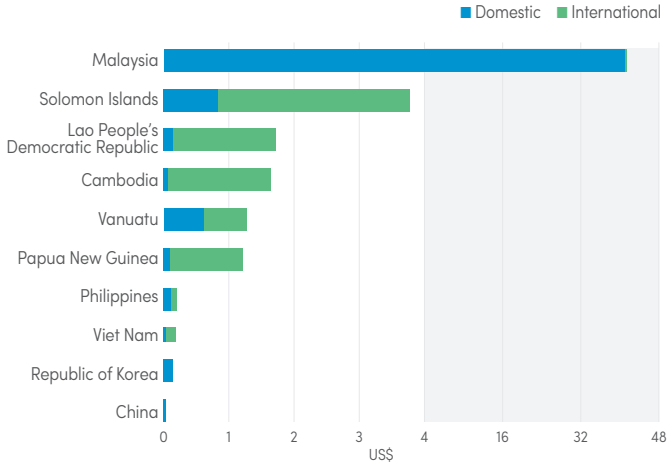
B. Malaria funding* by source, 2010–2017



Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; USAID: United States Agency for International Development.

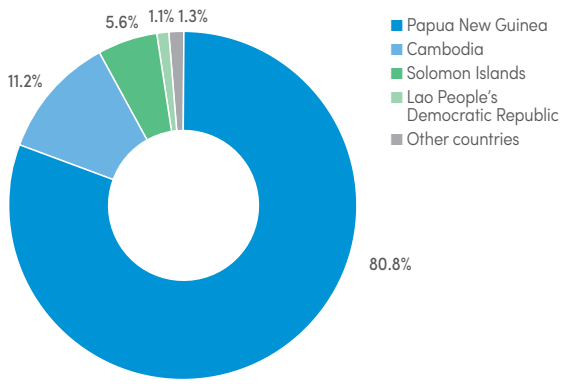
* Excludes patient service delivery costs and out-of-pocket expenditure.

C. Malaria funding* per person at risk, average 2015–2017

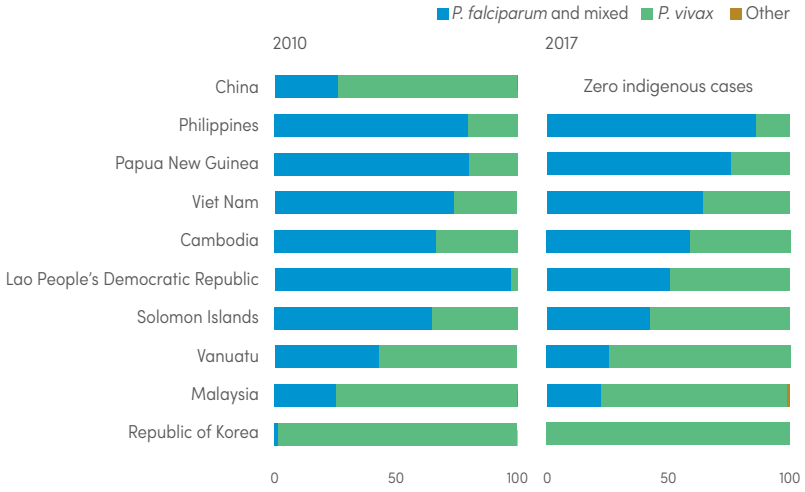


* Excludes costs related to health staff, costs at subnational level and out-of-pocket expenditure.

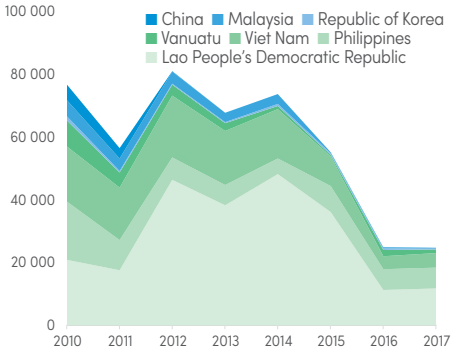
D. Share of estimated malaria cases, 2017



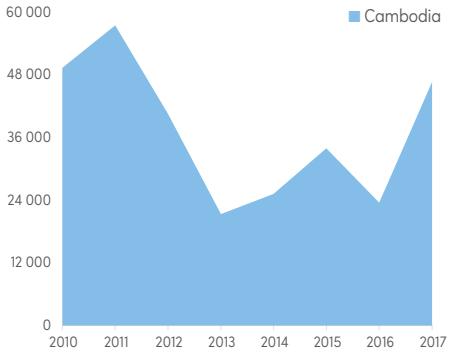
E. Percentage of *Plasmodium* species from indigenous cases, 2010 and 2017



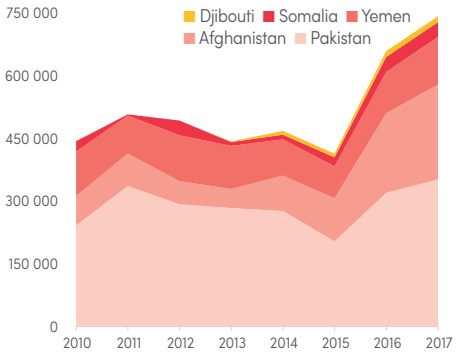
F. Countries projected to reduce case incidence by ≥40% by 2020



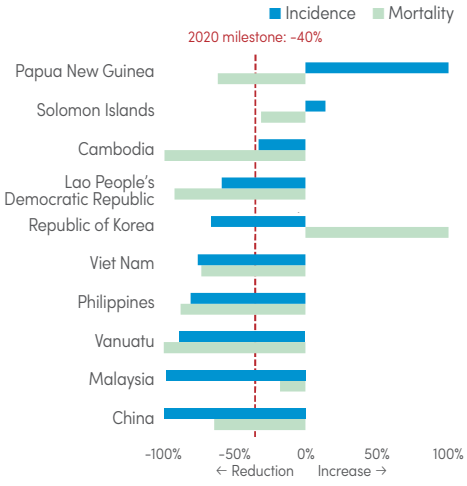
G. Countries projected to reduce case incidence by <40% by 2020



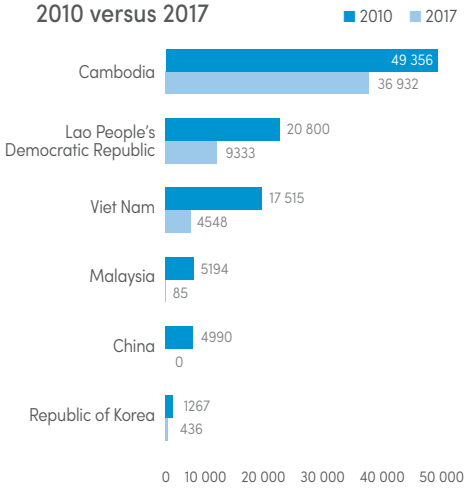
H. Countries with increase in case incidence, 2010–2017



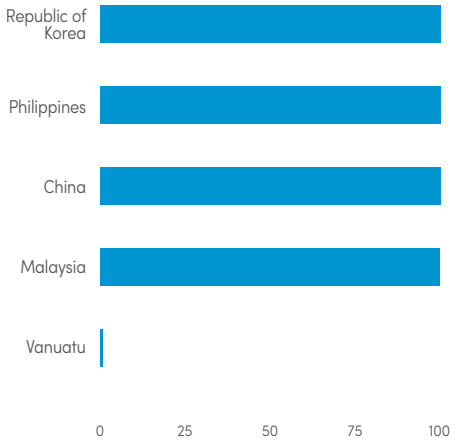
Ia. Change in reported malaria incidence and mortality rates, 2010–2017



Ib. Reported indigenous cases in countries with nationwide elimination activities, 2010 versus 2017



J. Percentage of total confirmed cases investigated, 2017



Note: Countries with no case investigation: Cambodia, Lao People's Democratic Republic, Papua New Guinea, Solomon Islands and Viet Nam.

KEY MESSAGES

- Seven out of the 10 malaria endemic countries in the region are on target to achieve a more than 40% reduction in case incidence by 2020, and Cambodia is on track for a 20–40% reduction. Papua New Guinea and Solomon Islands have seen an increase in reported cases since 2010. Three countries – Papua New Guinea, Cambodia and Solomon Islands – accounted for 98% of the reported cases, with relative contributions of 81%, 11% and 6%, respectively. Cambodia reported an increase of cases by 98% between 2016 and 2017, while Lao People's Democratic Republic and Viet Nam had slight increases during the same period. Reported cases between 2016 and 2017 in Malaysia, Vanuatu and Republic of Korea dropped by nearly 68%, 34% and 28%, respectively. Malaria deaths in the region decreased from 910 in 2010 to 335 in 2017 (63% reduction). Among malaria-related deaths in the region, 82% were in Papua New Guinea, followed by Solomon Islands at 8%.
- China, Malaysia and the Republic of Korea are on course for elimination by 2020. China reported zero indigenous cases in 2017 for the first time, paving the way for the attainment of nationwide elimination. Transmission in Malaysia is limited to Sarawak and Sabah, but the country is facing increasing cases of zoonotic malaria *P. knowlesi*, which increased from 1600 to over 3600 between 2016 and 2017. The Republic of Korea is facing the challenge of malaria transmission in military personnel along the norther border. The Philippines has initiated subnational elimination, reporting zero indigenous cases in 74 out of 81 provinces in 2017.
- Three countries of the GMS (Cambodia, Lao People's Democratic Republic and Viet Nam), supported through a Global Fund financed regional artemisinin-resistance initiative, aim to eliminate *P. falciparum* by 2025 and all species of malaria by 2030. However, the percentage of cases due to *P. falciparum* increased from below 30% in 2010 to 58% in 2017 in these countries. This is mainly attributed to the stagnation of progress, mainly in Cambodia. Challenges include decreased funding, multiple artemisinin-based combination therapy failures, vector resistance to pyrethroids (in Cambodia, Lao People's Democratic Republic, Philippines and Viet Nam) and organophosphates (in China), and resurgence of malaria. Substantial efforts are underway to improve access to services and case-based surveillance to accelerate elimination in Lao People's Democratic Republic, Malaysia, Philippines, Republic of Korea and Vanuatu.
- Vector resistance to pyrethroids was confirmed in half of the countries. Resistance to organochlorines was confirmed in more than half of the countries, although there are significant gaps in standard resistance monitoring for this class. Almost no standard resistance monitoring was reported for carbamates or organophosphates.

Annex 3 - A. Policy adoption, 2017

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	●	●	●	●	○	○	○
Eswatini	●	○	●	●	●	○	○
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]	●	●	●	●	○	●	○
Togo	●	●	●	●	○	●	●
Uganda	●	●	●	●	○	●	○
United Republic of Tanzania[3]							
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. falciparum*	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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●	●	●	○	●	●	●	○	○
●	●	●	○	●	●	●	●	○
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●	●	●	○	●	●	●	●	●
●	●	○	○	NA	○	●	●	●
●	●	○	○	NA	○	●	●	●
●	●	●	○	●	–	●	●	○
●	●	●	○	●	●	●	●	○
●	●	●	○	●	●	●	●	●

Annex 3 - A. Policy adoption, 2017

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	●	●	●	●	○	●	○
Philippines	●	●	○	●	○	NA	NA
Republic of Korea	○	○	○	○	○	○	●
Solomon Islands	●	●	●	●	○	○	○
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; NMP: national malaria programme; RDT: rapid diagnostic test; SMC: seasonal malaria chemoprevention.

● = Actually implemented ○ = Not implemented – = Question not answered or not applicable

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. falciparum*	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	○	●	●	–
●	●	○	●	●	○	○	●	○
●	●	●	○	NA	–	●	●	○
●	●	●	○	●	○	●	●	○
●	●	○	○	NA	–	●	○	●
●	●	●	○	NA	–	●	●	○
●	●	○	○	NA	–	●	●	●
●	●	●	○	NA	–	●	●	●
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[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).

[3] Where national data for the United Republic of Tanzania is unavailable, refer to Mainland and Zanzibar.

Annex 3 – B. Antimalarial drug policy, 2017

WHO region Country/area	*P. falciparum*				*P. vivax*
	Uncomplicated unconfirmed	Uncomplicated confirmed	Severe	Prevention during pregnancy	Treatment
AFRICAN					
Algeria					CQ
Angola	AL	AL	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
Eswatini		AL	AS		
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	SP	
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
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+PQ(1d)	AS	-	CQ+PQ
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+PQ(7d)
El Salvador	-	CQ+PQ(1d)	QN	-	CQ+PQ(14d)
French Guiana	-	AL	AS	-	CQ+PQ(14d)
Guatemala	-	CQ+PQ	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)	-	AL+PQ	AM; QN	-	CQ+PQ(14d)
EASTERN MEDITERRANEAN					
Afghanistan	CQ	AL+PQ	AS; AM; QN		CQ+PQ(8w)
Djibouti	AL	AL+PQ	AS		AL+PQ (14d)
Iran (Islamic Republic of)		AS+SP+PQ	AS; QN		CQ+PQ(14d & 8w)
Pakistan	CQ	AL+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	AS, QN;		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-PPQ; AS+AQ; DHA-PPQ; PYR	AM; AS; PYR		CQ+PQ(8d); PQ+PPQ(8d); ACTs+PQ(8d); PYR
Lao People's Democratic Republic	AL+PQ	AL+PQ	AS+AL+PQ		PQ(14d): 1st line after AL; CQ: 2nd line
Malaysia		AS+MQ	AS+D; QN		ACT + PQ(14d)
Papua New Guinea		AL	AM; AS	SP	AL+PQ
Philippines	AL	AL+PQ	QN+T; QN+D; QN+CL	SP(IPT)	CQ+PQ(14d)
Republic of Korea	CQ		QN		CQ+PQ(14d)
Solomon Islands	AL	AL	AS+AL or QN	CQ (5mg/kg weekly)	AL+PQ(14d)
Vanuatu		AL	AS	CQ(weekly)	AL+PQ(14d)
Viet Nam	DHA-PPQ	DHA-PPQ	AS; QN		CQ+PQ(14d)

ACT: artemisinin-based combination therapy; AL: artemether-lumefantrine; AM: artemether; AQ: amodiaquine; ART: artemisinin; AS: artesunate; CL: clindamycin; CQ: chloroquine; D: doxycycline; DHA: dihydroartemisinin; IPTp: intermittent preventive treatment in pregnancy; MQ: mefloquine; 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, 2015–2017

WHO region Country/area	Year	Contributions reported by donors			
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	UK[4]
AFRICAN					
Angola	2015	1 359 473	28 840 000	0	0
	2016	2 667 655	27 540 000	0	0
	2017	15 112 443	22 000 000	0	0
Benin	2015	2 742 977	16 995 000	1 996 546	0
	2016	2 423 916	16 830 000	0	0
	2017	25 132 743	16 000 000	0	0
Botswana	2015	1 700 968	0	0	0
	2016	0	0	0	0
	2017	1 618 249	0	0	0
Burkina Faso	2015	27 442 112	12 360 000	-4 997	124 024
	2016	29 095 587	14 280 000	5 206 640	58 767
	2017	9 466 859	25 000 000	5 206 640	21 280
Burundi	2015	3 534 364	12 360 000	1 508 650	0
	2016	7 711 335	9 690 000	0	0
	2017	27 805 909	9 000 000	0	0
Cabo Verde	2015	522 677	0	0	0
	2016	32 033	0	0	0
	2017	231 933	0	0	0
Cameroon	2015	45 841 905	0	0	0
	2016	10 847 259	0	0	0
	2017	22 705 982	20 000 000	0	0
Central African Republic	2015	2 731 882	0	0	0
	2016	2 174 746	0	0	0
	2017	13 226 196	0	0	0
Chad	2015	3 796 204	0	0	0
	2016	33 636 106	0	0	0
	2017	13 958 039	0	0	0
Comoros	2015	76 626	0	0	0
	2016	2 953 582	0	0	0
	2017	841 355	0	0	0
Congo	2015	-282 740	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
Côte d'Ivoire	2015	15 501 315	0	0	0
	2016	60 807 815	0	0	0
	2017	30 710 817	25 000 000	0	0
Democratic Republic of the Congo	2015	130 200 000	51 500 000	0	4 242 108
	2016	117 900 000	51 000 000	0	7 471 812
	2017	126 000 000	50 000 000	0	2 705 624
Equatorial Guinea	2015	-140 630	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
Eritrea	2015	7 505 719	0	0	0
	2016	6 759 808	0	0	0
	2017	13 007 753	0	0	0
Eswatini	2015	-9 519	0	0	0
	2016	878 190	0	0	0
	2017	1 649 319	0	0	0

Contributions reported by countries							
Government (NMP)	Global Fund	World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[7]
47 356 258 [5]	2 675 645		28 000 000				
49 752 484 [6]	16 852 909		27 000 000				
9 020 546	12 023 625		18 000 000		139 995		
602 489	0					214 930	
17 540 458 [5]	13 424 427	230 534	3 387 786		148 346	179 879	
4 395 380	33 122 938	0	9 642 332	3 140	158 723	5 400	
1 605 618	280 899	0	0	0		0	0
1 310 536	2 019 079	0	0	0		0	0
1 092 695	1 079 069	0	0	0		0	0
576 253	42 735 771	284 328	8 579 441	9 454	11 800	305 704	2 533 200
805 813	41 106 186	2 522 884	5 849 900		20 367	179 278	3 638 120
15 573 795	9 474 402	5 608 893	13 053 101		164 363	163 431	5 570 878
464 515	4 523 416		9 500 000		32 595	47 445 292	
3 050 306	4 759 452		9 500 000		18 579	786 133	
3 070 872	21 228 086		9 000 000		37 832	4 967 372	869 962
1 520 070 [5]	325 273				99 519		
1 229 033 [5]	315 038				59 219		
4 627 843	466 244				29 000		
12 122 087 [5]	54 918 697				221 000		
1 989 500	14 478 500				747 500		2 024 000
2 288 193 [5]	28 008 486				882 650	1 105 377	9 477
530 000 [5]	0				100 000		
530 000	4 724 918				150 000		
530 000	443 466				70 419		
1 184 508	6 141 762				20 000	216 491	
1 000 000 [5]	504 853			73 721	1 000	263 754	
1 030 000 [6]	34 927 891				237 873	308 737 013	494 964 867
114 685	224 643	0	0	0	30 000	6 221	0
114 684	2 154 616				15 000		
114 684	852 996	0	0	0	54 000		0
446 000	0	0	0	0	68 000	18 000	0
118 498	0	0	0	0	24 727	2 863	0
122 182	0	0	0	0	15 000	0	10 000
1 632 336	25 744 972	0	0	0	0	26 915	40 998
4 688 040	60 352 423	0	0	0	13 627	35 933	
5 380 263	95 971 000	0	0	0	18 218	76 943	10 319
7 014 345	107 594 221	0	34 000 000	23 018 218	2 933 630	808 130	0
7 327 062	143 685 771	0	49 325 000	8 063 499	3 677 567	4 771 747	0
683 314	75 183 622	0	46 738 755	4 694 136	2 265 298	82 857	0
2 822 238 [6]	0						
3 053 994 [6]	0						
3 083 935 [6]	0						
0	6 216 618	0	0	0	46 081	0	0
388 886 [6]	16 685 629	0	0	0	200 000	0	0
392 699 [6]	9 150 700				80 450		
11 847 354	1 714 840						
1 112 523	1 719 139	0	0	0		0	
10 019 754	20 910 608	0	0	0	620 000	0	0

Annex 3 - C. Funding for malaria control, 2015–2017

WHO region Country/area	Year	Contributions reported by donors			
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	UK[4]
AFRICAN					
Ethiopia	2015	37 476 859	45 320 000	0	0
	2016	25 754 804	40 800 000	0	0
	2017	72 047 923	37 000 000	0	0
Gabon	2015	-306 468	0	0	0
	2016	-562	0	0	0
	2017	0	0	0	0
Gambia	2015	3 677 498	0	0	2 662 528
	2016	3 104 196	0	0	338 126
	2017	10 174 081	0	0	122 439
Ghana	2015	50 026 202	28 840 000	0	5 212 666
	2016	38 429 103	28 560 000	0	5 247 876
	2017	39 934 110	28 000 000	0	1 900 313
Guinea	2015	11 450 399	12 875 000	0	0
	2016	28 544 793	15 300 000	245 355	0
	2017	14 087 689	15 000 000	245 355	0
Guinea-Bissau	2015	2 515 554	0	0	0
	2016	8 920 756	0	0	0
	2017	6 590 790	0	0	0
Kenya	2015	4 303 360	36 050 000	0	13 299 866
	2016	11 123 148	35 700 000	0	6 807 304
	2017	59 165 162	35 000 000	0	2 464 998
Liberia	2015	7 546 777	12 360 000	0	0
	2016	6 238 674	14 280 000	0	0
	2017	13 804 437	14 000 000	0	0
Madagascar	2015	24 107 188	26 780 000	0	0
	2016	12 197 281	26 520 000	0	0
	2017	13 994 308	26 000 000	0	0
Malawi	2015	29 962 842	22 660 000	0	0
	2016	16 189 819	22 440 000	0	3 801 033
	2017	11 663 688	22 000 000	0	1 376 395
Mali	2015	7 370 952	25 750 000	0	86 680
	2016	9 509 757	25 500 000	4 695 211	125 981
	2017	22 692 524	25 000 000	4 695 211	45 619
Mauritania	2015	-192 449	0	0	12 776
	2016	1 822 342	0	0	0
	2017	4 490 910	0	0	0
Mayotte	2015	0	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
Mozambique	2015	18 938 749	29 870 000	-461 921	0
	2016	60 406 176	29 580 000	1 375 334	0
	2017	62 182 557	29 000 000	1 375 334	0
Namibia	2015	-441 270	0	0	0
	2016	2 165 845	0	0	0
	2017	2 647 838	0	0	0
Niger	2015	7 806 400	0	0	0
	2016	9 031 592	0	3 685 517	0
	2017	24 167 557	18 000 000	3 685 517	0

Contributions reported by countries							
Government (NMP)	Global Fund	World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[7]
7 336 301 [6]	18 448 416		3 800 000				13 114 670
7 483 027 [6]	49 500 000		10 600 000		0	30 000	13 500 000
7 556 390 [6]	31 604 918		7 150 000		0	30 000	13 500 000
27 677 576 [5]	0	0	0	0	47 147	0	272 289
1 379 318 [6]	0	0	0	0		0	
142 296	0	0	0	0	12 616	0	0
793 818	2 887 213	0	0	0		3 062	2 406 568
591 125 [6]	9 352 149				0	0	1 031 868
596 920 [6]	9 557 650				14 400	33 839	117 749
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
683 179	40 951 105	0	22 445 306		140 000	0	0
48 178 445	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
14 796 [5]	9 251 505	125 000	12 500 000		65 000		
216 800	536 775	0	0	0			0
241 163	8 972 945	0	0	0			269 981
1 655 769	9 086 476	0	0	0		0	256 659
1 520 205	64 945 727		32 400 000		604 058	100 000	
1 597 127 [6]	0						
1 612 786 [6]	0						
292 835 [6]	0						
298 692 [6]	0						
301 620 [6]	18 526 566		14 000 000				
25 400	23 199 442	0	26 000 000	213 615	298 946	70 000	56 422
32 100	6 395 563	0	26 000 000	0	486 635		
37 214	43 205 989	0	26 000 000	0	220 000	0	0
4 266 640 [5]	22 777 197		12 234 171				1 082 008
4 482 532 [6]	0						
344 828 [5]	13 177 696		22 000 000				
5 670 552	21 201 959	0	25 500 000		120 000	574 693	5 326 854
3 263 366	16 374 449		25 500 000		4 983	2 203 890	
4 382 069	19 288 748	3 226 759	25 500 000	0	140 713	854 199	
173 720	0				67 000	67 000	
2 450 845	0	3 500 400			220	384 900	
605 079 [5]	6 957 945				47 950		13 944
0 [6]	0						
0 [6]	0						
0 [6]	0						
5 146 910	4 357 070	0	29 000 000	0	200 000	1 688 356	139 501
1 237 214	190 374 239		29 000 000		325 000	1 250 640	
76 074	58 222 077		29 000 000		240 000	3 848 028	10 995
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
5 166 667	1 096 657				100 000		
8 999 547	9 324 003	0	72 000	0	86 567	18 500	0
2 672 787	14 911 144	641 402	106 000	0	75 586	39 712	39 712
4 454 320	22 404 758	2 177 698	220 000	0	328 594	805 598	476 444

Annex 3 - C. Funding for malaria control, 2015–2017

WHO region Country/area	Year	Contributions reported by donors			
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	UK[4]
AFRICAN					
Nigeria	2015	85 492 092	77 250 000	5 346 741	17 210 986
	2016	104 200 000	76 500 000	12 991 673	2 959 913
	2017	118 800 000	75 000 000	12 991 673	1 071 816
Rwanda	2015	11 220 654	18 540 000	0	0
	2016	22 191 521	18 360 000	0	0
	2017	16 690 320	18 000 000	0	0
Sao Tome and Principe	2015	1 121 112	0	0	0
	2016	2 883 597	0	0	0
	2017	2 912 648	0	0	0
Senegal	2015	16 334 055	24 720 000	0	0
	2016	10 011 356	24 480 000	0	0
	2017	5 810 522	25 000 000	0	0
Sierra Leone	2015	6 362 725	0	0	0
	2016	5 654 407	0	0	7 692 308
	2017	1 488 059	15 000 000	0	2 785 468
South Africa	2015	0	0	0	92 425
	2016	0	0	0	48 490
	2017	0	0	0	17 559
South Sudan[8]	2015	0	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
Togo	2015	591 315	0	722 495	0
	2016	4 806 133	0	1 794 230	0
	2017	17 803 327	0	1 794 230	0
Uganda	2015	19 731 661	35 020 000	0	18 820 623
	2016	74 648 726	34 680 000	0	30 562 933
	2017	52 914 027	33 000 000	0	11 067 168
United Republic of Tanzania[9]	2015	58 168 414	47 380 000	0	4 436 019
	2016	62 681 243	46 920 000	0	8 964 840
	2017	72 183 435	44 000 000	0	3 246 265
Mainland	2015	58 262 366	0	0	0
	2016	61 652 875	0	0	0
	2017	69 674 305	0	0	0
Zanzibar	2015	-93 953	0	0	0
	2016	1 028 368	0	0	0
	2017	2 509 129	0	0	0
Zambia	2015	9 819 486	24 720 000	121 867	0
	2016	27 039 233	25 500 000	275 341	28 208
	2017	39 488 105	30 000 000	275 341	10 214
Zimbabwe	2015	25 010 265	15 450 000	0	0
	2016	16 641 260	15 300 000	0	0
	2017	17 117 012	15 000 000	0	0
AMERICAS					
Belize	2015	0	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
Bolivia (Plurinational State of)	2015	1 199 904	0	0	0
	2016	4 233 592	0	0	0
	2017	2 743 499	0	0	0

Contributions reported by countries							
Government (NMP)	Global Fund	World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[7]
438 106 536	144 939 060		75 000 000	12 322 449	964 784		4 809 717
476 077 607	372 939 170		75 000 000	2 967 421			
107 005 355	198 176 039		75 000 000				
531 541	10 893 838		18 000 000				
16 853 782	30 497 401		18 000 000		72 000		
20 554 441	11 440 292		18 000 000		270 000		
47 033	1 668 679	0	0	1 000 000	60 006	1 293	1 600
1 745 437	2 261 202	0	0	1 000 000	52 985	2 826	4 584
2 044 439	3 296 207	0	0	0	89 244	0	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
4 931 741	3 039 725	0	24 000 000	0	0	0	4 500 000
190 741	5 353 621	0	0	0	101 207	100 847	
346 772 [5]	5 389 748				36 569	55 295	
789 780 [6]	19 300 000				72 812	3 464 362	
7 752 321	0	0	0	41 140	40 000	0	0
15 428 406	0	0	0	0	0	0	75 061
10 656 029	27 226 495	0	0	0	20 000	0	0
8 919 615 [5]	37 595 704	28 717 695	6 000 000	12 079 880	941 876	29 015 974	25 024 544
8 919 615 [5]	20 288 506	7 000 000	6 000 000	6 000 808	4 779 900	12 812 860	6 758 505
2 603 242 [5]	16 478 112	0	6 000 000	6 654 000	200 000		5 249 000
232 301 [6]	0						
68 213	2 973 548	943 022	0	0	7 158	169 496	10 650
1 847 898	24 435 381	1 014 708	0	0	7 765	556 712	5 238 461
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
7 280 412	150 649 446	0	34 000 000	8 974 881		743 791	4 335 860
6 405 297 [6]	0						
5 990 723 [6]	0						
1 402 357 [6]	0						
30 523 723	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
70 274 555	70 274 555				42 000		
16 557 [6]	0						
15 071	639 075	0	863 539	484 175	0	0	0
8 894	2 960 586	0	978 962		10 000		
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		
27 928 587	45 468 736		25 000 000		200 000		
780 000	33 425 777		12 000 000		39 649		
675 000	21 823 373		12 000 000		46 698		
782 250	17 407 287		15 120 000				224 970
297 500	189 879	0	12 747	0	0	0	0
248 000	0	0	1 419	0	0	0	0
250 000	0	0	0	0	0	0	0
726 587	1 170 000	0	0	0	38 991	0	0
425 405	2 846 786	0	0	0		0	
451 993	0	0	0	0		0	0

Annex 3 - C. Funding for malaria control, 2015–2017

WHO region Country/area	Year	Contributions reported by donors			
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	UK[4]
AMERICAS					
Brazil	2015	0	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
Colombia	2015	-589 624	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
Costa Rica	2015	0	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
Dominican Republic	2015	-24 382	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
Ecuador	2015	0	0	0	0
	2016	0	0	0	0
	2017	-584 983	0	0	0
El Salvador	2015	0	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
French Guiana	2015	0	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
Guatemala	2015	4 924 598	0	0	0
	2016	1 820 149	0	0	0
	2017	2 245 758	0	0	0
Guyana	2015	56 021	0	0	0
	2016	-59 903	0	0	0
	2017	744 589	0	0	0
Haiti	2015	4 653 592	0	0	0
	2016	6 275 177	0	0	0
	2017	10 431 775	0	0	0
Honduras	2015	3 405 138	0	0	0
	2016	1 201 628	0	0	0
	2017	1 204 185	0	0	0
Mexico	2015	0	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
Nicaragua	2015	572 388	0	0	0
	2016	5 169 765	0	0	0
	2017	2 436 491	0	0	0
Panama	2015	0	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
Paraguay	2015	0	0	0	0
	2016	1 547 843	0	0	0
	2017	334 089	0	0	0
Peru	2015	0	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0

Contributions reported by countries							
Government (NMP)	Global Fund	World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[7]
60 803 769 [5]	0	0	273 530	0	0	0	0
44 240 812 [5]	0	0	0	0	0	0	0
54 904 744 [5]	0	0	0	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
10 897 170	0	0	0	0	0	0	0
6 830 000 [5]	64 496	0	0	0	0	0	0
5 090 000 [5]	14 000	0	1 624	0	3 000	0	0
4 980 000 [5]	0	0	0	0	9 770	0	0
180 922	72 511	0	0	0	0	0	213 094
3 525 868	0	0	0	0	0	0	334 363
1 149 368	125 543	0	0	0	824	0	27 987
2 444 718	0	0		0	141 000	0	
20 000 000 [5]	0	0		0		0	0
5 835 716 [5]	0	0		0		0	0
3 007 245	0	0	13 376	0	11 563	0	0
2 662 869	166 311	0	1 089	0		0	65 789
2 662 869	538 732	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
2 137 013	8 232 108	0	56 824	0	0	0	0
2 639 249	10 669 242	0		0		0	
3 374 612	2 231 020						
741 485	337 939	0	288 169	0	47 500	0	0
521 018	338 772	0	98 000	0	50 000	0	0
1 473 101	1 009 615	0		0	9 793	0	
152 174 [5]	5 144 270	0	62 156	470 000	231 185		242 094
362 174 [5]	4 926 108	0	0	500 000	227 455		330 566
373 039 [6]	12 540 295	0	0	500 000	227 455		196 777
543 312	4 131 915	0	118 071	0	18 457	0	0
543 312	3 017 548		7 840	0	0	0	0
543 312	3 309 273	0	54 475	0	0	0	0
46 662 926	0	0	0	0	0	0	0
43 376 321	0	0	0	0	0	0	0
40 661 276	0						
2 479 318	1 013 568	0	47 409		9 937		
3 544 313	3 727 737	0		0	8 250	0	
3 984 944	1 826 934				118 871		
5 605 824	10 000	0	49 079	0	11 000	0	0
3 822 596	0	0	23 247	0	9 665	0	
3 671 002	0				100 000		
2 264 399	0	0	0	0	16 800	0	0
2 264 399	1 517 493	0	0	0	0	0	0
2 883 082	593 059	0	0	0	0	0	0
2 134 919 [5]	0	0	98 598	0		0	0
180 563	0	0	183 809	0		0	0
2 028 367 [6]	0				168 737		

Annex 3 - C. Funding for malaria control, 2015–2017

WHO region Country/area	Year	Contributions reported by donors			
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	UK[4]
AMERICAS					
Suriname	2015	1 312 748	0	0	0
	2016	167 148	0	0	0
	2017	1 143 023	0	0	0
Venezuela (Bolivarian Republic of)	2015	0	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
EASTERN MEDITERRANEAN					
Afghanistan	2015	8 533 310	0	-559 069	0
	2016	5 820 274	0	0	0
	2017	6 888 183	0	0	0
Djibouti	2015	-292 463	0	175 876	0
	2016	4 638 096	0	133 236	0
	2017	2 559 419	0	133 236	0
Iran (Islamic Republic of)	2015	2 554 745	0	0	0
	2016	1 760 812	0	0	0
	2017	1 088 801	0	0	0
Pakistan	2015	8 746 667	0	0	0
	2016	11 093 231	0	0	0
	2017	16 242 679	0	0	0
Saudi Arabia	2015	0	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
Somalia	2015	10 330 077	0	0	0
	2016	9 622 187	0	0	0
	2017	15 967 800	0	0	0
Sudan	2015	46 904 013	0	0	0
	2016	54 480 333	0	0	0
	2017	10 254 657	0	0	0
Yemen	2015	1 819 958	0	0	0
	2016	4 607 360	0	0	0
	2017	3 583 441	0	0	0
SOUTH-EAST ASIA					
Bangladesh	2015	6 954 742	0	0	0
	2016	6 517 643	0	0	0
	2017	12 670 908	0	0	0
Bhutan	2015	581 333	0	0	0
	2016	446 270	0	0	0
	2017	560 007	0	0	0
Democratic People's Republic of Korea	2015	3 533 558	0	0	0
	2016	3 701 666	0	0	0
	2017	1 489 656	0	0	0
India	2015	33 745 075	0	0	0
	2016	4 158 569	0	0	0
	2017	66 304 364	0	0	0
Indonesia	2015	12 895 953	0	0	38 765
	2016	11 037 964	0	0	49 678
	2017	23 034 177	0	0	17 989

Contributions reported by countries							
Government (NMP)	Global Fund	World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[7]
99 016	975 757	0	47 762	400 541	41 437	0	0
104 026 [6]	0						
61 800	1 041 205	0	48 686		12 920	0	0
9 933 573	0	0	0				
2 200 925	945 713	0	0	0		0	0
2 200 925 [6]	0						
936 417 [6]	4 571 460				89 167		
923 733 [6]	9 762 977				12 905		
901 203 [6]	1 053 356				85 814		
1 181 784 [6]	0	25 000		100 000	49 000	25 000	
4 547 153 [5]	4 547 153	0		1 000 000	25 000	25 000	
3 222 506 [5]	0	0		0	51 000	0	
2 500 000	2 418 943				5 000		
2 500 000	1 364 857						
2 700 000	0				48 000		
16 385 240 [6]	5 910 215				89 000		
16 400 000	11 536 047				300 000		
17 940 124 [6]	22 635 097				130 000		
30 000 000	0	0	0	0	0	0	0
30 000 000	0	0	0	0	7 500	0	0
30 000 000	0	0	0	0	100 000	0	0
79 488	2 748 614	0	0	0	121 800		0
81 200	9 946 059	0	0	0	135 000		0
85 350	20 986 170	0	0	0	147 000		0
21 536 529	16 251 350	0	0	0	471 552	0	0
24 209 740	61 304 230	0	0	0	93 302	1 200 574	0
19 087 941	31 496 505	0	0	0	3 084	0	0
0	3 008 564				390 259		
0	1 140 758	0	0	0	105 000	0	
0	7 933 620				2 080 000	473 627	
935 897	9 507 849	0	0	0	65 000	0	0
1 162 970	9 734 466	0	0	0	188 000	0	0
1 493 690	8 821 888	0	0	0	210 000	0	0
179 104	487 909	0	0	0	5 552	0	0
163 046	550 197	0	0	0	40 273	0	72 424
179 470	586 015	0	0	0	35 212	0	121 212
2 042 000	6 817 631	0	0	0	30 200	0	
2 080 000	3 775 232	0	0	0	35 000	0	
2 151 000	3 426 508	0	0	0	35 000	0	0
48 419 018	5 244 575	0	0	0		0	
48 364 518	15 892 221	0	0	0		0	
145 564 257	94 474 099	0	0	0		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
17 686 075 [5]	30 336 061				147 033	1 385 855	

Annex 3 - C. Funding for malaria control, 2015–2017

WHO region Country/area	Year	Contributions reported by donors			
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	UK[4]
SOUTH-EAST ASIA					
Myanmar	2015	28 618 123	9 270 000	0	5 160 854
	2016	34 319 040	10 200 000	0	12 973 233
	2017	39 881 040	10 000 000	0	4 697 748
Nepal	2015	1 769 858	0	0	0
	2016	3 035 780	0	0	0
	2017	5 051 299	0	0	0
Thailand	2015	6 921 657	0	0	0
	2016	8 915 465	0	0	0
	2017	10 714 782	0	0	0
Timor-Leste	2015	2 590 797	0	0	0
	2016	3 164 959	0	0	0
	2017	2 629 555	0	0	0
WESTERN PACIFIC					
Cambodia	2015	9 041 837	4 635 000	0	0
	2016	8 206 227	6 120 000	0	0
	2017	14 051 730	10 000 000	0	0
China	2015	-7 488	0	0	0
	2016	-310 405	0	0	0
	2017	0	0	0	0
Lao People's Democratic Republic	2015	5 263 053	0	67 770	0
	2016	5 795 544	0	0	0
	2017	3 586 331	0	0	0
Malaysia	2015	0	0	0	298 153
	2016	0	0	0	782 991
	2017	0	0	0	283 530
Papua New Guinea	2015	7 965 454	0	0	70 085
	2016	7 713 809	0	0	135 814
	2017	10 330 349	0	0	49 180
Philippines	2015	4 399 516	0	0	0
	2016	3 457 013	0	0	0
	2017	7 180 456	0	0	0
Republic of Korea	2015	0	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
Solomon Islands	2015	702 483	0	0	0
	2016	2 486 618	0	0	0
	2017	1 003 287	0	0	0
Vanuatu	2015	0	0	0	0
	2016	0	0	0	0
	2017	0	0	0	0
Viet Nam	2015	8 002 949	0	0	0
	2016	5 962 984	0	0	0
	2017	15 454 252	0	0	0

NMP: national malaria 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.

[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 expediture.

Contributions reported by countries							
Government (NMP)	Global Fund	World Bank	PMI/USAID	Other bilaterals	WHO	UNICEF	Other contributions[7]
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		
6 630 553 [6]	53 056 520	0	10 000 000	6 532 464	25 000	0	3 462 068
2 315 400 [5]	5 199 862				45 000		
966 200 [5]	10 228 041				23 000		
263 262	102 424				24 509		
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
7 664 899	15 622 625	0			188 686		49 859
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
1 115 484	4 039 622				42 456		20 000
692 698	4 042 964	0	4 500 000	0	406 393	0	
22 297	2 002 435	0	6 000 000	0	304 651	0	
663 526	8 045 144	0	6 000 000	0	579 738	0	
17 620 404	0						
18 511 996 [6]	0						
18 693 486 [6]	0						
211 874	6 458 501	0	216 986	600 000	198 357	0	0
260 975	5 050 407	0	340 021	184 632	75 000	0	45 199
1 008 060	1 728 818	0	604 000	0	256 734	0	1 066 089
64 881 663	0						
39 703 616	0	0	0	0	0	0	0
48 365 863	0	0	0	0	0	0	0
1 637 421	11 000 000						
181 200	5 900 000	0	0	0	0	0	0
753 771	10 330 449	0	0	0	95 000	0	911 770
6 165 334	6 087 433	0	0	0	0	0	0
6 720 000 [5]	3 944 923	0	0	0	0	0	0
7 012 009	6 471 549	0	0	0	0	0	0
538 495	0	0	0	0	0	0	0
526 499	0	0	0	0	0	0	0
475 173	0	0	0	0	0	0	0
281 324	2 232 220	0	0	1 017 390	464 914	0	0
327 032	1 309 126	0	0	448 718	358 000	0	0
858 256	977 025	0	0	0	736 892	0	0
166 359	687 267	0	0	424 136	175 894	0	0
196 760	927 486	0	0	249 071	148 217	0	0
139 254	285 333	0	0	206 575	21 918	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
3 022 523	9 324 657	0	0	0	200 000	0	500 000

[6] WHO NMP funding estimates.

[7] Other contributions as reported by countries: NGOs, foundations, etc.

[8] 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.

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

Note: Negative disbursements reflect recovery of funds on behalf of the financing organization.

Annex 3 - D. Commodities distribution and coverage, 2015–2017

WHO region Country/area	Year	No. of LLINs sold or delivered	Modelled percentage 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	2015	0	-	-	-	0	747	-
	2016	0	-	-	-	0	432	-
	2017	0	-	-	-	36	453	-
Angola	2015	2 138 331	23	-	-	2 500 000	3 185 160	3 185 160
	2016	3 507 740	21	-	-	3 000 000	4 000 000	4 000 000
	2017	-	21	-	-	397 882	3 090 761	3 090 761
Benin	2015	392 110	74	802 597	8	1 486 667	1 177 261	1 177 261
	2016	720 706	55	853 221	8	1 500 047	1 199 055	1 199 055
	2017	6 771 009	42	853 221	8	2 171 867	1 431 175	1 431 175
Botswana	2015	50 000	-	143 268	10	1 600	1 386	1 386
	2016	116 048	-	115 973	8	2 196	1 634	1 634
	2017	3 000	-	139 244	9	2 645	4 429	4 429
Burkina Faso	2015	481 107	54	0	-	8 290 188	7 824 634	7 824 634
	2016	10 924 031	63	-	-	11 974 810	9 519 568	9 519 568
	2017	986 164	77	-	-	12 853 861	10 457 752	10 457 752
Burundi	2015	726 767	76	-	-	5 075 437	4 798 379	4 798 376
	2016	755 182	49	-	-	8 077 703	8 277 026	8 031 773
	2017	6 717 994	64	848 441	8	10 046 047	7 978 264	7 613 646
Cabo Verde	2015	0	-	308 586	100	6 620	26	26
	2016	0	-	349 126	100	8 906	71	71
	2017	80	-	495 313	100	16 573	420	420
Cameroon	2015	2 751 112	31	-	-	1 573 992	826 434	826 434
	2016	9 588 733	56	-	-	1 380 725	1 093 036	1 093 036
	2017	362 629	66	-	-	1 589 218	879 039	785 765
Central African Republic	2015	1 170 566	51	-	-	759 245	1 043 674	1 043 674
	2016	57 110	59	-	-	1 651 645	1 714 647	1 714 647
	2017	857 198	59	-	-	806 218	947 205	947 205
Chad	2015	1 218 640	30	-	-	1 057 033	1 326 091	1 326 091
	2016	384 606	12	-	-	882 617	-	-
	2017	6 886 534	45	-	-	1 287 405	1 486 086	1 486 086
Comoros	2015	16 969	71	20 275	3	14 813	577	550
	2016	451 358	75	-	-	61 600	1 373	1 373
	2017	34 590	90	-	-	21 988	2 794	2 794
Congo	2015	447	42	-	-	0	1 304 959	1 304 959
	2016	1 291	32	-	-	45 000	0	0
	2017	2 223	24	-	-	0	0	0
Côte d'Ivoire	2015	3 663 080	81	-	-	5 600 100	3 296 991	3 296 991
	2016	1 177 906	72	-	-	5 351 325	4 964 065	4 964 065
	2017	13 216 468	75	-	-	6 986 825	5 373 545	5 373 545
Democratic Republic of the Congo	2015	15 419 488	58	77 643	<1	13 574 891	9 871 484	9 871 484
	2016	31 439 920	72	916 524	1	18 630 636	17 258 290	17 258 290
	2017	8 412 959	77	232 181	<1	18 994 861	17 250 728	17 250 728
Equatorial Guinea	2015	139 523	13	76 067	7	46 836	22 638	22 638
	2016	66 232	16	82 749	7	62 133	18 072	18 072
	2017	42 317	18	64 617	5	60 798	15 341	15 341
Eritrea	2015	2 054 194	33	328 915	7	645	255 602	255 602
	2016	156 553	45	364 007	7	0	177 525	177 525
	2017	1 724 972	52	375 696	7	481 600	296 399	296 399
Eswatini	2015	3 808	-	-	-	58 700	491	396
	2016	4 758	-	24 179	6	56 780	600	600
	2017	0	-	21 316	6	59 760	900	861
Ethiopia	2015	17 233 074	57	16 147 333	24	13 148 960	7 036 620	6 049 320
	2016	13 266 926	61	15 050 413	22	9 742 450	6 530 973	5 239 080
	2017	2 755 700	51	17 628 133	25	6 400 000	8 470 000	7 300 000

WHO region Country/area	Year	No. of LLINs sold or delivered	Modelled percentage 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								
Gabon	2015	10 730	13	–	–	–	–	–
	2016	9 660	10	0	–	0	0	0
	2017	–	7	–	–	0	0	0
Gambia	2015	93 375	69	438 234	22	875 850	351 677	351 677
	2016	113 385	51	399 176	20	1 017 889	272 895	272 895
	2017	1 051 391	46	396 546	19	767 984	174 556	174 166
Ghana	2015	8 423 676	66	1 325 507	5	3 778 325	3 009 365	3 009 365
	2016	5 962 179	72	1 409 967	5	4 823 250	2 289 145	2 289 145
	2017	3 059 363	64	1 868 861	7	7 051 875	4 522 410	4 522 410
Guinea	2015	741 450	68	–	–	2 412 597	1 645 493	–
	2016	8 236 154	67	–	–	2 138 494	3 362 668	3 362 668
	2017	523 328	69	–	–	2 920 298	2 673 947	2 673 947
Guinea-Bissau	2015	62 942	91	–	–	261 868	139 341	104 730
	2016	71 500	82	–	–	238 412	133 647	115 361
	2017	1 222 428	65	–	–	303 651	136 507	110 508
Kenya	2015	11 637 493	64	0	–	4 319 000	11 052 564	10 321 221
	2016	2 005 477	70	0	–	8 352 950	11 327 340	11 327 340
	2017	15 015 105	73	360 719	<1	11 337 850	10 696 827	10 696 827
Liberia	2015	2 914 331	73	0	–	–	–	–
	2016	–	62	–	–	–	–	–
	2017	157 954	25	–	–	–	–	–
Madagascar	2015	11 249 042	2	1 327 326	6	4 962 600	2 040 289	2 040 289
	2016	464 407	2	2 856 873	12	1 352 225	757 613	757 613
	2017	764 022	6	2 008 963	8	2 465 600	1 620 050	1 620 050
Malawi	2015	1 100 000	43	–	–	8 462 325	6 240 060	6 240 060
	2016	9 093 657	60	–	–	8 746 750	6 799 354	6 440 490
	2017	994 136	54	–	–	15 060 625	10 177 530	10 177 530
Mali	2015	6 080 030	58	494 163	3	4 381 050	3 761 319	3 761 319
	2016	2 189 027	68	788 711	4	3 250 000	3 511 970	3 511 970
	2017	4 148 911	61	823 201	4	4 164 041	3 746 616	3 746 616
Mauritania	2015	240 000	13	–	–	360 000	–	109 000
	2016	51 000	11	–	–	208 650	174 420	84 000
	2017	921 245	41	–	–	234 520	101 450	–
Mayotte	2015	–	–	–	–	–	–	–
	2016	–	–	–	–	–	–	–
	2017	–	–	–	–	–	–	–
Mozambique	2015	5 126 340	68	3 659 845	13	17 219 225	13 653 685	13 653 685
	2016	4 527 936	70	4 375 512	15	19 822 825	14 136 250	14 136 250
	2017	15 482 093	81	5 349 948	18	19 662 975	15 996 892	15 996 892
Namibia	2015	488 661	–	386 759	20	30 120	79 215	79 215
	2016	0	–	485 730	25	15 185	21 519	21 519
	2017	0	–	753 281	38	914 175	79 316	79 316
Niger	2015	6 253 448	52	0	–	3 039 594	3 698 674	3 698 674
	2016	746 469	63	0	–	4 622 433	3 257 506	3 257 506
	2017	981 423	54	0	0	3 909 600	2 697 115	2 161 440
Nigeria	2015	27 628 073	51	–	–	41 089 368	20 249 636	41 089 368
	2016	9 896 250	54	130 061	<1	11 178 434	9 177 309	9 177 309
	2017	21 978 907	47	–	–	9 701 771	7 752 372	7 752 372
Rwanda	2015	2 066 915	67	2 013 652	17	2 015 100	4 392 006	4 392 006
	2016	2 882 445	65	2 484 672	21	–	–	–
	2017	2 816 586	74	1 753 230	14	–	–	–
Sao Tome and Principe	2015	113 221	–	143 571	73	72 407	1 704	1 704
	2016	11 922	–	149 930	75	117 676	2 121	2 121
	2017	15 151	–	138 000	68	96 826	2 410	2 410

Annex 3 - D. Commodities distribution and coverage, 2015–2017

WHO region Country/area	Year	No. of LLINs sold or delivered	Modelled percentage 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								
Senegal	2015	556 135	61	514 833	3	2 570 500	958 492	958 492
	2016	8 960 663	68	496 728	3	1 823 405	709 394	709 394
	2017	448 305	79	619 578	4	2 391 311	958 473	958 473
Sierra Leone	2015	395 061	65	–	–	2 494 935	1 687 031	1 687 031
	2016	452 608	41	–	–	3 093 725	4 714 900	4 714 900
	2017	4 611 638	59	–	–	2 611 550	2 504 960	2 504 960
South Africa	2015	0	–	1 178 719	21	16 007	28 709	28 709
	2016	0	–	1 165 955	21	227 325	12 677	12 677
	2017	0	–	1 550 235	27	865 050	72 439	72 439
South Sudan[1]	2015	446 665	62	296 977	3	4 049 559	9 971 675	9 971 675
	2016	2 759 527	65	281 998	2	5 147 954	13 617 422	13 617 422
	2017	1 902 020	73	153 285	1	1 945 875	12 188 601	12 188 601
Togo	2015	8 600	82	–	–	1 633 891	1 508 016	1 208 529
	2016	155 660	62	–	–	1 428 696	1 064 876	1 049 903
	2017	4 706 417	71	–	–	1 613 393	1 355 640	1 196 518
Uganda	2015	1 442 500	71	3 700 470	9	27 110 800	30 166 620	30 166 620
	2016	899 823	65	3 811 484	9	27 230 375	29 667 150	29 667 150
	2017	23 797 483	82	3 223 800	8	24 620 100	27 396 300	27 396 300
United Republic of Tanzania	2015	–	36	–	28	–	–	–
	2016	–	54	–	0	–	–	–
	2017	5 335 910	50	2 568 522	5	–	–	–
Mainland	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
	2017	5 335 910	–	2 377 403	4	34 649 050	20 895 180	20 895 180
Zanzibar	2015	347 998	–	298 645	20	615 275	3 750	3 750
	2016	756 445	–	27 664	2	24 026	11 100	10 020
	2017	0	–	191 119	12	459 957	8 506	8 506
Zambia	2015	1 506 206	70	5 930 141	37	11 310 350	14 365 969	14 365 969
	2016	1 292 400	53	6 737 918	41	15 286 570	19 084 818	19 084 818
	2017	10 759 947	67	7 717 767	45	18 884 600	17 460 232	17 460 232
Zimbabwe	2015	84 087	46	3 548 246	29	1 981 613	847 333	847 333
	2016	1 752 855	42	3 674 932	29	3 154 200	934 580	934 580
	2017	513 300	42	3 673 311	28	875 713	549 083	553 953
AMERICAS								
Argentina	2015	0	–	1 895	<1	0	50	0
	2016	0	–	0	0	0	30	0
	2017	0	–	4 208	2	0	39	9
Belize	2015	4 152	–	36 796	15	0	13	0
	2016	4 000	–	35 264	14	0	5	0
	2017	0	–	37 466	15	0	9	1
Bolivia (Plurinational State of)	2015	17 514	–	11 138	<1	–	6 907	6 907
	2016	84 000	–	12 689	<1	–	5 553	5 553
	2017	23 500	–	20 000	<1	3 500	0	0
Brazil	2015	0	–	–	2	101 700	290 580	94 380
	2016	0	–	–	<1	68 650	369 390	101 890
	2017	0	–	78 696	<1	72 200	638 024	67 110
Colombia	2015	25 100	–	252 500	2	0	108 469	55 469
	2016	306 498	–	1 180 400	11	21 575	202 175	94 494
	2017	295 250	–	153 690	1	265 250	95 570	56 030
Costa Rica	2015	0	–	0	0	0	8	4
	2016	206	–	430	0	0	13	3
	2017	104	–	8 479	<1	0	25	7

WHO region Country/area	Year	No. of LLINs sold or delivered	Modelled percentage 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	2015	105 906	–	100 090	2	50 220	661	3
	2016	1 483	–	40 510	<1	89 800	755	40
	2017	0	–	30 361	<1	48 850	398	–
Ecuador	2015	120 532	–	–	–	–	686	227
	2016	51 795	–	–	–	–	1 191	403
	2017	72 015	–	667 111	100	–	1 380	371
El Salvador	2015	0	–	37 500	3	0	16 029	0
	2016	0	–	27 338	2	0	144	0
	2017	0	–	19 167	2	0	4	0
French Guiana	2015	0	–	–	–	–	–	–
	2016	4 455	–	–	–	–	–	–
	2017	–	–	–	–	–	–	–
Guatemala	2015	600 049	–	–	–	108 900	0	0
	2016	485 010	–	–	–	92 100	0	0
	2017	83 258	–	6 245	0	170 325	9 995	0
Guyana	2015	24 201	–	146	0	0	9 984	3 219
	2016	8 320	–	0	–	8 268	10 979	3 759
	2017	5 534	–	–	–	–	13 936	5 141
Haiti	2015	0	–	–	–	233 152	26 151	–
	2016	10 000	–	–	–	274 404	19 702	–
	2017	709 720	–	–	–	261 600	18 772	–
Honduras	2015	36 149	–	125 975	2	9 750	–	8
	2016	81 470	–	360 553	4	27 300	43 097	45
	2017	24 092	–	225 027	3	29 710	–	–
Mexico	2015	15 000	–	214 032	8	0	3 133	6
	2016	61 000	–	112 184	4	0	596	13
	2017	5 695	–	–	–	0	765	14
Nicaragua	2015	0	–	59 282	2	12 527	2 307	–
	2016	191 178	–	147 801	6	20 840	6 284	–
	2017	103 676	–	182 602	7	46 500	49 085	50
Panama	2015	0	–	11 581	<1	0	562	0
	2016	0	–	9 675	<1	0	811	0
	2017	–	–	3 921	<1	16 000	689	144
Paraguay	2015	0	–	12 809	5	0	8	6
	2016	0	–	600	<1	0	10	7
	2017	0	–	356	<1	5 000	2 498	408
Peru	2015	64 687	–	142 253	1	–	66 609	13 618
	2016	430	–	30 499	<1	150 000	74 554	6 500
	2017	–	–	62 804	<1	–	–	–
Suriname	2015	0	–	–	–	17 625	–	–
	2016	37 000	–	–	–	13 825	–	–
	2017	6 022	–	–	–	14 325	–	–
Venezuela (Bolivarian Republic of)	2015	1 041	–	2 739 290	26	–	136 389	35 509
	2016	30 000	–	29 232	<1	80 000	240 613	61 034
	2017	5 000	–	3 900	0	–	–	–
EASTERN MEDITERRANEAN								
Afghanistan	2015	58 830	–	–	–	98 065	–	200
	2016	992 319	–	–	–	758 675	93 335	89 500
	2017	2 372 354	–	–	–	514 875	27 850	27 850
Djibouti	2015	0	7	–	–	–	–	–
	2016	33 851	10	–	–	–	–	–
	2017	134 701	21	–	–	63 488	14 212	–

Annex 3 - D. Commodities distribution and coverage, 2015–2017

WHO region Country/area	Year	No. of LLINs sold or delivered	Modelled percentage 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)	2015	91 845	–	217 773	27	114 450	37 971	2 042
	2016	6 393	–	172 666	21	120 000	–	–
	2017	4 218	–	126 111	15	–	–	–
Pakistan	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
	2017	1 508 037	–	776 650	<1	1 826 221	800 000	63 566
Saudi Arabia	2015	125 000	–	131 661	5	–	1 444	1 444
	2016	0	–	307 927	12	–	3 922	3 922
	2017	127 800	–	253 222	10	–	1 915	1 915
Somalia	2015	291 085	13	15 645	<1	424 140	386 200	386 200
	2016	655 798	14	11 015	–	593 310	351 755	351 755
	2017	2 571 923	21	1 267 526	9	468 750	322 260	322 260
Sudan	2015	2 729 334	51	2 460 816	6	4 344 150	2 551 310	2 551 310
	2016	5 370 774	50	3 678 400	9	2 375 275	3 847 768	3 847 768
	2017	5 741 449	54	3 683 031	9	3 498 425	4 507 838	4 507 838
Yemen	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
	2017	433 266	–	1 338 585	7	148 935	138 494	77 115
SOUTH-EAST ASIA								
Bangladesh	2015	2 380 759	–	–	–	259 171	40 742	35 708
	2016	41 255	–	–	–	420 049	28 407	24 431
	2017	2 242 527	–	–	–	373 138	29 916	24 790
Bhutan	2015	26 000	–	70 926	12	16 875	416	416
	2016	22 322	–	66 675	11	12 600	216	216
	2017	137 000	–	71 690	12	21 650	132	132
Democratic People's Republic of Korea	2015	864 750	–	1 146 750	12	253 320	29 272	0
	2016	0	–	1 152 402	12	182 980	23 231	0
	2017	0	–	1 147 548	12	176 612	17 038	0
India	2015	7 241 418	–	41 849 017	3	21 182 000	2 123 760	2 123 760
	2016	5 000 000	–	43 477 154	4	21 082 000	2 123 760	300 000
	2017	16 340 000	–	39 341 409	3	1 064 000	104 110	62 650
Indonesia	2015	56 337	–	53 497	0	300 000	406 614	406 614
	2016	2 977 539	–	6 240	0	1 382 208	438 178	438 178
	2017	4 376 636	–	3 320	0	1 783 498	607 965	607 965
Myanmar	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
	2017	5 835 192	–	–	–	2 053 525	108 364	108 364
Nepal	2015	304 437	–	329 905	4	56 000	3 350	300
	2016	290 647	–	286 865	3	61 000	4 500	274
	2017	324 156	–	300 000	4	100 000	3 070	238
Sri Lanka	2015	104 000	–	22 115	<1	19 900	36	18
	2016	16 465	–	57 111	1	31 950	41	19
	2017	18 019	–	10 317	<1	27 500	57	27
Thailand	2015	251 500	–	348 713	3	15 400	31 875	8 125
	2016	465 600	–	237 398	2	68 500	40 801	14 321
	2017	358 400	–	207 250	2	173 425	21 540	7 540
Timor-Leste	2015	24 607	–	93 019	44	90 818	80	56
	2016	309 067	–	166 426	77	114 263	84	84
	2017	334 471	–	102 891	47	115 115	30	30

WHO region Country/area	Year	No. of LLINs sold or delivered	Modelled percentage 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	2015	1 517 074	–	–	–	483 600	128 004	122 013
	2016	4 089 321	–	–	–	400 350	98 990	88 990
	2017	1 994 150	–	–	–	503 250	145 518	145 518
China	2015	29 611	–	1 697 188	<1	–	67 555	20 710
	2016	26 562	–	272 108	0	–	6 290	4 130
	2017	11 349	–	352 731	<1	–	–	–
Lao People's Democratic Republic	2015	152 791	–	–	–	324 225	86 456	86 456
	2016	1 213 755	–	–	–	270 950	63 889	62 994
	2017	242 405	–	–	–	333 675	42 972	39 272
Malaysia	2015	285 946	–	489 030	40	–	2 311	1 616
	2016	284 031	–	513 076	41	0	2 302	2 197
	2017	278 104	–	539 029	43	0	4 114	3 443
Papua New Guinea	2015	991 440	–	–	–	1 000 000	728 310	728 310
	2016	944 847	–	–	–	1 733 500	540 400	540 400
	2017	1 694 315	–	–	–	1 135 577	832 532	832 532
Philippines	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
	2017	814 984	–	490 640	<1	145 325	23 400	23 400
Republic of Korea	2015	5 250	–	–	–	4 900	699	–
	2016	0	–	–	–	4 625	673	–
	2017	0	–	–	–	0	515	–
Solomon Islands	2015	10 721	–	175 683	30	107 425	242 456	242 456
	2016	291 339	–	16 179	3	542 975	237 492	237 492
	2017	85 976	–	0	0	374 850	238 665	238 665
Vanuatu	2015	38 211	–	–	–	53 400	20 256	20 256
	2016	110 215	–	–	–	39 525	11 729	11 729
	2017	91 028	–	–	–	56 150	27 409	20 853
Viet Nam	2015	658 450	–	620 093	<1	459 332	97 570	45 000
	2016	200 000	–	417 142	<1	408 055	71 853	2 358
	2017	752 000	–	151 153	<1	921 897	87 225	40 000

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, 2015–2017

WHO region Country/area	Source	% of households					% of population	
		with at least one ITN	with at least one ITN for every two persons who stayed in the household the previous night	with IRS in last 12 months	with at least one ITN and/or IRS in the past 12 months	with at least one ITN for every two persons and/or IRS in the past 12 months	with access to an ITN	who slept under an ITN last night
AFRICAN								
Angola	2015–16 DHS	30.9	11.3	1.6	31.8	12.5	19.7	17.6
Burundi	2016–17 DHS	46.2	17.1	1	46.8	17.9	32.3	34.7
Chad	2014–15 DHS	77.3	42.4	0.6	77.3	42.4	61.2	33.3
Ethiopia	2016 DHS							
Ghana	2016 MIS	73	50.9	8.1	74.1	53.6	65.8	41.7
Kenya	2015 MIS	62.5	40		62.5	39.7	52.5	47.6
Liberia	2016 MIS	61.5	25.2	1.2	62.1	25.9	41.5	39.3
Madagascar	2016 MIS	79.5	44.4	6.9	80.9	47.9	62.1	68.2
Malawi	2015–16 DHS	56.9	23.5	4.9	58.6	27	38.8	33.9
Malawi	2017 MIS	82.1	41.7				63.1	55.4
Mali	2015 MIS	93	39.3	4	93.6	41.8	69.5	63.9
Mozambique	2015 AIS	66	38.9	11.2	68.7	45.3	53.8	45.4
Nigeria	2015 MIS	68.8	34.9	1.3	69	35.5	54.7	37.3
Rwanda	2014–15 DHS	80.6	42.6		80.6	42.5	63.8	61.4
Senegal	2015 DHS	76.8	40.5	4.8	77.1	43	66	51
Senegal	2016 DHS	82.4	56.4	5.3	82.9	58	75.7	63.1
Sierra Leone	2016 MIS	60.3	16.2	1.7	61.1	17.7	37.1	38.6
Uganda	2014–15 MIS	90.2	62.3	4.9	90.5	64	78.8	68.6
Uganda	2016 DHS	78.4	51.1				64.6	55
United Republic of Tanzania	2015–16 DHS	65.6	38.8	5.5	66.2	41	55.9	49
Zimbabwe	2015 DHS	47.9	26.4	21.3	54.9	39.4	37.2	8.5
EASTERN MEDITERRANEAN								
Afghanistan	2015 DHS	26	2.9				13.2	3.9
SOUTH-EAST ASIA								
India	2015–16 DHS							
Myanmar	2015–16 DHS	26.8	14.1				21.2	15.6
Timor-Leste	2016 DHS	63.6	32.7				48.1	47.3

ACT: artemisinin-based combination therapy; ANC: antenatal care; DHS: demographic and health survey; IPTp: intermittent preventive treatment in pregnancy; 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 ITNs	% of pregnant women		% of children <5 years				% of children <5 years with fever in last 2 weeks			
that were used last night	who slept under an ITN	who took 3+ doses of IPTp, at least one during ANC visit	who slept under an ITN	with haemoglobin <8 g/dL	with a positive RDT	with a positive microscopy blood smear	for whom advice or treatment was sought	who had blood taken from a finger or heel for testing	who took antimalarial drugs	who took an ACT among those who received any antimalarial
71	23	19	21.7	5.7	13.5		50.8	34.3	18.1	76.7
86.9	43.9	12.6	39.9	8.3	37.9	26.8	69.6	66.4	47	11.3
48.6	34.7	7.6	36.4				36.9	12.9	26.9	10
				7.5			35.3		7.7	11.5
47.7	50	59.6	52.2	6.9	27.9	20.6	71.8	30.3	50.1	58.8
75.2	57.8	21.9	56.1	2.2	9.1	5	71.9	39.2	27.1	91.6
71.2	39.5	22.2	43.7	8.3	44.9		78.2	49.8	65.5	81.1
78.7	68.5	10.3	73.4	2.3	5.1	6.9	55.5	15.5	10.1	17
73.3	43.9	30	42.7	6.4			66.9	52	37.6	91.8
76.8	62.5	40.9	67.5	5.1	36	24.3	54.4	37.6	29.4	96.4
90.7	77.9	16	71.2	19.9	32.4	35.7	49.2	14.2	28.7	28.9
70.9	52.1	22.4	47.9	7.9	40.2		62.7	39.6	38.4	92.6
60.8	49	19	43.6	9.3	45.1	27.4	66.1	12.6	41.2	37.6
77.4	72.9		67.7	2.3	7.8	2.2	56.7	36.1	11.4	98.7
70	51.8	10.6	55.4	7.4	0.6	0.3	49.3	9.5	3.4	12.5
68.2	69	21.5	66.6	5.6	0.9	0.9	49.5	13	1.7	85
89	44	31	44.1	10.1	52.7	40.1	71.4	51.1	57	96
74.4	75.4	25.2	74.3	4.7	31.7	20	82	35.8	76.9	86.7
74	64.1	16.8	62	6.2	30.4		81.2	49	71.5	87.8
69.4	53.9	7.7	54.4	4.8	14.4	5.6	80.1	35.9	51.1	84.9
18.8	6.1		9	1.5			49.8	12.7	1	
21.4	4.1		4.6				63.3	7.9	11.8	4.4
				4.9			73.2	10.8	20.1	8.5
58.3	18.4		18.6	3.4			65	3	0.8	
79.8	60.1		55.4	1.7			57.6	24.5	10	11.1

Annex 3 - F. Population at risk and estimated malaria cases and deaths, 2010–2017

WHO region Country/area	Year	Population at risk	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AFRICAN								
Algeria[1,2]	2010	2 121 369		1			1	
	2011	2 162 597		1			0	
	2012	2 206 430		55			0	
	2013	2 251 814		8			0	
	2014	2 297 320		0			0	
	2015	2 341 854		0			0	
	2016	2 384 996		0			0	
	2017	2 427 028		0			0	
Angola	2010	23 369 124	2 009 000	3 125 901	4 595 000	9 730	13 351	17 000
	2011	24 218 571	1 910 000	3 040 461	4 456 000	9 270	12 763	16 300
	2012	25 096 151	1 964 000	3 111 760	4 531 000	9 050	12 437	15 800
	2013	25 998 342	2 191 000	3 384 997	4 970 000	9 070	12 399	15 700
	2014	26 920 475	2 485 000	3 768 087	5 526 000	9 410	12 763	16 100
	2015	27 859 303	2 882 000	4 303 582	6 212 000	9 640	13 046	16 400
	2016	28 813 475	3 010 000	4 485 050	6 468 000	9 840	13 197	16 600
	2017	29 784 185	3 106 000	4 615 605	6 661 000	9 970	13 316	16 600
Benin	2010	9 199 254	2 495 000	3 713 395	5 565 000	6 520	8 273	10 000
	2011	9 460 802	2 362 000	3 515 943	5 240 000	5 900	7 554	9 210
	2012	9 729 160	2 272 000	3 307 673	4 869 000	5 380	6 940	8 500
	2013	10 004 442	2 175 000	3 219 441	4 744 000	5 130	6 633	8 140
	2014	10 286 715	2 299 000	3 387 590	5 154 000	5 190	6 709	8 220
	2015	10 575 962	2 518 000	3 787 806	6 071 000	5 340	6 872	8 410
	2016	10 872 305	2 703 000	4 007 210	6 376 000	5 570	7 137	8 710
	2017	11 175 693	2 774 000	4 111 699	6 552 000	5 740	7 328	8 920
Botswana	2010	1 335 820	1 300	3 072	8 600	0	7	30
	2011	1 360 000	520	678	970	0	1	3
	2012	1 385 176	230	302	430	0	0	1
	2013	1 411 166	570	725	1 000	0	1	3
	2014	1 437 722	1 600	2 065	2 900	0	5	10
	2015	1 464 658	400	519	730	0	1	2
	2016	1 491 881	890	1 150	1 600	0	2	5
	2017	1 519 328	2 300	2 989	4 200	0	7	20
Burkina Faso	2010	15 605 211	6 578 000	9 221 846	12 230 000	37 300	43 695	50 100
	2011	16 081 903	6 648 000	9 320 362	12 390 000	35 100	40 873	46 600
	2012	16 571 207	6 569 000	9 228 345	12 300 000	32 100	37 028	42 000
	2013	17 072 731	6 232 000	8 736 057	11 820 000	29 200	33 414	37 600
	2014	17 585 973	5 941 000	8 258 938	11 230 000	28 100	31 910	35 700
	2015	18 110 616	5 534 000	7 770 245	11 050 000	26 500	29 833	33 100
	2016	18 646 436	5 478 000	7 675 183	11 000 000	25 600	28 453	31 400
	2017	19 193 381	5 645 000	7 907 562	11 330 000	25 100	27 791	30 500
Burundi	2010	8 766 936	955 000	1 608 931	2 677 000	3 840	4 801	5 760
	2011	9 043 497	916 000	1 546 912	2 506 000	3 800	4 724	5 660
	2012	9 319 702	900 000	1 501 315	2 373 000	3 940	4 876	5 820
	2013	9 600 189	911 000	1 539 318	2 416 000	3 930	4 857	5 790
	2014	9 891 791	999 000	1 688 069	2 680 000	4 030	4 964	5 900
	2015	10 199 267	1 186 000	1 957 365	3 159 000	4 110	5 044	5 980
	2016	10 524 125	1 247 000	2 053 294	3 303 000	4 220	5 161	6 100
	2017	10 864 242	1 284 000	2 113 066	3 401 000	4 300	5 253	6 200
Cabo Verde[1,2]	2010	130 619		47			1	
	2011	132 097		7			1	
	2012	133 635		1			0	
	2013	135 231		22			0	
	2014	136 874		26			2	
	2015	138 556		7			0	
	2016	140 285		48			1	
	2017	142 060		423			1	
Cameroon	2010	19 970 502	3 578 000	5 361 329	7 972 000	9 450	12 340	15 200
	2011	20 520 446	3 592 000	5 462 230	8 136 000	9 060	11 848	14 600
	2012	21 082 377	4 057 000	6 168 031	9 447 000	9 450	12 301	15 200
	2013	21 655 715	4 546 000	6 960 282	10 510 000	9 620	12 484	15 400
	2014	22 239 907	4 754 000	7 282 873	11 060 000	9 710	12 638	15 500
	2015	22 834 529	4 647 000	7 223 417	10 940 000	9 580	12 445	15 300
	2016	23 439 194	4 625 000	7 176 158	10 820 000	9 230	11 999	14 800
	2017	24 053 736	4 704 000	7 307 515	11 030 000	8 900	11 566	14 200
Central African Republic	2010	4 448 521	1 060 000	2 140 887	3 519 000	6 590	8 165	9 730
	2011	4 476 145	1 003 000	2 118 745	3 588 000	6 020	7 426	8 830
	2012	4 490 417	881 000	2 023 795	3 485 000	5 480	6 739	7 990
	2013	4 499 658	804 000	1 885 599	3 320 000	4 990	6 106	7 220
	2014	4 515 392	746 000	1 786 895	3 255 000	4 640	5 668	6 690
	2015	4 546 103	754 000	1 758 188	3 277 000	4 350	5 289	6 220
	2016	4 594 618	762 000	1 780 632	3 310 000	4 130	4 998	5 870
	2017	4 659 086	777 000	1 804 550	3 363 000	3 980	4 804	5 640

WHO region Country/area	Year	Population at risk	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AFRICAN								
Chad	2010	11 757 090	2 594 000	3 594 883	4 735 000	10 300	13 695	17 000
	2011	12 154 144	2 570 000	3 565 593	4 807 000	9 660	12 809	16 000
	2012	12 566 054	2 209 000	3 296 088	4 858 000	8 700	11 575	14 400
	2013	12 989 827	1 699 000	2 947 833	4 685 000	8 000	10 632	13 300
	2014	13 420 903	1 513 000	2 797 275	4 737 000	7 350	9 749	12 200
	2015	13 856 066	1 407 000	2 690 084	4 633 000	6 950	9 206	11 500
	2016	14 294 347	1 404 000	2 689 908	4 670 000	6 730	8 900	11 100
	2017	14 736 846	1 449 000	2 779 489	4 832 000	6 640	8 729	10 800
Comoros[1]	2010	689 696		36 538		3	90	140
	2011	706 578		24 856		2	61	100
	2012	723 862		49 840		5	126	200
	2013	741 504		53 156		5	134	210
	2014	759 387		2 203		0	5	8
	2015	777 435		1 300		0	3	5
	2016	795 603		1 143		0	2	4
	2017	813 911		3 230		0	8	10
Congo	2010	4 386 700	468 000	835 820	1 370 000	1 710	1 962	2 210
	2011	4 512 720	485 000	861 145	1 412 000	1 710	1 948	2 190
	2012	4 633 368	537 000	916 492	1 538 000	1 720	1 951	2 180
	2013	4 751 394	562 000	975 903	1 638 000	1 760	1 994	2 230
	2014	4 871 102	569 000	1 017 800	1 712 000	1 770	2 000	2 230
	2015	4 995 644	561 000	1 044 034	1 718 000	1 780	2 001	2 220
	2016	5 125 827	551 000	1 030 697	1 698 000	1 780	1 996	2 210
	2017	5 260 743	559 000	1 039 706	1 710 000	1 790	1 993	2 190
Côte d'Ivoire	2010	20 401 332	5 391 000	7 939 844	11 380 000	13 800	16 925	20 000
	2011	20 895 315	5 095 000	7 525 922	11 190 000	12 200	14 960	17 700
	2012	21 418 603	3 700 000	5 908 246	9 477 000	10 300	12 502	14 700
	2013	21 966 307	2 601 000	4 332 409	6 860 000	9 020	10 871	12 700
	2014	22 531 354	2 104 000	3 592 810	5 852 000	8 200	9 793	11 400
	2015	23 108 477	1 860 000	3 395 695	5 510 000	8 220	9 800	11 400
	2016	23 695 923	1 802 000	3 319 810	5 391 000	8 080	9 579	11 100
	2017	24 294 747	1 847 000	3 373 486	5 475 000	8 090	9 579	11 100
Democratic Republic of the Congo	2010	9 602 529	16 060 000	23 691 683	35 620 000	48 100	62 375	76 600
	2011	9 653 566	14 950 000	22 535 174	34 200 000	41 200	53 765	66 300
	2012	9 705 003	14 450 000	22 281 939	34 250 000	37 300	48 763	60 200
	2013	9 756 518	14 430 000	22 488 362	34 870 000	35 800	46 747	57 600
	2014	9 807 438	14 630 000	23 031 390	35 610 000	35 600	46 449	57 300
	2015	9 857 244	15 210 000	24 159 871	37 230 000	35 500	46 276	57 000
	2016	9 905 938	15 330 000	24 454 696	37 700 000	35 600	46 408	57 200
	2017	9 953 712	15 670 000	25 021 891	38 570 000	35 400	46 007	56 600
Equatorial Guinea	2010	951 102	239 000	381 639	558 000	840	1 047	1 260
	2011	994 285	302 000	481 385	706 000	860	1 079	1 300
	2012	1 038 591	308 000	490 132	709 000	850	1 067	1 280
	2013	1 083 738	308 000	496 542	725 000	810	1 017	1 220
	2014	1 129 421	252 000	413 388	626 000	730	919	1 110
	2015	1 175 380	259 000	418 770	628 000	640	807	970
	2016	1 221 495	264 000	427 357	642 000	580	728	880
	2017	1 267 692	269 000	435 143	653 000	530	669	810
Eritrea	2010	4 390 839	53 000	83 471	119 000	9	161	330
	2011	4 474 695	49 000	76 678	107 000	9	142	290
	2012	4 560 974	33 000	52 483	75 000	6	85	180
	2013	4 650 994	31 000	49 309	70 000	5	88	180
	2014	4 746 048	70 000	109 689	153 000	10	227	470
	2015	4 846 986	41 000	64 176	89 000	6	129	270
	2016	4 954 643	47 000	86 561	138 000	7	198	440
	2017	5 068 824	75 000	115 928	162 000	10	222	460
Eswatini[1]	2010	336 796		268		0	0	1
	2011	343 071		549		0	1	2
	2012	349 483		562		0	1	2
	2013	356 009		962		0	2	3
	2014	362 628		711		0	1	2
	2015	369 323		157			0	
	2016	376 067		350		0	0	1
	2017	382 831		724		0	1	2
Ethiopia	2010	59 637 819	478 000	7 701 107	27 080 000	60	14 514	64 700
	2011	61 231 792	410 000	5 094 685	22 710 000	50	8 489	45 000
	2012	62 862 041	424 000	5 237 442	22 450 000	50	8 816	46 500
	2013	64 523 655	420 000	5 173 952	21 680 000	50	9 520	50 800
	2014	66 209 400	430 000	3 825 848	10 260 000	60	6 694	24 000
	2015	67 913 658	520 000	3 632 424	9 265 000	80	6 795	22 700
	2016	69 634 176	525 000	2 927 266	6 983 000	80	5 705	17 900
	2017	71 371 055	538 000	2 666 954	6 277 000	80	5 369	16 700

Annex 3 - F. Population at risk and estimated malaria cases and deaths, 2010–2017

WHO region Country/area	Year	Population at risk	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AFRICAN								
Gabon	2010	1 640 213	130 000	285 725	549 000	360	413	460
	2011	1 697 096	145 000	309 019	576 000	380	438	490
	2012	1 756 817	145 000	326 053	584 000	400	460	520
	2013	1 817 273	134 000	339 163	622 000	420	478	540
	2014	1 875 717	139 000	341 474	642 000	430	490	550
	2015	1 930 178	143 000	333 155	631 000	440	498	560
	2016	1 979 787	142 000	334 796	637 000	440	502	560
	2017	2 025 129	145 000	341 980	651 000	450	505	560
Gambia	2010	1 692 147	367 000	465 479	580 000	520	619	720
	2011	1 746 369	400 000	483 793	577 000	530	631	730
	2012	1 802 122	434 000	531 834	638 000	540	636	730
	2013	1 859 331	377 000	471 968	575 000	550	644	740
	2014	1 917 851	235 000	291 528	354 000	560	652	750
	2015	1 977 584	333 000	412 588	501 000	570	659	750
	2016	2 038 507	204 000	253 981	307 000	580	667	760
	2017	2 100 571	96 000	119 044	144 000	580	674	760
Ghana	2010	24 512 093	6 265 000	9 171 294	13 160 000	13 200	15 241	17 300
	2011	25 121 786	6 348 000	9 251 148	13 300 000	13 000	14 954	16 900
	2012	25 733 048	6 128 000	9 004 550	13 160 000	12 600	14 403	16 200
	2013	26 346 250	5 764 000	8 552 123	12 670 000	12 100	13 686	15 300
	2014	26 962 572	5 384 000	8 113 023	12 160 000	11 300	12 625	14 000
	2015	27 582 820	4 861 000	7 513 657	11 440 000	10 600	11 749	12 900
	2016	28 206 727	4 966 000	7 652 909	11 680 000	10 300	11 223	12 200
	2017	28 833 623	5 031 000	7 805 045	11 880 000	10 100	10 917	11 800
Guinea	2010	10 794 176	3 111 000	4 348 149	5 940 000	10 200	12 896	15 600
	2011	11 035 170	3 236 000	4 455 792	6 069 000	9 870	12 479	15 100
	2012	11 281 464	3 251 000	4 452 801	6 051 000	9 200	11 578	14 000
	2013	11 536 622	3 003 000	4 344 956	5 922 000	8 220	10 278	12 300
	2014	11 805 512	2 833 000	4 255 458	5 892 000	7 580	9 428	11 300
	2015	12 091 534	2 811 000	4 205 085	5 957 000	6 900	8 542	10 200
	2016	12 395 916	2 801 000	4 197 876	5 973 000	6 480	7 962	9 460
	2017	12 717 183	2 858 000	4 282 165	6 083 000	6 180	7 562	8 950
Guinea-Bissau	2010	1 555 869	67 000	122 027	203 000	550	664	770
	2011	1 596 156	56 000	113 666	192 000	560	664	770
	2012	1 638 140	46 000	102 959	190 000	560	660	760
	2013	1 681 489	39 000	102 461	216 000	560	657	760
	2014	1 725 743	38 000	103 918	239 000	560	660	760
	2015	1 770 528	40 000	106 338	258 000	570	661	760
	2016	1 815 702	39 000	105 441	257 000	590	684	780
	2017	1 861 276	40 000	107 972	263 000	590	688	780
Kenya	2010	41 350 157	1 647 000	2 845 913	4 630 000	10 000	11 375	12 700
	2011	42 486 835	1 701 000	2 930 265	4 797 000	10 400	11 834	13 200
	2012	43 646 631	1 862 000	3 252 855	5 394 000	10 600	11 990	13 400
	2013	44 826 849	2 110 000	3 754 660	6 328 000	10 700	12 111	13 500
	2014	46 024 248	2 205 000	3 916 556	6 574 000	10 900	12 242	13 600
	2015	47 236 267	1 921 000	3 455 175	5 783 000	11 000	12 331	13 600
	2016	48 461 564	1 921 000	3 452 117	5 768 000	11 100	12 419	13 700
	2017	49 699 854	1 970 000	3 520 384	5 860 000	11 200	12 467	13 700
Liberia	2010	3 948 136	838 000	1 295 630	2 051 000	2 280	2 764	3 250
	2011	4 070 173	785 000	1 253 129	2 007 000	2 120	2 554	2 980
	2012	4 181 557	617 000	1 033 327	1 648 000	1 980	2 354	2 730
	2013	4 286 293	483 000	907 189	1 425 000	1 870	2 208	2 540
	2014	4 390 744	421 000	877 199	1 502 000	1 850	2 176	2 500
	2015	4 499 620	427 000	903 748	1 559 000	1 840	2 158	2 470
	2016	4 613 828	417 000	898 524	1 550 000	1 890	2 213	2 530
	2017	4 731 908	423 000	911 333	1 571 000	1 910	2 227	2 540
Madagascar	2010	21 151 640	559 000	937 413	1 501 000	70	2 399	5 360
	2011	21 743 950	524 000	841 836	1 225 000	60	2 155	4 520
	2012	22 346 579	1 126 000	1 824 487	2 899 000	130	4 670	10 400
	2013	22 961 147	1 184 000	1 813 487	2 781 000	140	4 642	10 000
	2014	23 589 798	940 000	1 303 958	1 752 000	100	3 338	6 560
	2015	24 234 080	2 078 000	2 840 141	3 761 000	230	7 270	14 000
	2016	24 894 543	1 241 000	1 692 049	2 231 000	140	4 331	8 280
	2017	25 570 892	1 740 000	2 324 289	2 992 000	190	5 950	11 200
Malawi	2010	15 167 096	3 214 000	4 602 005	6 681 000	7 800	9 506	11 200
	2011	15 627 611	3 085 000	4 476 529	6 518 000	7 480	9 085	10 700
	2012	16 097 313	2 969 000	4 317 650	6 244 000	7 290	8 819	10 400
	2013	16 577 150	2 817 000	4 169 285	6 014 000	6 790	8 161	9 530
	2014	17 068 838	2 743 000	4 161 861	6 007 000	6 490	7 737	8 990
	2015	17 573 606	2 573 000	4 102 579	6 068 000	6 240	7 384	8 530
	2016	18 091 580	2 647 000	4 223 467	6 235 000	6 110	7 177	8 250
	2017	18 622 107	2 707 000	4 303 543	6 366 000	6 060	7 077	8 090

WHO region Country/area	Year	Population at risk	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AFRICAN								
Mali	2010	15 075 081	4 132 000	5 772 983	7 960 000	13 900	17 725	21 600
	2011	15 540 990	4 466 000	6 279 267	8 577 000	15 200	19 409	23 600
	2012	16 006 665	4 944 000	6 961 475	9 445 000	15 500	19 798	24 100
	2013	16 477 818	5 311 000	7 448 756	10 230 000	15 500	19 765	24 100
	2014	16 962 854	5 359 000	7 468 113	10 370 000	14 300	18 224	22 100
	2015	17 467 913	4 836 000	6 833 022	9 683 000	12 700	16 151	19 600
	2016	17 994 835	4 871 000	6 902 717	9 821 000	11 100	13 974	16 900
	2017	18 541 977	5 060 000	7 160 192	10 180 000	9 870	12 425	15 000
Mauritania	2010	3 609 542	21 000	128 567	287 000	1 040	1 226	1 410
	2011	3 717 666	43 000	171 669	357 000	1 060	1 250	1 440
	2012	3 830 238	24 000	105 626	234 000	1 090	1 274	1 460
	2013	3 946 169	38 000	127 145	263 000	1 110	1 296	1 480
	2014	4 063 927	69 000	193 933	376 000	1 160	1 355	1 550
	2015	4 182 338	100 000	249 961	467 000	1 190	1 383	1 570
	2016	4 301 022	138 000	298 498	540 000	1 210	1 402	1 590
	2017	4 420 184	95 000	238 272	445 000	1 230	1 421	1 610
Mayotte	2010	45 917	270	418	760	0	1	2
	2011	47 283	60	93	170		0	
	2012	48 646	40	55	100		0	
	2013	50 017	1	2	3		0	
	2014	51 400	1	2	3		0	
	2015	52 804		0			0	
	2016	54 228	20	24	40		0	
	2017	55 678		0			0	
Mozambique	2010	24 221 406	6 102 000	8 455 521	11 640 000	14 200	17 542	20 900
	2011	24 939 008	6 554 000	8 930 459	12 230 000	14 100	17 478	20 800
	2012	25 676 608	7 090 000	9 576 806	12 950 000	14 100	17 343	20 600
	2013	26 434 367	7 129 000	9 644 363	13 080 000	14 100	17 334	20 600
	2014	27 212 381	6 967 000	9 425 097	12 880 000	13 700	16 804	19 900
	2015	28 010 695	6 976 000	9 496 089	12 850 000	13 100	15 985	18 900
	2016	28 829 471	7 163 000	9 753 050	13 210 000	12 600	15 269	17 900
	2017	29 668 838	7 360 000	10 025 823	13 570 000	12 200	14 713	17 200
Namibia	2010	1 724 946	800	2 601	6 200	0	6	20
	2011	1 758 637	2 600	3 671	5 400	0	9	20
	2012	1 796 992	2 700	5 884	9 700	0	15	40
	2013	1 838 727	6 500	8 109	9 900	0	20	40
	2014	1 881 964	21 000	26 278	32 000	2	67	120
	2015	1 925 274	16 000	20 092	24 000	1	51	90
	2016	1 968 260	33 000	41 608	51 000	3	106	190
	2017	2 011 198	71 000	89 611	109 000	7	229	420
Niger	2010	16 425 582	3 855 000	7 007 707	10 710 000	16 400	21 750	27 200
	2011	17 064 637	4 124 000	7 323 097	11 200 000	16 800	22 258	27 800
	2012	17 731 634	4 461 000	7 660 985	11 860 000	16 600	22 040	27 400
	2013	18 426 368	4 452 000	7 780 901	12 230 000	16 000	21 180	26 400
	2014	19 148 225	4 169 000	7 700 900	12 400 000	15 100	20 025	24 900
	2015	19 896 963	3 902 000	7 397 212	12 230 000	14 200	18 769	23 300
	2016	20 672 980	3 910 000	7 457 829	12 420 000	13 800	18 226	22 700
	2017	21 477 346	4 039 000	7 702 777	12 850 000	13 000	17 155	21 300
Nigeria	2010	158 578 259	43 800 000	60 749 349	83 240 000	115 000	146 734	179 000
	2011	162 877 075	43 880 000	60 529 456	82 700 000	107 000	136 533	166 000
	2012	167 297 289	43 510 000	61 587 135	83 800 000	98 100	125 290	152 000
	2013	171 829 305	43 310 000	62 020 888	84 840 000	91 200	116 472	142 000
	2014	176 460 503	41 180 000	59 365 039	81 580 000	84 600	107 843	131 000
	2015	181 181 747	35 940 000	52 697 962	74 500 000	77 400	98 478	120 000
	2016	185 989 645	35 450 000	52 357 005	74 040 000	71 100	90 378	110 000
	2017	190 886 313	36 330 000	53 667 565	75 930 000	64 400	81 640	98 800
Rwanda	2010	10 246 837	848 000	1 260 186	1 729 000	2 820	3 253	3 690
	2011	10 516 067	301 000	401 794	511 000	2 820	3 218	3 620
	2012	10 788 851	596 000	748 975	911 000	2 840	3 209	3 580
	2013	11 065 156	1 093 000	1 304 560	1 531 000	2 850	3 200	3 550
	2014	11 345 347	1 826 000	2 405 272	3 011 000	2 880	3 202	3 530
	2015	11 629 546	2 887 000	3 799 535	4 747 000	2 910	3 218	3 530
	2016	11 917 511	5 020 000	6 608 358	8 268 000	2 950	3 242	3 530
	2017	12 208 407	4 689 000	6 172 220	7 718 000	2 990	3 270	3 550
Sao Tome and Principe[1,2]	2010	174 770		2 740			14	
	2011	178 802		8 442			19	
	2012	182 893		12 550			7	
	2013	187 050		9 243			11	
	2014	191 273		1 754			0	
	2015	195 549		2 058			0	
	2016	199 909		2 238			0	
	2017	204 335		2 239			0	

Annex 3 - F. Population at risk and estimated malaria cases and deaths, 2010–2017

WHO region Country/area	Year	Population at risk	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AFRICAN								
Senegal	2010	12 916 229	563 000	792 643	1 046 000	3 710	4 284	4 860
	2011	13 300 906	498 000	709 373	942 000	3 720	4 271	4 820
	2012	13 703 519	570 000	835 134	1 128 000	3 740	4 256	4 770
	2013	14 120 328	782 000	1 126 085	1 484 000	3 760	4 252	4 740
	2014	14 546 114	498 000	673 074	869 000	3 870	4 364	4 860
	2015	14 976 991	798 000	1 176 494	1 591 000	3 940	4 424	4 910
	2016	15 411 614	574 000	836 561	1 124 000	4 000	4 475	4 950
	2017	15 850 566	701 000	1 024 285	1 384 000	4 060	4 523	4 980
Sierra Leone	2010	6 458 719	1 954 000	3 031 470	4 234 000	20 400	23 575	26 800
	2011	6 611 686	1 957 000	3 006 695	4 314 000	19 500	22 419	25 300
	2012	6 766 101	1 799 000	2 849 037	4 171 000	18 200	20 678	23 100
	2013	6 922 079	1 808 000	2 717 309	4 035 000	17 100	19 129	21 200
	2014	7 079 168	1 754 000	2 683 566	4 004 000	16 400	18 143	19 900
	2015	7 237 028	1 860 000	2 727 461	4 045 000	16 100	17 700	19 300
	2016	7 396 182	1 904 000	2 796 045	4 132 000	16 100	17 550	19 000
	2017	7 557 216	1 954 000	2 869 588	4 250 000	16 200	17 590	19 000
South Africa[1,2]	2010	5 158 466		8 060			83	
	2011	5 226 351		9 866			54	
	2012	5 299 821		5 629			72	
	2013	5 376 739		8 645			105	
	2014	5 453 957		11 705			174	
	2015	5 529 122		1 157			110	
	2016	5 601 547		4 323			34	
	2017	5 671 715		22 517			274	
South Sudan[3]	2010	10 067 196	1 283 000	1 940 101	2 836 000	4 470	5 286	6 110
	2011	10 448 856	1 248 000	1 939 487	2 904 000	4 380	5 136	5 890
	2012	10 818 259	1 122 000	1 818 297	2 834 000	4 300	5 006	5 710
	2013	11 177 483	1 007 000	1 707 171	2 741 000	4 370	5 075	5 780
	2014	11 530 974	970 000	1 668 785	2 686 000	4 580	5 321	6 060
	2015	11 882 127	1 081 000	1 805 509	2 834 000	4 790	5 570	6 340
	2016	12 230 730	1 030 000	1 739 256	2 735 000	5 010	5 821	6 630
	2017	12 575 716	1 055 000	1 781 704	2 799 000	5 220	6 069	6 920
Togo	2010	6 502 946	1 580 000	2 366 948	3 356 000	4 100	5 064	6 030
	2011	6 679 278	1 593 000	2 350 507	3 322 000	3 910	4 814	5 720
	2012	6 859 485	1 634 000	2 399 812	3 435 000	3 810	4 676	5 540
	2013	7 042 947	1 690 000	2 484 119	3 568 000	3 820	4 689	5 560
	2014	7 228 905	1 814 000	2 626 144	3 785 000	4 020	4 933	5 850
	2015	7 416 806	1 943 000	2 800 982	4 129 000	4 290	5 268	6 250
	2016	7 606 369	1 997 000	2 862 933	4 209 000	4 370	5 381	6 380
	2017	7 797 696	2 015 000	2 891 868	4 257 000	4 360	5 341	6 330
Uganda	2010	33 915 138	7 618 000	11 503 116	17 700 000	17 200	21 558	26 000
	2011	35 093 648	7 124 000	10 686 032	16 720 000	14 700	18 393	22 100
	2012	36 306 795	5 816 000	9 074 100	14 490 000	12 700	15 821	18 900
	2013	37 553 731	4 431 000	7 407 982	11 680 000	11 600	14 254	16 900
	2014	38 833 341	4 174 000	7 040 282	11 000 000	11 400	14 003	16 600
	2015	40 144 867	4 914 000	8 182 789	12 970 000	11 300	13 809	16 300
	2016	41 487 969	5 051 000	8 425 793	13 370 000	11 600	14 101	16 600
	2017	42 862 955	5 168 000	8 600 724	13 630 000	11 800	14 390	16 900
United Republic of Tanzania	2010	46 098 595	3 955 000	6 545 932	9 995 000	17 600	20 281	23 000
	2011	47 570 899	3 854 000	6 300 351	9 585 000	17 600	20 131	22 700
	2012	49 082 996	3 638 000	5 851 532	8 761 000	17 700	20 124	22 600
	2013	50 636 590	3 646 000	5 792 430	8 693 000	18 400	20 990	23 600
	2014	52 234 872	3 724 000	5 927 919	8 923 000	18 800	21 330	23 900
	2015	53 879 951	3 870 000	6 085 465	9 136 000	19 100	21 662	24 200
	2016	55 572 195	4 017 000	6 317 222	9 481 000	19 500	21 981	24 500
	2017	57 310 016	4 140 000	6 477 825	9 717 000	19 800	22 301	24 800
Zambia	2010	13 850 036	1 449 000	2 169 307	3 095 000	5 580	6 544	7 510
	2011	14 264 756	1 550 000	2 298 064	3 291 000	5 710	6 688	7 660
	2012	14 699 937	1 807 000	2 681 660	3 828 000	5 870	6 865	7 860
	2013	15 153 206	2 292 000	3 355 470	4 698 000	6 040	7 042	8 040
	2014	15 620 967	2 468 000	3 534 876	4 925 000	6 380	7 451	8 530
	2015	16 100 579	2 398 000	3 347 169	4 710 000	6 470	7 526	8 580
	2016	16 591 381	2 422 000	3 387 771	4 776 000	6 540	7 588	8 630
	2017	17 094 128	2 492 000	3 475 522	4 899 000	6 600	7 618	8 630
Zimbabwe	2010	11 091 953	606 000	1 095 083	1 717 000	80	2 803	6 190
	2011	11 328 434	473 000	718 725	982 000	50	1 839	3 720
	2012	11 583 696	408 000	592 186	791 000	40	1 515	2 980
	2013	11 854 324	617 000	863 883	1 122 000	70	2 211	4 270
	2014	12 135 565	812 000	1 093 731	1 394 000	90	2 799	5 290
	2015	12 423 589	739 000	1 081 888	1 465 000	80	2 769	5 480
	2016	12 717 227	501 000	740 192	1 009 000	60	1 894	3 800
	2017	13 016 087	826 000	1 239 430	1 737 000	90	3 172	6 410

WHO region Country/area	Year	Population at risk	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AMERICAS								
Argentina[1,2]	2010	206 119		14			0	
	2011	208 284		0			0	
	2012	210 483		0			0	
	2013	212 699		0			0	
	2014	214 907		0			0	
	2015	217 088		0			0	
	2016	219 237		0			0	
	2017	221 355		0			0	
Belize[1,2]	2010	221 908		150			0	
	2011	227 141		72			0	
	2012	232 327		33			0	
	2013	237 490		20			0	
	2014	242 670		19			0	
	2015	247 908		9			0	
	2016	253 198		4			0	
	2017	258 533		7			0	
Bolivia (Plurinational State of)	2010	4 499 619	15 000	19 614	25 000	3	11	20
	2011	4 572 253	7 600	10 175	13 000	1	5	9
	2012	4 645 139	8 400	11 534	15 000	1	5	9
	2013	4 718 298	8 300	11 356	15 000	1	7	10
	2014	4 791 746	8 400	11 512	15 000	1	5	9
	2015	4 865 486	7 300	9 792	12 000	1	3	7
	2016	4 939 514	5 900	7 894	10 000	0	2	5
	2017	5 013 775	4 900	6 512	8 300	0	2	4
Brazil[2]	2010	39 949 643	346 000	384 655	417 000		76	
	2011	40 333 396	271 000	281 346	300 000		70	
	2012	40 713 879	246 000	255 662	273 000		60	
	2013	41 088 951	175 000	194 191	211 000		40	
	2014	41 455 265	141 000	146 675	156 000		36	
	2015	41 810 308	143 000	158 963	172 000		35	
	2016	42 153 530	128 000	133 591	142 000		35	
	2017	42 485 520	196 000	217 928	236 000		30	
Colombia[2]	2010	10 165 855	125 000	163 874	204 000		42	
	2011	10 274 015	64 000	83 763	104 000		23	
	2012	10 379 136	64 000	83 866	105 000		24	
	2013	10 481 310	55 000	72 044	90 000		10	
	2014	10 580 698	43 000	56 815	71 000		17	
	2015	10 677 401	54 000	72 460	93 000		0	
	2016	10 771 431	88 000	115 125	144 000		0	
	2017	10 862 635	60 000	80 357	103 000		0	
Costa Rica[1,2]	2010	1 590 847		110			0	
	2011	1 610 165		10			0	
	2012	1 628 942		6			0	
	2013	1 647 240		0			0	
	2014	1 665 152		0			0	
	2015	1 682 745		0			0	
	2016	1 700 045		4			0	
	2017	1 717 017		12			0	
Dominican Republic	2010	5 451 963	3 600	4 247	5 000	0	10	20
	2011	5 523 087	1 700	2 010	2 300	0	5	8
	2012	5 593 511	1 000	1 185	1 400	0	3	5
	2013	5 663 101	610	720	840	0	1	3
	2014	5 731 708	480	546	620	0	1	2
	2015	5 799 210	660	751	850	0	1	3
	2016	5 865 522	760	896	1 000	0	2	4
	2017	5 930 679	360	405	460	0	1	1
Ecuador[1,2]	2010	435 226		1 888			0	
	2011	442 298		1 219			0	
	2012	449 359		544			0	
	2013	456 408		368			0	
	2014	463 448		242			0	
	2015	470 478		618			0	
	2016	477 493		1 191			0	
	2017	484 448		1 275			0	
El Salvador[1,2]	2010	1 251 419		19			0	
	2011	1 257 089		9			0	
	2012	1 262 912		13			0	
	2013	1 268 906		6			0	
	2014	1 275 080		6			0	
	2015	1 281 433		2			0	
	2016	1 287 978		12			0	
	2017	1 294 702		0			0	

Annex 3 - F. Population at risk and estimated malaria cases and deaths, 2010–2017

WHO region Country/area	Year	Population at risk	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AMERICAS								
French Guiana	2010	129 568	1 800	2 225	3 000	0	4	8
	2011	133 149	1 300	1 531	2 000	0	3	5
	2012	136 916	950	1 143	1 500	0	2	4
	2013	140 811	980	1 215	1 600	0	2	4
	2014	144 751	490	585	750	0	1	2
	2015	148 661	420	497	640		0	
	2016	152 547	240	289	370		0	
	2017	156 429	610	737	940		0	
Guatemala	2010	11 044 796	7 900	9 545	12 000	1	3	7
	2011	11 285 238	7 200	8 638	11 000	1	3	6
	2012	11 528 426	5 600	6 793	8 800	1	2	4
	2013	11 773 887	6 600	7 886	10 000	1	3	5
	2014	12 021 015	6 000	7 170	9 200	1	2	5
	2015	12 269 280	7 200	8 621	11 000	1	3	6
	2016	12 518 434	5 100	6 120	7 800	0	2	4
	2017	12 768 343	4 000	4 739	6 100	0	1	3
Guyana	2010	746 559	26 000	32 656	41 000	4	57	100
	2011	749 095	33 000	40 880	50 000	4	76	140
	2012	753 092	35 000	43 311	53 000	5	77	140
	2013	758 077	43 000	56 946	78 000	7	90	180
	2014	763 390	17 000	22 085	30 000	3	28	50
	2015	768 514	13 000	17 848	24 000	2	22	40
	2016	773 302	17 000	22 108	30 000	3	28	50
	2017	777 854	19 000	24 913	34 000	3	33	60
Haiti	2010	8 933 849	48 000	82 766	131 000	5	211	480
	2011	9 063 801	49 000	79 329	122 000	5	203	440
	2012	9 192 592	36 000	58 234	89 000	4	149	320
	2013	9 319 959	30 000	48 004	73 000	3	122	270
	2014	9 445 653	22 000	31 950	43 000	2	81	160
	2015	9 569 485	21 000	31 181	42 000	2	79	160
	2016	9 691 228	24 000	35 105	47 000	2	89	180
	2017	9 810 845	22 000	32 011	43 000	2	81	160
Honduras	2010	7 422 849	10 000	13 106	16 000	2	7	10
	2011	7 564 895	7 900	9 969	12 000	1	5	9
	2012	7 704 430	6 800	8 544	10 000	1	4	8
	2013	7 842 238	5 700	7 205	8 800	1	6	10
	2014	7 979 401	3 600	4 484	5 500	0	3	5
	2015	8 116 731	3 800	4 745	5 800	0	4	7
	2016	8 254 451	4 600	5 934	7 400	0	6	10
	2017	8 392 301	1 400	1 695	2 100	0	1	1
Mexico[1,2]	2010	2 487 630		1 226			0	
	2011	2 525 184		1 124			0	
	2012	2 562 043		833			0	
	2013	2 598 252		495			0	
	2014	2 633 994		656			0	
	2015	2 669 391		517			0	
	2016	2 704 367		551			0	
	2017	2 738 261		736			0	
Nicaragua	2010	2 504 508	730	866	1 000	0	0	1
	2011	2 535 107	970	1 158	1 400	0	0	1
	2012	2 565 351	1 300	1 546	1 800	0	1	2
	2013	2 595 310	1 200	1 455	1 700	0	1	1
	2014	2 625 105	1 200	1 430	1 700	0	0	1
	2015	2 654 800	2 400	2 853	3 300	0	2	3
	2016	2 684 437	6 600	7 854	9 200	1	6	10
	2017	2 713 974	11 000	13 711	16 000	2	10	20
Panama[2]	2010	3 524 567	430	444	470		1	
	2011	3 587 022	360	376	400		0	
	2012	3 650 061	860	896	960		1	
	2013	3 713 448	730	758	810		0	
	2014	3 776 843	960	1 016	1 100		0	
	2015	3 839 976	560	580	620		0	
	2016	3 902 740	790	817	870		0	
	2017	3 965 094	760	808	860		0	
Paraguay[1,2]	2010	223 555		18			0	
	2011	226 576		1			0	
	2012	229 651		0			0	
	2013	232 766		0			0	
	2014	235 892		0			0	
	2015	239 008		0			0	
	2016	242 110		0			0	
	2017	245 206		0			0	

WHO region Country/area	Year	Population at risk	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AMERICAS								
Peru[2]	2010	11 536 849	33 000	37 121	42 000		0	
	2011	11 688 591	26 000	30 122	34 000		1	
	2012	11 845 294	33 000	39 448	46 000		7	
	2013	12 005 050	51 000	61 137	72 000		4	
	2014	12 165 156	69 000	81 884	96 000		4	
	2015	12 323 566	77 000	91 640	108 000		5	
	2016	12 479 556	60 000	71 056	83 000		7	
	2017	12 633 316	59 000	70 745	83 000		10	
Suriname[1,2]	2010	77 704		1 712			1	
	2011	78 514		771			1	
	2012	79 326		356			0	
	2013	80 133		729			1	
	2014	80 929		401			1	
	2015	81 708		81			0	
	2016	82 469		76			0	
	2017	83 213		40			0	
Venezuela (Bolivarian Republic of)	2010	9 907 708	47 000	57 257	74 000	9	52	90
	2011	10 056 260	48 000	58 086	75 000	9	51	90
	2012	10 202 952	56 000	67 122	86 000	10	62	110
	2013	10 347 936	83 000	99 809	129 000	20	114	200
	2014	10 491 465	96 000	114 404	148 000	20	119	210
	2015	10 633 714	144 000	172 036	220 000	30	162	280
	2016	10 774 694	253 000	303 471	387 000	50	281	490
	2017	10 914 252	433 000	519 109	665 000	80	456	790
EASTERN MEDITERRANEAN								
Afghanistan	2010	22 201 738	181 000	353 343	581 000	60	200	410
	2011	22 899 658	210 000	454 823	746 000	70	242	490
	2012	23 661 490	134 000	278 223	472 000	30	117	260
	2013	24 459 075	118 000	213 914	352 000	30	99	200
	2014	25 250 177	189 000	284 198	409 000	50	136	260
	2015	26 004 393	247 000	369 809	524 000	60	175	320
	2016	26 713 177	439 000	614 491	838 000	100	294	530
	2017	27 386 943	495 000	630 308	801 000	110	298	510
Djibouti	2010	425 574	240	731	1 800	0	1	6
	2011	432 974	190	588	1 400	0	1	5
	2012	440 594	180	594	1 700	0	1	6
	2013	448 345	170	700	2 300	0	1	8
	2014	456 087	180	846	3 300	0	2	10
	2015	463 707	190	1 046	3 900	0	2	10
	2016	471 172	2	11	40		0	
	2017	478 497	2	12	40		0	
Egypt[1]	2010	0		0			2	
	2011	0		0			4	
	2012	0		0			0	
	2013	0		0			0	
	2014	0		22			0	
	2015	0		0			0	
	2016	0		0			0	
	2017	0		0			0	
Iran (Islamic Republic of)[1,2]	2010	761 632		1 847			0	
	2011	771 070		1 632			0	
	2012	780 896		756			0	
	2013	790 925		479			0	
	2014	800 890		358			0	
	2015	810 588		167			0	
	2016	819 953		81			0	
	2017	828 672		57			0	
Iraq[1,2]	2010	3 999 151		0			0	
	2011	4 124 517		0			0	
	2012	4 260 954		0			0	
	2013	4 404 808		0			0	
	2014	4 550 789		0			0	
	2015	4 695 034		0			0	
	2016	4 836 335		0			0	
	2017	0		0			0	
Morocco[1]	2010	0		3			2	
	2011	0		0			0	
	2012	0		0			4	
	2013	0		0			0	
	2014	0		0			0	
	2015	0		0			0	
	2016	0		0			0	
	2017	0		0			0	

Annex 3 - F. Population at risk and estimated malaria cases and deaths, 2010–2017

WHO region Country/area	Year	Population at risk	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
EASTERN MEDITERRANEAN								
Oman[1]	2010	0		7			0	
	2011	0		0			0	
	2012	0		0			0	
	2013	0		0			0	
	2014	0		0			0	
	2015	0		0			0	
	2016	0		0			0	
	2017	0		0			0	
Pakistan	2010	167 679 246	660 000	1 445 704	2 959 000	190	1 617	4 250
	2011	171 242 121	933 000	1 905 938	3 682 000	280	1 814	4 330
	2012	174 906 421	796 000	1 652 576	3 282 000	230	1 704	4 250
	2013	178 643 286	762 000	1 419 225	2 687 000	220	1 047	2 390
	2014	182 412 201	747 000	1 373 352	2 602 000	220	981	2 300
	2015	186 181 679	533 000	992 605	2 002 000	150	781	1 940
	2016	189 940 081	823 000	1 202 476	1 904 000	200	1 013	2 030
	2017	193 688 352	726 000	956 280	1 348 000	160	805	1 480
Saudi Arabia[1,2]	2010	2 196 962		29			0	
	2011	2 262 034		69			0	
	2012	2 329 992		82			0	
	2013	2 398 732		34			0	
	2014	2 465 400		30			0	
	2015	2 527 915		83			0	
	2016	2 585 476		272			0	
	2017	2 638 680		177			0	
Somalia	2010	12 053 231	214 000	356 323	527 000	20	912	1 990
	2011	12 404 724	181 000	301 405	441 000	20	771	1 680
	2012	12 763 777	187 000	310 864	454 000	20	795	1 730
	2013	13 132 351	222 000	366 378	544 000	20	937	2 080
	2014	13 513 114	267 000	430 886	641 000	30	1 103	2 440
	2015	13 908 126	302 000	514 253	770 000	40	1 316	2 940
	2016	14 317 989	310 000	528 591	794 000	40	1 353	3 010
	2017	14 742 532	319 000	541 768	814 000	40	1 386	3 100
Sudan	2010	34 385 961	606 000	961 960	1 453 000	70	2 462	5 520
	2011	35 167 311	611 000	951 357	1 442 000	70	2 435	5 500
	2012	35 990 191	631 000	993 585	1 493 000	70	2 543	5 690
	2013	36 849 916	683 000	1 115 132	1 694 000	80	2 854	6 440
	2014	37 737 909	789 000	1 293 793	2 009 000	90	3 312	7 640
	2015	38 647 801	873 000	1 476 591	2 288 000	100	3 780	8 730
	2016	39 578 826	879 000	1 484 475	2 301 000	100	3 800	8 720
	2017	40 533 342	903 000	1 517 910	2 348 000	110	3 885	8 940
Syrian Arab Republic[1]	2010	0		0			0	
	2011	0		0			0	
	2012	0		0			0	
	2013	0		0			0	
	2014	0		0			0	
	2015	0		0			0	
	2016	0		0			0	
	2017	0		0			0	
United Arab Emirates[1]	2010	0		0			0	
	2011	0		0			0	
	2012	0		0			0	
	2013	0		0			0	
	2014	0		0			0	
	2015	0		0			0	
	2016	0		0			0	
	2017	0		0			0	
Yemen	2010	18 387 353	611 000	1 134 927	2 686 000	90	2 874	8 490
	2011	18 890 066	480 000	792 458	1 406 000	70	2 013	4 620
	2012	19 402 403	578 000	849 989	1 295 000	70	2 169	4 360
	2013	19 921 428	507 000	707 544	1 009 000	60	1 805	3 480
	2014	20 443 291	686 000	1 168 534	4 710 000	90	2 983	13 600
	2015	20 965 057	606 000	1 022 338	4 645 000	80	2 607	11 600
	2016	17 784 091	477 000	667 967	946 000	60	1 698	3 290
	2017	18 213 612	547 000	762 995	1 083 000	70	1 926	3 760

WHO region Country/area	Year	Population at risk	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
EUROPEAN								
Armenia[1]	2010	0		0			0	
	2011	0		0			0	
	2012	0		0			0	
	2013	0		0			0	
	2014	0		0			0	
	2015	0		0			0	
	2016	0		0			0	
	2017	0		0			0	
Azerbaijan[1]	2010	207 746		50			0	
	2011	210 366		4			0	
	2012	213 093		3			0	
	2013	215 861		0			0	
	2014	218 586		0			0	
	2015	221 202		0			0	
	2016	223 683		0			0	
	2017	226 034		0			0	
Georgia[1]	2010	42 316		0			0	
	2011	41 712		0			0	
	2012	41 077		0			0	
	2013	40 459		0			0	
	2014	39 923		0			0	
	2015	39 515		0			0	
	2016	39 254		0			0	
	2017	39 120		0			0	
Kazakhstan[1]	2010	0		0			0	
	2011	0		0			0	
	2012	0		0			0	
	2013	0		0			0	
	2014	0		0			0	
	2015	0		0			0	
	2016	0		0			0	
	2017	0		0			0	
Kyrgyzstan[1]	2010	4 316		3			0	
	2011	4 383		0			0	
	2012	4 452		0			0	
	2013	4 524		0			0	
	2014	4 596		0			0	
	2015	4 668		0			0	
	2016	0		0			0	
	2017	4 836		0			0	
Tajikistan[1]	2010	2 552 302		111			0	
	2011	2 610 525		65			0	
	2012	2 670 351		18			0	
	2013	2 731 388		3			0	
	2014	2 793 156		2			0	
	2015	2 855 247		0			0	
	2016	2 917 473		0			0	
	2017	2 979 728		0			0	
Turkey[1]	2010	16 418		0			0	
	2011	16 663		0			0	
	2012	16 927		0			0	
	2013	17 203		0			0	
	2014	17 485		0			0	
	2015	17 767		0			0	
	2016	18 049		0			0	
	2017	18 571		0			0	
Turkmenistan[1]	2010	0		0			0	
	2011	0		0			0	
	2012	0		0			0	
	2013	0		0			0	
	2014	0		0			0	
	2015	0		0			0	
	2016	0		0			0	
	2017	0		0			0	

Annex 3 - F. Population at risk and estimated malaria cases and deaths, 2010–2017

WHO region Country/area	Year	Population at risk	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
EUROPEAN								
Uzbekistan[1]	2010	28 606		3			0	
	2011	29 068		0			0	
	2012	29 540		0			0	
	2013	30 019		0			0	
	2014	30 499		0			0	
	2015	30 976		0			0	
	2016	31 446		0			0	
	2017	0		0			0	
SOUTH-EAST ASIA								
Bangladesh	2010	16 359 985	97 000	113 895	133 000	10	274	470
	2011	16 549 533	88 000	102 302	118 000	10	250	420
	2012	16 744 706	31 000	35 333	40 000	3	87	140
	2013	16 943 010	22 000	25 019	28 000	2	60	100
	2014	17 140 212	49 000	53 948	59 000	5	132	210
	2015	17 333 286	41 000	44 948	49 000	4	107	180
	2016	17 521 528	28 000	31 169	34 000	3	73	120
	2017	17 706 937	30 000	32 924	36 000	3	76	130
Bhutan[1,2]	2010	538 457		526			2	
	2011	547 984		228			1	
	2012	557 192		0			1	
	2013	566 070		15			0	
	2014	574 573		19			0	
	2015	582 666		34			0	
	2016	590 337		15			0	
	2017	597 633		11			0	
Democratic People's Republic of Korea[1,2]	2010	64 523 263		13 520			0	
	2011	66 713 597		16 760			0	
	2012	68 978 680		21 850			0	
	2013	71 316 029		14 407			0	
	2014	73 722 857		10 535			0	
	2015	76 196 615		773			0	
	2016	78 736 162		2 719			0	
	2017	81 339 998		2 184			0	
India	2010	1 150 227 120	15 080 000	20 490 000	28 300 000	2 770	30 930	58 600
	2011	1 165 416 103	12 760 000	17 520 000	23 930 000	2 360	25 990	49 100
	2012	1 180 207 466	10 490 000	14 220 000	19 450 000	1 980	20 722	39 300
	2013	1 194 687 246	8 306 000	11 210 000	15 110 000	1 530	17 086	32 100
	2014	1 208 980 835	8 506 000	11 420 000	15 510 000	1 410	20 647	39 800
	2015	1 223 178 733	9 175 000	12 200 000	16 200 000	1 520	22 326	42 000
	2016	1 237 304 391	8 993 000	12 630 000	17 830 000	1 580	22 786	45 300
	2017	1 251 329 914	6 965 000	9 590 000	13 260 000	1 200	16 733	31 900
Indonesia	2010	242 524 122	2 199 000	2 730 079	3 531 000	380	4 364	8 290
	2011	245 707 505	2 013 000	2 488 590	3 226 000	340	3 921	7 430
	2012	248 883 233	1 994 000	2 473 705	3 214 000	340	3 893	7 440
	2013	252 032 265	1 643 000	2 033 858	2 632 000	280	3 236	6 170
	2014	255 131 112	1 204 000	1 492 130	1 935 000	200	2 406	4 570
	2015	258 162 114	1 038 000	1 284 900	1 663 000	170	2 023	3 840
	2016	261 115 454	1 043 000	1 293 337	1 679 000	170	2 239	4 290
	2017	263 991 376	1 232 000	1 530 566	1 978 000	200	2 680	5 110
Myanmar	2010	29 851 635	1 393 000	2 019 172	3 044 000	240	3 885	8 270
	2011	30 088 006	1 036 000	1 322 336	1 724 000	160	2 471	4 650
	2012	30 345 995	1 375 000	1 898 175	2 730 000	230	3 690	7 560
	2013	30 620 778	529 000	709 051	978 000	90	1 356	2 690
	2014	30 904 074	352 000	480 112	667 000	60	913	1 830
	2015	31 189 463	348 000	425 073	511 000	60	754	1 370
	2016	31 476 063	214 000	262 577	316 000	30	444	800
	2017	31 765 117	95 000	116 772	140 000	10	218	390
Nepal	2010	7 844 222	15 000	30 690	63 000	4	27	70
	2011	7 932 469	15 000	24 062	45 000	3	10	20
	2012	8 026 166	8 300	13 227	27 000	2	6	20
	2013	8 123 519	7 200	10 326	18 000	1	7	20
	2014	8 221 609	3 100	4 933	9 700	0	3	8
	2015	8 318 289	2 300	4 084	8 700	0	2	7
	2016	8 413 061	1 900	2 754	4 800	0	1	4
	2017	8 506 652	3 100	3 829	4 800	0	1	3

WHO region Country/area	Year	Population at risk	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
SOUTH-EAST ASIA								
Sri Lanka[1]	2010	4 645 622		684			0	
	2011	4 672 455		124			0	
	2012	4 697 646		23			0	
	2013	4 721 263		0			0	
	2014	4 743 422		0			0	
	2015	4 764 229		0			0	
	2016	4 783 652		0			0	
	2017	4 801 686		0			0	
Thailand[1,2]	2010	12 753 677		32 480			80	
	2011	12 814 652		24 897			43	
	2012	12 874 207		32 569			37	
	2013	12 930 964		33 302			47	
	2014	12 982 902		37 921			38	
	2015	13 028 602		17 427			33	
	2016	13 067 679		13 451			27	
	2017	13 100 556		11 043			11	
Timor-Leste	2010	188 331	74 000	103 604	137 000	10	200	390
	2011	192 054	26 000	33 063	41 000	3	70	130
	2012	196 338	6 600	7 821	9 100	1	10	20
	2013	201 023	1 500	1 709	2 000	0	2	4
	2014	205 852	480	567	660	0	0	1
	2015	210 633	120	141	160		0	
	2016	215 332	120	148	170		0	
	2017	220 021	30	36	40		0	
WESTERN PACIFIC								
Cambodia	2010	10 119 052	304 000	361 377	430 000	40	659	1 170
	2011	10 281 107	338 000	376 898	424 000	50	657	1 120
	2012	10 450 115	239 000	266 576	300 000	40	393	670
	2013	10 623 954	155 000	173 259	196 000	20	238	400
	2014	10 799 411	221 000	247 065	281 000	30	410	700
	2015	10 973 972	201 000	224 858	256 000	30	385	660
	2016	11 147 054	114 000	127 552	144 000	20	210	360
	2017	11 318 839	186 000	208 273	236 000	30	345	590
China[1,2]	2010	571 835 337		4 990			19	
	2011	575 088 320		3 367			33	
	2012	578 338 717		244			0	
	2013	581 538 110		86			0	
	2014	584 622 922		56			0	
	2015	587 542 687		39			0	
	2016	590 277 898		3			0	
	2017	592 828 876		0			0	
Lao People's Democratic Republic	2010	3 250 161	30 000	40 528	54 000	3	101	190
	2011	3 295 540	27 000	36 513	47 000	3	87	160
	2012	3 338 043	73 000	98 137	126 000	10	215	420
	2013	3 379 352	60 000	80 695	104 000	10	148	280
	2014	3 421 931	79 000	105 109	136 000	10	160	300
	2015	3 467 505	60 000	79 592	103 000	10	103	190
	2016	3 516 614	21 000	28 152	36 000	4	34	60
	2017	3 568 577	16 000	20 712	27 000	2	30	60
Malaysia[1,2]	2010	1 124 492		5 194			13	
	2011	1 145 405		3 954			12	
	2012	1 166 818		3 662			12	
	2013	1 188 269		2 921			10	
	2014	1 209 120		3 147			4	
	2015	1 228 926		242			4	
	2016	1 247 490		266			2	
	2017	1 264 970		85			10	
Papua New Guinea	2010	7 108 248	439 000	1 240 109	2 154 000	100	2 634	6 250
	2011	7 269 354	388 000	1 045 967	1 806 000	80	2 344	5 580
	2012	7 430 831	503 000	1 414 839	2 815 000	110	3 048	8 100
	2013	7 592 863	956 000	1 677 722	2 546 000	150	4 044	8 350
	2014	7 755 777	1 185 000	1 931 287	2 926 000	220	3 728	7 860
	2015	7 919 826	736 000	1 066 533	1 454 000	110	2 228	4 450
	2016	8 084 993	1 063 000	1 469 150	1 958 000	160	3 109	6 100
	2017	8 251 167	1 032 000	1 500 657	2 063 000	170	3 053	6 120

Annex 3 - F. Population at risk and estimated malaria cases and deaths, 2010–2017

WHO region Country/area	Year	Population at risk	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
WESTERN PACIFIC								
Philippines	2010	54 430 796	39 000	54 209	71 000	5	114	220
	2011	55 331 709	18 000	24 222	31 000	2	48	90
	2012	56 254 330	14 000	19 379	25 000	2	36	70
	2013	57 191 871	13 000	17 718	22 000	1	36	70
	2014	58 133 375	11 000	14 293	18 000	1	30	60
	2015	59 070 761	20 000	26 726	35 000	2	59	120
	2016	60 002 186	12 000	16 173	21 000	1	36	70
	2017	60 930 128	11 000	15 253	19 000	1	34	60
Republic of Korea[1,2]	2010	3 468 699		1 267			1	
	2011	3 482 125		505			2	
	2012	3 496 656		394			0	
	2013	3 511 847		383			0	
	2014	3 526 989		557			0	
	2015	3 541 556		627			0	
	2016	3 555 434		602			0	
	2017	3 568 755		436			0	
Solomon Islands	2010	522 518	65 000	91 425	132 000	10	163	330
	2011	534 209	44 000	62 676	92 000	8	109	230
	2012	546 018	38 000	52 221	74 000	6	89	180
	2013	557 876	40 000	53 689	75 000	7	83	160
	2014	569 753	25 000	30 591	39 000	4	49	90
	2015	581 601	33 000	39 916	49 000	5	58	100
	2016	593 431	71 000	84 451	102 000	10	103	180
	2017	605 230	79 000	103 482	141 000	20	134	260
Vanuatu	2010	236 310	12 000	15 695	20 000	2	20	40
	2011	241 870	8 800	11 651	16 000	1	14	30
	2012	247 481	6 400	8 408	12 000	1	12	20
	2013	253 148	4 000	5 334	7 200	0	7	10
	2014	258 848	1 800	2 431	3 300	0	2	4
	2015	264 603	670	788	940	0	0	1
	2016	270 405	3 200	4 184	5 700	0	2	4
	2017	276 246	1 700	2 270	3 100	0	2	3
Viet Nam	2010	65 203 263	21 000	23 062	26 000	2	45	80
	2011	65 913 824	19 000	20 206	23 000	2	35	60
	2012	66 662 040	22 000	23 838	27 000	3	40	70
	2013	67 432 816	19 000	20 760	23 000	2	34	60
	2014	68 204 585	18 000	19 060	21 000	2	29	50
	2015	68 961 217	10 000	11 283	12 000	1	16	30
	2016	69 696 361	4 600	5 024	5 600	0	8	10
	2017	70 412 520	5 100	5 481	6 000	0	9	20

[1] The number of indigenous malaria cases registered by the NMPs is reported here without further adjustments.

[2] The number of indigenous malaria deaths registered by the NMPs is reported here without further adjustments.

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

WHO region	Year	Cases			Deaths		
		Lower	Point	Upper	Lower	Point	Upper
REGIONAL SUMMARY							
African	2010	186 100 000	206 300 000	252 100 000	504 000	555 000	619 000
	2011	182 500 000	201 000 000	244 200 000	473 000	517 000	569 000
	2012	181 800 000	201 200 000	246 100 000	447 000	489 000	538 000
	2013	180 500 000	200 500 000	243 700 000	427 000	467 000	520 000
	2014	178 000 000	196 200 000	237 600 000	411 000	446 000	481 000
	2015	178 100 000	193 800 000	235 200 000	399 000	432 000	466 000
	2016	178 600 000	195 500 000	236 800 000	383 000	413 000	444 000
	2017	184 500 000	200 500 000	243 600 000	375 000	403 000	432 000
Americas	2010	743 000	814 000	898 000	230	480	760
	2011	566 000	611 000	668 000	190	450	710
	2012	543 000	581 000	629 000	200	400	600
	2013	523 000	564 000	621 000	200	400	610
	2014	448 000	482 000	525 000	150	300	440
	2015	528 000	573 000	635 000	140	320	480
	2016	646 000	712 000	806 000	190	460	700
	2017	880 000	976 000	1 128 000	240	630	980
Eastern Mediterranean	2010	3 128 000	4 255 000	6 549 000	2 970	8 070	15 300
	2011	3 269 000	4 408 000	6 399 000	2 920	7 280	12 400
	2012	3 040 000	4 087 000	5 928 000	2 700	7 340	12 300
	2013	2 918 000	3 823 000	5 336 000	2 410	6 750	11 400
	2014	3 488 000	4 552 000	8 637 000	2 890	8 520	20 000
	2015	3 344 000	4 377 000	7 908 000	2 810	8 660	19 100
	2016	3 682 000	4 498 000	5 786 000	2 840	8 160	14 000
	2017	3 633 000	4 410 000	5 561 000	2 690	8 300	14 200
European	2010		170			0	
	2011		70			0	
	2012		20			0	
	2013		3			0	
	2014		2			0	
	2015		0			0	
	2016		0			0	
	2017		0			0	
South-East Asia	2010	20 160 000	25 530 000	33 720 000	9 120	39 800	68 500
	2011	16 870 000	21 530 000	27 930 000	7 460	32 800	56 300
	2012	14 890 000	18 700 000	23 920 000	7 410	28 400	48 200
	2013	11 050 000	14 040 000	17 930 000	4 620	21 800	37 500
	2014	10 610 000	13 500 000	17 570 000	3 690	24 100	43 100
	2015	10 990 000	13 980 000	18 270 000	3 580	25 200	45 800
	2016	10 540 000	14 230 000	19 600 000	3 300	25 600	48 000
	2017	8 565 000	11 290 000	14 840 000	2 810	19 700	35 900
Western Pacific	2010	1 047 000	1 838 000	2 769 000	780	3 770	7 510
	2011	921 000	1 586 000	2 375 000	580	3 340	6 670
	2012	957 000	1 888 000	3 310 000	680	3 850	8 830
	2013	1 313 000	2 033 000	2 912 000	570	4 600	9 050
	2014	1 599 000	2 354 000	3 338 000	700	4 420	8 600
	2015	1 123 000	1 451 000	1 849 000	510	2 860	5 090
	2016	1 331 000	1 736 000	2 208 000	450	3 510	6 470
	2017	1 395 000	1 857 000	2 399 000	560	3 620	6 690
Total	2010	218 600 000	238 800 000	285 400 000	545 000	607 000	677 000
	2011	210 500 000	229 100 000	273 200 000	507 000	561 000	621 000
	2012	206 700 000	226 400 000	271 600 000	481 000	529 000	584 000
	2013	200 500 000	221 000 000	266 200 000	455 000	500 000	556 000
	2014	199 600 000	217 100 000	259 300 000	440 000	483 000	528 000
	2015	198 700 000	214 200 000	257 200 000	427 000	469 000	514 000
	2016	200 400 000	216 600 000	259 000 000	410 000	451 000	491 000
	2017	202 800 000	219 000 000	262 000 000	401 000	435 000	470 000

Annex 3 - G. Population at risk and reported malaria cases by place of care, 2017

WHO region Country/area	Population			
	UN population	At risk (low + high)	At risk (high)	Number of people living in active foci
AFRICAN				
Angola	29 784 185	29 784 185	29 784 185	-
Benin	11 175 693	11 175 693	11 175 693	-
Botswana	2 291 665	1 519 328	96 525	-
Burkina Faso	19 193 381	19 193 381	19 193 381	-
Burundi	10 864 242	10 864 242	10 864 242	-
Cabo Verde	546 386	-	-	175 668
Cameroon	24 053 736	24 053 736	17 078 153	-
Central African Republic	4 659 086	4 659 086	4 659 086	-
Chad	14 900 002	14 736 847	10 035 896	-
Comoros	813 911	813 911	387 259	-
Congo	5 260 743	5 260 743	5 260 743	-
Côte d'Ivoire	24 294 747	24 294 747	24 294 747	-
Democratic Republic of the Congo	81 339 998	81 339 998	78 899 798	-
Equatorial Guinea	1 267 692	1 267 692	1 267 692	-
Eritrea	5 068 824	5 068 824	3 598 865	-
Eswatini	1 367 254	382 831	-	-
Ethiopia	104 957 434	71 371 055	28 548 422	-
Gabon	2 025 129	2 025 129	2 025 129	-
Gambia	2 100 571	2 100 571	2 100 571	-
Ghana	28 833 623	28 833 623	28 833 623	-
Guinea	12 717 183	12 717 183	12 717 183	-
Guinea-Bissau	1 861 276	1 861 276	1 861 276	-
Kenya	49 699 854	49 699 854	34 886 813	-
Liberia	4 731 908	4 731 908	4 731 908	-
Madagascar	25 570 892	25 570 892	22 443 060	-
Malawi	18 622 107	18 622 107	18 622 107	-
Mali	18 541 977	18 541 977	16 901 383	-
Mauritania	4 420 184	4 420 184	2 849 604	-
Mayotte	253 085	-	-	-
Mozambique	29 668 838	29 668 838	29 668 838	-
Namibia	2 533 793	2 011 198	1 169 624	-
Niger	21 477 346	21 477 346	21 477 346	-
Nigeria	190 886 313	190 886 313	145 795 148	-
Rwanda	12 208 407	12 208 407	12 208 407	-
Sao Tome and Principe	204 335	204 335	204 335	-
Senegal	15 850 566	15 850 566	15 759 108	-
Sierra Leone	7 557 216	7 557 216	7 557 216	-
South Africa	56 717 150	5 671 715	2 268 686	-
South Sudan[1]	12 575 716	12 575 716	12 575 716	-
Togo	7 797 696	7 797 696	7 797 696	-
Uganda	42 862 955	42 862 955	42 862 955	-
United Republic of Tanzania	57 310 016	57 310 016	56 682 219	-
Mainland	55 688 471	55 688 471	55 688 471	-
Zanzibar	1 621 545	1 621 545	993 748	-
Zambia	17 094 128	17 094 128	17 094 128	-
Zimbabwe	16 529 898	13 016 088	4 730 196	-
AMERICAS				
Belize	374 686	-	-	29 474
Bolivia (Plurinational State of)	11 051 592	5 013 776	276 069	-
Brazil	209 288 278	42 485 520	4 813 630	-
Colombia	49 065 612	10 862 636	4 930 113	-
Costa Rica	4 905 765	-	-	83 421
Dominican Republic	10 767 001	5 930 679	152 353	-
Ecuador	16 624 854	-	-	135 004
El Salvador	6 377 843	-	-	134 467
French Guiana	282 731	156 429	26 096	-
Guatemala	16 913 505	12 768 343	2 307 509	-
Guyana	777 854	777 854	84 895	-

Public sector		Private sector		Community level	
Presumed	Confirmed	Presumed	Confirmed	Presumed	Confirmed
625 329	3 874 892	–	–	–	–
22 394	1 696 777	110 791	159 890	2 253	171 442
2	1 900	0	9	–	–
1 690 357	10 225 459	347 277	301 845	8 054	29 956
463 742	7 670 177	19 818	342 142	–	783 633
0	446	–	–	–	–
1 297 736	1 191 257	1 029 666	927 417	65 374	126 114
884 364	383 309	89 456	28 604	–	–
0	1 962 372	–	–	90 557	234 757
0	2 274	0	666	–	956
169 713	127 939	–	–	–	–
117 284	3 274 683	0	558 828	0	201 270
95 840	15 176 927	–	–	0	1 616 075
0	15 725	–	–	–	–
958	31 486	–	–	625	22 519
0	1 127	0	535	–	–
225 009	1 530 739	–	–	–	–
122 395	35 244	–	–	–	–
5 628	69 931	0	5 628	0	2 481
5 853 049	4 375 939	1 858 306	1 391 725	615 885	1 235 491
0	1 335 323 [4]	79 592	35 945	114 141	238 550
0	143 554	0	6 003	0	3 062
4 746 328	3 215 116	580 210	187 143	108 722	204 767
272 840	1 070 113	0	0	221	23 002
0	800 661	188 952	50 623	177 955	134 568
988 905	4 947 443	–	–	0	922 984
179 421	2 097 797	–	–	–	179 421
162 572	20 105	–	–	–	–
–	–	–	–	–	–
72 271	8 921 081	–	–	16 405	971 520
0	66 505	–	–	–	–
0	2 638 580	–	–	0	122 688
7 118 996	11 571 958	555 863	1 448 165	12 394	67 755
512	3 403 183	–	–	–	2 537 350
0	2 241	–	–	0	0
2 671	395 706 [4]	–	–	1 010	126 026
90 276	1 651 236	5 325	49 327	14 292	452 056
0	28 295	0	864	0	456
2 114 203	1 488 005	–	–	452 587	0
0	1 209 034	–	–	0	546 543
2 797 635	11 667 831	398 850	398 827	539 576	1 157 836
243 229	5 354 486	1 808 570	390 088	0	333
242 407	5 351 137	1 808 570	388 726	–	–
822	3 349	0	1 362	0	333
549 040	5 505 639	–	–	0	593 271
0	316 392	–	–	298 793	151 884
0	9 [3]	0	3	–	–
0	4 587 [4]	–	–	0	253
0	194 370 [3]	–	–	–	–
0	43 405 [3]	–	–	–	–
0	25 [3]	0	3	–	–
0	398 [3]	0	58	–	–
0	1 380 [3]	0	6	–	–
0	4 [3]	0	0	0	0
0	597 [3]	–	–	–	–
0	3 744 [3]	–	–	1 498	0
0	13 936 [3]	201	2	–	38

Annex 3 - G. Population at risk and reported malaria cases by place of care, 2017

WHO region Country/area	Population			
	UN population	At risk (low + high)	At risk (high)	Number of people living in active foci
AMERICAS				
Haiti	10 981 224	9 810 845	2 661 739	-
Honduras	9 265 071	8 392 301	2 361 481	-
Mexico	129 163 276	-	-	4 170 976
Nicaragua	6 217 582	2 713 975	533 655	-
Panama	4 098 585	3 965 094	172 714	-
Peru	32 165 486	12 633 316	1 610 204	-
Suriname	563 397	83 214	23 922	-
Venezuela (Bolivarian Republic of)	31 977 067	15 988 534	6 631 555	-
EASTERN MEDITERRANEAN				
Afghanistan	35 530 083	27 386 943	9 674 131	-
Djibouti	956 994	478 497	0	-
Iran (Islamic Republic of)	81 162 782	-	-	341 117
Pakistan	197 015 952	193 688 353	56 971 103	-
Saudi Arabia	32 938 211	-	-	173 294
Somalia	14 742 532	14 742 532	7 503 507	-
Sudan	40 533 342	40 533 342	35 223 474	-
Yemen	28 250 422	18 213 612	10 868 502	-
SOUTH-EAST ASIA				
Bangladesh	164 669 741	17 706 937	2 079 779	-
Bhutan	807 613	-	-	10 782
Democratic People's Republic of Korea	25 490 966	-	-	8 512 441
India	1 339 180 131	1 251 329 914	162 455 942	-
Indonesia	263 991 376	263 991 376	16 879 609	-
Myanmar	53 370 607	31 765 118	8 438 427	-
Nepal	29 304 990	8 506 652	1 531 772	-
Thailand	69 037 502	13 100 556	1 528 490	-
Timor-Leste	1 296 305	220 022	89 717	-
WESTERN PACIFIC				
Cambodia	16 005 373	11 318 840	7 702 746	-
China	1 417 504 846	-	-	-
Lao People's Democratic Republic	6 858 165	3 568 578	3 568 578	-
Malaysia	31 624 270	-	-	8 666
Papua New Guinea	8 251 167	8 251 167	7 756 097	-
Philippines	104 918 084	60 930 128	7 150 167	-
Republic of Korea	50 982 220	-	-	-
Solomon Islands	611 344	605 231	605 231	-
Vanuatu	276 246	276 246	240 127	-
Viet Nam	95 540 803	70 412 521	6 494 386	-
REGIONAL SUMMARY				
African	1 002 491 141	911 103 536	770 968 962	175 668
Americas	550 861 409	131 582 516	26 585 935	4 553 342
Eastern Mediterranean	431 130 318	295 043 279	120 240 717	514 411
South-East Asia	1 947 149 231	1 586 620 575	193 003 736	8 523 223
Western Pacific	1 732 572 518	155 362 711	33 517 332	8 666
Total	**5 664 204 617**	**3 079 712 617**	**1 144 316 682**	**13 775 310**

[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] Figures reported for the public sector include cases detected at the community level.

[3] Figures reported for the public sector include cases detected in the private sector.

[4] Figures reported for the public sector include cases detected at the community level and in the private sector.

Public sector		Private sector		Community level	
Presumed	Confirmed	Presumed	Confirmed	Presumed	Confirmed
0	18 843 [3]	0	3 077	0	1 015
0	1 286 [3]	0	113	–	115
0	765 [3]	0	6	–	–
0	10 949 [3]	–	–	–	–
0	689 [3]	0	5	–	–
0	57 692 [3]	–	–	–	–
0	551 [3]	247	21	–	–
0	411 586 [3]	–	–	–	–
158 267	161 778	0	1 488	17 271	64 397
0	14 671	1 384	139	–	–
0	939	–	–	–	–
1 839 951	350 467	37	70 510	–	–
0	3 151	–	–	–	–
2 018	35 138	–	–	–	–
653 059	715 526	–	–	–	–
46 000	114 004 [2]	0	29 329	–	–
0	4 912	0	221	0	24 114
11	51 [4]	0	11	–	–
0	4 626 [2]	–	–	–	–
0	844 558 [2]	–	–	–	537 790
0	261 617 [2]	–	–	–	–
0	19 619 [2]	0	2 599	0	62 801
2 646	1 622 [2]	976	120	–	329
2 610	7 342 [2]	0	3 023	0	1 075
0	30 [4]	–	–	0	10
0	36 932	0	30 214	0	9 658
9	2 666 [2]	–	–	–	–
8	9 328	0	601	0	2 420
0	4 114	0	60	–	–
403 357	478 340	–	–	0	10 538
0	3 827	13	249	0	2 715
0	143	0	372	–	–
16 193	52 483	–	–	–	–
0	1 072	–	–	0	156
2 269	6 142	–	–	–	–
30 912 699	119 498 887	7 072 676	6 284 274	2 518 844	12 858 766
0	764 816	448	3 294	1 498	1 421
2 699 295	1 395 674	1 421	101 466	17 271	64 397
5 267	1 144 377	976	5 974	0	626 119
421 836	595 047	13	31 496	0	25 487
34 039 097	**123 398 801**	**7 075 534**	**6 426 504**	**2 537 613**	**13 576 190**

Annex 3 - H. Reported malaria cases by method of confirmation, 2010–2017

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
AFRICAN									
Algeria	Presumed and confirmed	408	191	887	603	266	747	432	453
	Microscopy examined	12 224	11 974	15 790	12 762	8 690	8 000	6 628	6 469
	Confirmed with microscopy	408	191	887	603	266	747	432	453
	RDT examined	–	–	–	–	–	0	0	0
	Confirmed with RDT	–	–	–	–	–	0	0	0
	Imported cases	396	187	828	588	260	727	420	446
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	4 500 221
	Microscopy examined	1 947 349	1 765 933	2 245 223	3 025 258	3 398 029	3 345 693	4 183 727	7 493 969
	Confirmed with microscopy	1 324 264	1 147 473	1 056 563	1 462 941	1 431 313	1 396 773	2 058 128	2 199 810
	RDT examined	639 476	833 753	1 069 483	1 103 815	1 855 400	3 009 305	2 959 282	2 931 055
	Confirmed with RDT	358 606	484 809	440 271	536 927	867 666	1 372 532	1 736 125	1 675 082
	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	1 719 171
	Microscopy examined	–	88 134	243 008	291 479	155 205	296 264	267 405	267 492
	Confirmed with microscopy	–	68 745	–	99 368	108 714	108 061	104 601	208 823
	RDT examined	–	475 986	825 005	1 158 526	1 335 582	1 486 667	1 500 047	2 016 767
	Confirmed with RDT	–	354 223	705 839	979 466	935 521	1 160 286	1 219 975	1 487 954
	Imported cases	–	–	–	–	–	–	–	–
Botswana	Presumed and confirmed	12 196	1 141	308	506	1 485	340	718	1 902
	Microscopy examined	–	–	–	–	–	–	5 178	5 223
	Confirmed with microscopy	1 046	432	–	–	–	–	–	–
	RDT examined	–	–	–	–	–	1 284	7 806	7 380
	Confirmed with RDT	–	–	193	456	1 346	326	716	1 900
	Imported cases	–	–	–	30	30	48	64	62
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	11 915 816
	Microscopy examined	177 879	400 005	223 372	183 971	198 947	222 190	191 208	133 101
	Confirmed with microscopy	88 540	83 857	90 089	82 875	83 259	92 589	80 077	46 411
	RDT examined	940 985	450 281	4 516 273	4 296 350	6 224 055	8 290 188	11 794 810	12 561 490
	Confirmed with RDT	715 999	344 256	3 767 957	3 686 176	5 345 396	6 922 857	9 699 077	10 179 048
	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	8 133 919
	Microscopy examined	2 825 558	2 859 720	2 659 372	4 123 012	4 471 998	3 254 670	3 941 251	3 814 355
	Confirmed with microscopy	1 599 908	1 485 332	1 484 676	2 366 134	2 718 391	1 964 862	2 520 622	2 269 831
	RDT examined	273 324	181 489	1 148 965	2 933 869	2 903 679	5 076 107	8 307 007	8 058 231
	Confirmed with RDT	163 539	86 542	666 400	1 775 253	1 866 882	3 194 844	5 753 440	5 400 346
	Imported cases	–	–	–	–	–	–	–	–
Cabo Verde	Presumed and confirmed	47	36	36	46	46	28	75	892
	Microscopy examined	–	–	8 715	10 621	6 894	3 117	8 393	3 857
	Confirmed with microscopy	47	–	36	46	46	28	75	446
	RDT examined	–	26 508	–	–	–	–	–	–
	Confirmed with RDT	–	36	–	–	–	–	–	–
	Imported cases	–	29	35	24	20	21	27	23
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	2 488 993
	Microscopy examined	–	1 110 308	1 182 610	1 236 306	1 086 095	1 024 306	1 373 802	627 709
	Confirmed with microscopy	–	–	–	–	–	592 351	810 367	390 130
	RDT examined	–	120 466	93 392	591 670	1 254 293	1 128 818	1 740 375	1 420 522
	Confirmed with RDT	–	–	–	–	–	570 433	864 897	801 127
	Imported cases	–	–	–	–	–	–	–	–
Central African Republic	Presumed and confirmed	66 484	221 980	459 999	407 131	495 238	953 535	1 400 526	1 267 673
	Microscopy examined	–	–	–	63 695	55 943	139 241	189 481	112 007
	Confirmed with microscopy	–	–	–	36 943	41 436	106 524	144 924	28 855
	RDT examined	–	–	55 746	136 548	369 208	724 303	1 249 963	483 714
	Confirmed with RDT	–	–	46 759	79 357	253 652	492 309	887 840	354 454
	Imported cases	–	–	–	–	–	–	–	–

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
AFRICAN									
Chad	Presumed and confirmed	544 243	528 454	660 575	1 272 841	1 513 772	1 490 556	1 402 215	1 962 372
	Microscopy examined	89 749	–	69 789	–	–	–	1 063 293	1 584 525
	Confirmed with microscopy	75 342	86 348	–	206 082	160 260	149 574	720 765	1 064 354
	RDT examined	309 927	114 122	–	621 469	1 137 455	937 775	861 561	1 359 070
	Confirmed with RDT	125 106	94 778	–	548 483	753 772	637 472	574 003	898 018
	Imported cases	–	–	–	–	–	–	–	–
Comoros	Presumed and confirmed	103 670	76 661	65 139	62 565	2 465	1 517	1 333	2 274
	Microscopy examined	87 595	63 217	125 030	154 824	93 444	89 634	71 902	130 134
	Confirmed with microscopy	35 199	22 278	45 507	46 130	1 987	963	559	1 325
	RDT examined	5 249	20 226	27 714	21 546	9 839	11 479	22 219	60 691
	Confirmed with RDT	1 339	2 578	4 333	7 026	216	337	507	949
	Imported cases	–	–	–	–	–	–	–	–
Congo	Presumed and confirmed	446 656	277 263	120 319	183 026	248 159	264 574	374 252	297 652
	Microscopy examined	–	–	–	69 375	88 764	87 547	202 922	153 203
	Confirmed with microscopy	–	37 744	120 319	43 232	54 523	51 529	134 612	127 939
	RDT examined	–	–	–	0	19 746	0	60 927	0
	Confirmed with RDT	–	–	–	0	11 800	0	37 235	0
	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	3 391 967
	Microscopy examined	–	49 828	195 546	395 914	568 562	811 426	975 507	1 221 845
	Confirmed with microscopy	62 726	29 976	107 563	215 104	306 926	478 870	579 566	588 969
	RDT examined	–	–	1 572 785	3 384 765	4 904 066	4 174 097	4 202 868	5 007 162
	Confirmed with RDT	–	–	1 033 064	2 291 849	3 405 905	2 897 034	2 891 458	2 685 714
	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	15 272 767
	Microscopy examined	3 678 849	4 226 533	4 329 318	4 126 129	3 533 165	2 877 585	2 810 067	1 981 621
	Confirmed with microscopy	2 374 930	2 700 818	2 656 864	2 611 478	2 126 554	1 902 640	1 847 143	1 291 717
	RDT examined	54 728	2 912 088	3 327 071	6 096 993	11 114 215	13 574 891	18 630 636	18 994 861
	Confirmed with RDT	42 850	1 861 163	2 134 734	4 103 745	7 842 429	9 724 833	13 483 698	13 885 210
	Imported cases	–	–	–	–	–	–	–	–
Equatorial Guinea	Presumed and confirmed	78 095	37 267	20 890	25 162	20 417	15 142	147 714	15 725
	Microscopy examined	42 585	23 004	33 245	27 039	47 322	21 831	239 938	13 127
	Confirmed with microscopy	39 636	20 601	13 196	11 235	17 685	8 564	125 623	6 800
	RDT examined	16 772	2 899	6 826	5 489	9 807	46 227	78 841	78 090
	Confirmed with RDT	14 177	1 865	1 973	1 894	2 732	6 578	22 091	8 925
	Imported cases	–	–	–	–	–	–	–	–
Eritrea	Presumed and confirmed	53 750	39 567	42 178	34 678	35 725	24 310	47 055	32 444
	Microscopy examined	79 024	67 190	84 861	81 541	63 766	59 268	83 599	74 962
	Confirmed with microscopy	13 894	15 308	11 557	10 890	10 993	8 332	24 251	14 519
	RDT examined	–	25 570	33 758	39 281	53 032	47 744	–	45 144
	Confirmed with RDT	22 088	19 540	10 258	10 427	19 775	11 040	–	16 967
	Imported cases	–	–	–	–	–	–	–	–
Eswatini	Presumed and confirmed	1 722	797	626	962	711	651	487	1 127
	Microscopy examined	–	–	–	–	–	–	1 249	371
	Confirmed with microscopy	87	130	345	488	711	43	141	68
	RDT examined	–	–	–	–	–	–	–	2 841
	Confirmed with RDT	181	419	217	474	–	152	209	1 059
	Imported cases	–	170	153	234	322	282	221	403
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	1 755 748
	Microscopy examined	2 509 543	3 418 719	3 778 479	8 573 335	7 062 717	5 679 932	6 367 309	6 246 949
	Confirmed with microscopy	1 158 197	1 480 306	1 692 578	2 645 454	2 118 815	1 867 059	1 718 504	1 530 739
	RDT examined	–	–	–	–	–	–	–	–
	Confirmed with RDT	–	–	–	–	–	–	–	–
	Imported cases	–	–	–	–	–	–	–	–

Annex 3 - H. Reported malaria cases by method of confirmation, 2010–2017

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
AFRICAN									
Gabon	Presumed and confirmed	185 105	178 822	188 089	185 196	185 996	217 287	161 508	157 639
	Microscopy examined	54 714	–	66 018	90 185	90 275	79 308	62 658	70 820
	Confirmed with microscopy	12 816	–	18 694	26 432	27 687	20 390	22 419	28 297
	RDT examined	7 887	–	4 129	10 132	11 812	12 761	2 738	18 877
	Confirmed with RDT	1 120	–	1 059	2 550	4 213	3 477	1 496	6 947
	Imported cases	–	–	–	–	–	–	–	–
Gambia	Presumed and confirmed	194 009	261 967	300 363	279 829	166 229	249 437	155 456	75 559
	Microscopy examined	290 842	172 241	156 580	236 329	286 111	272 604	165 793	77 491
	Confirmed with microscopy	52 245	71 588	29 325	65 666	66 253	49 649	26 397	11 343
	RDT examined	123 564	–	705 862	614 128	317 313	609 852	677 346	508 107
	Confirmed with RDT	64 108	190 379	271 038	175 126	99 976	190 733	127 377	58 588
	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	10 228 988
	Microscopy examined	2 031 674	1 172 838	4 219 097	1 394 249	1 987 959	2 023 581	2 594 918	2 495 536
	Confirmed with microscopy	1 029 384	624 756	2 971 699	721 898	970 448	934 304	1 189 012	1 089 799
	RDT examined	247 278	781 892	1 438 284	1 488 822	3 610 453	5 478 585	5 532 416	5 677 564
	Confirmed with RDT	42 253	416 504	783 467	917 553	2 445 464	3 385 615	3 346 155	3 286 140
	Imported cases	–	–	–	–	–	–	–	–
Guinea	Presumed and confirmed	1 092 554	1 189 016	1 220 574	775 341	1 595 828	895 016	992 146	1 335 323
	Microscopy examined	–	43 549	–	–	116 767	78 377	79 233	99 083
	Confirmed with microscopy	20 936	5 450	191 421	63 353	82 818	52 211	53 805	64 211
	RDT examined	–	139 066	–	–	–	1 092 523	1 423 802	2 035 460
	Confirmed with RDT	–	90 124	125 779	147 904	577 389	758 768	938 341	1 271 112
	Imported cases	–	–	–	–	–	–	–	–
Guinea-Bissau	Presumed and confirmed	140 143	174 986	129 684	132 176	98 952	142 309	150 903	143 554
	Microscopy examined	48 799	57 698	61 048	58 909	106 882	123 810	146 708	157 970
	Confirmed with microscopy	30 239	21 320	23 547	17 733	35 546	45 789	53 014	53 770
	RDT examined	56 455	139 531	97 047	102 079	197 536	261 868	234 488	303 651
	Confirmed with RDT	20 152	50 662	26 834	36 851	57 885	96 520	97 889	89 784
	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	7 961 444
	Microscopy examined	2 384 402	3 009 051	4 836 617	6 606 885	7 444 865	7 772 329	6 167 609	5 952 353
	Confirmed with microscopy	898 531	1 002 805	1 426 719	2 060 608	2 415 950	1 025 508	1 569 045	2 215 665
	RDT examined	–	–	164 424	655 285	850 884	1 965 661	3 588 676	3 314 695
	Confirmed with RDT	–	–	26 752	274 678	392 981	473 519	1 214 801	999 451
	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	1 342 953
	Microscopy examined	335 973	728 443	772 362	818 352	1 318 801	509 062	649 096	715 643
	Confirmed with microscopy	212 927	577 641	507 967	496 269	302 708	305 981	381 781	425 639
	RDT examined	998 043	1 593 676	1 276 521	1 144 405	912 382	947 048	1 304 021	1 045 323
	Confirmed with RDT	709 246	1 338 121	899 488	747 951	561 496	625 105	809 356	644 474
	Imported cases	–	–	–	–	–	–	–	–
Madagascar	Presumed and confirmed	293 910	255 814	395 149	385 598	433 101	752 176	475 333	800 661
	Microscopy examined	24 393	34 813	38 453	42 573	37 362	39 604	33 085	34 265
	Confirmed with microscopy	2 173	3 447	3 667	4 947	3 853	4 748	3 734	5 134
	RDT examined	604 114	739 572	906 080	1 026 110	926 998	1 488 667	1 496 990	1 974 518
	Confirmed with RDT	200 277	221 051	355 753	380 651	374 110	739 355	471 599	795 527
	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	5 936 348
	Microscopy examined	–	119 996	406 907	132 475	198 534	216 643	240 212	127 752
	Confirmed with microscopy	–	50 526	283 138	44 501	77 635	75 923	96 538	46 099
	RDT examined	–	580 708	2 763 986	3 029 020	5 344 724	7 030 084	8 661 237	9 413 944
	Confirmed with RDT	–	253 973	1 281 846	1 236 391	2 827 675	3 585 315	4 730 835	4 901 344
	Imported cases	–	–	–	–	–	–	–	–

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
AFRICAN									
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	2 097 797
	Microscopy examined	–	–	–	–	–	–	–	397 723
	Confirmed with microscopy	–	–	97 995	190 337	219 637	243 151	235 212	276 673
	RDT examined	1 380 178	974 558	–	1 889 286	–	3 389 449	3 408 254	2 755 935
	Confirmed with RDT	227 482	307 035	788 487	1 176 881	1 820 216	2 052 460	1 921 070	1 821 124
	Imported cases	–	–	–	–	–	–	–	–
Mauritania	Presumed and confirmed	244 319	154 003	169 104	128 486	172 326	181 562	165 234	182 677
	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	51 515
	Confirmed with RDT	1 085	1 796	1 633	630	15 835	22 631	29 156	20 105
	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	8 993 352
	Microscopy examined	1 950 933	2 504 720	2 546 213	2 058 998	2 295 823	2 313 129	1 886 154	1 699 589
	Confirmed with microscopy	644 568	1 093 742	886 143	774 891	1 009 496	735 750	674 697	700 282
	RDT examined	2 287 536	2 966 853	2 234 994	5 215 893	9 944 222	11 928 263	13 567 501	14 134 096
	Confirmed with RDT	878 009	663 132	927 841	2 223 983	6 108 152	6 983 032	7 845 679	8 220 799
	Imported cases	–	–	–	–	–	–	–	–
Namibia	Presumed and confirmed	25 889	14 406	3 163	4 911	15 914	12 168	25 198	66 505
	Microscopy examined	14 522	13 262	7 875	1 507	1 894	1 471	1 778	1 778
	Confirmed with microscopy	556	335	194	136	222	118	329	364
	RDT examined	–	48 599	–	32 495	185 078	207 612	308 414	616 513
	Confirmed with RDT	–	1 525	–	4 775	15 692	12 050	24 869	66 141
	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	2 638 580
	Microscopy examined	165 514	130 658	1 781 505	1 799 299	2 872 710	295 229	3 198 194	203 583
	Confirmed with microscopy	49 285	68 529	1 119 929	1 176 711	0	206 660	2 120 515	125 856
	RDT examined	7 426 774	1 130 514	1 781 505	1 799 299	2 872 710	2 657 057	3 066 101	3 615 853
	Confirmed with RDT	570 773	712 347	1 119 929	1 176 711	1 953 309	2 065 340	2 027 652	2 512 724
	Imported cases	–	–	–	–	–	–	–	–
Nigeria	Presumed and confirmed	3 873 463	4 306 945	6 938 519	12 830 911	16 512 127	14 732 621	16 740 560	18 690 954
	Microscopy examined	–	672 185	1 953 399	1 633 960	1 681 469	839 849	901 141	1 055 444
	Confirmed with microscopy	523 513	–	–	–	1 233 654	556 871	618 363	749 118
	RDT examined	45 924	242 526	2 898 052	7 194 960	9 188 933	8 690 087	11 765 893	14 808 335
	Confirmed with RDT	27 674	–	–	–	6 593 300	6 261 971	8 616 024	10 822 840
	Imported cases	–	–	–	–	–	–	–	–
Rwanda	Presumed and confirmed	638 669	208 858	483 470	962 618	1 610 812	2 505 794	3 380 568	3 403 695
	Microscopy examined	2 708 973	1 602 271	2 904 793	2 862 877	4 010 202	5 811 267	6 603 261	6 637 571
	Confirmed with microscopy	638 669	208 858	422 224	879 316	1 528 825	2 354 400	2 916 902	2 927 780
	RDT examined	–	–	190 593	201 708	168 004	281 847	898 913	920 295
	Confirmed with RDT	–	–	61 246	83 302	81 987	151 394	463 666	475 403
	Imported cases	–	–	–	–	–	–	–	–
Sao Tome and Principe	Presumed and confirmed	3 346	8 442	12 550	9 243	1 754	2 058	2 238	2 241
	Microscopy examined	48 366	83 355	103 773	73 866	33 355	11 941	3 658	2 146
	Confirmed with microscopy	2 233	6 373	10 706	6 352	569	140	35	109
	RDT examined	9 989	33 924	23 124	34 768	58 090	72 407	117 676	94 466
	Confirmed with RDT	507	2 069	1 844	2 891	1 185	1 918	2 203	2 132
	Imported cases	–	–	–	–	–	2	4	2

Annex 3 - H. Reported malaria cases by method of confirmation, 2010–2017

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
AFRICAN									
Senegal	Presumed and confirmed	707 772	604 290	634 106	772 222	628 642	502 084	356 272	398 377
	Microscopy examined	27 793	18 325	19 946	24 205	19 343	26 556	38 748	21 639
	Confirmed with microscopy	17 750	14 142	15 612	20 801	12 636	17 846	9 918	10 463
	RDT examined	651 737	555 614	524 971	668 562	697 175	1 384 834	1 513 574	2 011 383
	Confirmed with RDT	325 920	263 184	265 468	325 088	252 988	474 407	339 622	385 243
	Imported cases	-	-	-	-	-	352	1 905	0
Sierra Leone	Presumed and confirmed	934 028	856 332	1 945 859	1 715 851	1 898 852	1 569 606	1 845 727	1 741 512
	Microscopy examined	718 473	46 280	194 787	185 403	66 277	75 025	120 917	10 910
	Confirmed with microscopy	218 473	25 511	104 533	76 077	39 414	37 820	60 458	5 717
	RDT examined	1 609 455	886 994	1 975 972	2 377 254	2 056 722	2 176 042	2 805 621	2 834 261
	Confirmed with RDT	715 555	613 348	1 432 789	1 625 881	1 335 062	1 445 556	1 714 848	1 645 519
	Imported cases	-	-	-	-	-	-	-	-
South Africa	Presumed and confirmed	8 060	9 866	6 846	8 851	13 988	8 976	4 323	28 295
	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	9 592
	RDT examined	276 669	204 047	30 053	239 705	240 622	17 446	42 624	56 257
	Confirmed with RDT	4 273	3 880	3 997	6 073	7 604	3 572	3 104	18 703
	Imported cases	-	-	-	-	-	3 568	3 075	6 234
South Sudan[1]	Presumed and confirmed	900 283	795 784	1 125 039	1 855 501	2 433 991	3 789 475	7 619	3 602 208
	Microscopy examined	-	-	-	-	27 321	22 721	6 954	800 067
	Confirmed with microscopy	900 283	112 024	225 371	262 520	18 344	11 272	2 357	335 642
	RDT examined	-	-	-	-	102 538	26 507	10 751	2 024 503
	Confirmed with RDT	-	-	-	-	53 033	13 099	5 262	1 152 363
	Imported cases	-	-	-	-	-	-	-	-
Togo	Presumed and confirmed	983 430	519 450	768 287	882 430	1 130 251	1 113 928	1 183 265	1 209 034
	Microscopy examined	478 354	502 977	579 507	560 096	621 119	621 119	435 164	445 035
	Confirmed with microscopy	224 087	237 305	260 535	272 855	310 207	305 727	231 819	209 626
	RDT examined	575 245	390 611	660 627	882 475	1 135 581	1 135 581	1 410 290	1 597 463
	Confirmed with RDT	393 014	282 145	436 839	609 575	820 044	808 200	951 446	999 408
	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	14 465 466
	Microscopy examined	3 705 284	385 928	3 466 571	3 718 588	2 048 185	3 684 722	4 492 090	5 515 931
	Confirmed with microscopy	1 581 160	134 726	1 413 149	1 502 362	578 289	1 248 576	1 542 091	1 694 441
	RDT examined	-	194 819	2 449 526	7 387 826	7 060 545	12 126 996	17 473 299	16 803 712
	Confirmed with RDT	-	97 147	1 249 109	-	3 053 650	5 889 086	7 843 041	9 973 390
	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	5 597 715
	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	5 593 544
	Microscopy examined	3 573 710	5 513 619	6 784 639	6 720 141	592 320	532 118	1 285 720	2 826 948
	Confirmed with microscopy	1 276 660	1 812 704	1 771 388	1 480 791	571 598	411 741	1 261 650	915 887
	RDT examined	-	1 315 662	701 477	369 444	17 566 750	16 416 675	15 379 517	15 052 571
	Confirmed with RDT	-	333 568	212 636	69 459	106 609	3 827 749	3 926 855	4 435 250
	Imported cases	-	-	-	-	-	-	-	-
Zanzibar	Presumed and confirmed	74 343	4 489	3 157	2 548	4 246	4 442	5 015	4 171
	Microscopy examined	63 949	143 288	146 386	83 944	134 810	141 105	100 669	61 590
	Confirmed with microscopy	364	475	674	484	691	961	1 029	855
	RDT examined	136 123	312 430	390 138	443 659	173 457	203 624	159 192	204 891
	Confirmed with RDT	1 974	4 014	2 257	1 710	1 119	2 281	3 986	2 494
	Imported cases	-	-	-	719	1 583	2 550	-	-

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
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	6 054 679
	Microscopy examined	–	–	–	–	–	–	–	–
	Confirmed with microscopy	–	–	–	–	–	–	–	–
	RDT examined	–	–	–	–	5 964 354	7 207 500	8 502 989	10 403 283
	Confirmed with RDT	–	–	–	–	4 077 547	4 184 661	4 851 319	5 505 639
	Imported cases	–	–	–	–	–	–	–	–
Zimbabwe	Presumed and confirmed	648 965	319 935	276 963	422 633	535 983	391 651	280 853	316 392
	Microscopy examined	–	10 004	–	–	–	–	–	0
	Confirmed with microscopy	–	–	–	–	–	–	–	0
	RDT examined	513 032	470 007	727 174	1 115 005	1 420 894	1 384 893	1 223 509	1 110 705
	Confirmed with RDT	249 379	319 935	276 963	422 633	535 931	391 651	279 988	316 392
	Imported cases	–	–	–	–	–	180	358	768
AMERICAS									
Argentina[2]	Presumed and confirmed	72	18	4	4	4	11	7	17
	Microscopy examined	2 547	7 872	7 027	4 913	5 691	3 862	3 479	2 114
	Confirmed with microscopy	72	18	4	4	4	11	7	18
	RDT examined	–	–	–	0	0	0	0	0
	Confirmed with RDT	–	–	–	0	0	0	0	0
	Imported cases	46	18	4	4	4	8	5	15
Belize	Presumed and confirmed	150	79	37	26	19	13	5	9
	Microscopy examined	27 366	22 996	20 789	25 351	24 122	13	5	9
	Confirmed with microscopy	150	79	37	26	19	13	5	9
	RDT examined	–	–	–	–	–	0	0	0
	Confirmed with RDT	–	–	–	–	–	0	0	0
	Imported cases	–	7	4	4	0	4	1	2
Bolivia (Plurinational State of)	Presumed and confirmed	13 769	7 143	7 415	7 342	7 401	6 907	5 553	4 587
	Microscopy examined	133 463	143 272	121 944	133 260	124 900	159 167	155 407	151 697
	Confirmed with microscopy	12 252	6 108	6 293	6 272	7 401	6 907	5 553	4 334
	RDT examined	7 394	7 390	10 960	10 789	–	–	–	–
	Confirmed with RDT	1 517	1 035	1 122	1 070	–	–	–	253
	Imported cases	–	–	–	–	–	33	11	15
Brazil	Presumed and confirmed	334 668	267 146	242 758	178 546	144 130	143 161	129 246	194 370
	Microscopy examined	2 711 432	2 476 335	2 325 775	1 873 518	1 744 640	1 573 538	1 341 644	1 656 428
	Confirmed with microscopy	334 667	266 713	237 978	174 048	142 746	139 843	124 212	184 821
	RDT examined	–	1 486	23 566	19 500	11 820	16 865	23 273	39 377
	Confirmed with RDT	–	433	4 780	3 719	1 384	3 318	5 034	9 549
	Imported cases	–	–	–	8 905	4 847	4 915	5 087	4 867
Colombia	Presumed and confirmed	117 650	64 436	60 179	51 722	40 768	55 866	63 170	54 102
	Microscopy examined	521 342	396 861	346 599	284 332	325 713	316 451	242 973	244 732
	Confirmed with microscopy	117 637	60 121	50 938	44 293	36 166	48 059	57 515	38 349
	RDT examined	–	21 171	70 168	42 723	77 819	11 983	53 118	9 648
	Confirmed with RDT	13	4 188	9 241	7 403	4 602	3 535	5 655	5 056
	Imported cases	–	–	–	–	–	7 785	618	1 297
Costa Rica	Presumed and confirmed	114	17	8	6	6	8	13	25
	Microscopy examined	15 599	10 690	7 485	16 774	4 420	7 373	5 160	9 680
	Confirmed with microscopy	114	17	8	6	6	8	13	25
	RDT examined	–	–	–	0	0	0	0	0
	Confirmed with RDT	–	–	–	0	0	0	0	0
	Imported cases	4	6	1	4	5	8	9	13
Dominican Republic	Presumed and confirmed	3 414	1 616	952	579	496	661	755	398
	Microscopy examined	469 052	421 405	415 808	431 683	362 304	317 257	280 150	226 988
	Confirmed with microscopy	2 482	1 616	952	579	496	661	755	398
	RDT examined	26 585	56 150	90 775	71 000	54 425	7 530	22 450	38 547
	Confirmed with RDT	932	–	–	–	–	–	–	–
	Imported cases	–	–	–	105	37	30	65	57

Annex 3 - H. Reported malaria cases by method of confirmation, 2010–2017

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
AMERICAS									
Ecuador	Presumed and confirmed	1 888	1 233	558	378	242	686	1 424	1 380
	Microscopy examined	481 030	460 785	459 157	397 628	370 825	261 824	311 920	306 894
	Confirmed with microscopy	1 888	1 233	558	378	242	686	1 424	1 380
	RDT examined	7 800	-	-	-	-	-	-	-
	Confirmed with RDT	-	-	-	-	-	-	-	-
	Imported cases	-	14	14	10	-	59	233	105
El Salvador[2]	Presumed and confirmed	24	16	19	7	8	9	14	4
	Microscopy examined	115 256	100 883	124 885	103 748	106 915	89 267	81 904	70 022
	Confirmed with microscopy	24	15	19	7	8	9	14	4
	RDT examined	-	1	-	-	0	0	0	0
	Confirmed with RDT	-	1	-	-	0	0	0	0
	Imported cases	7	6	6	1	2	7	1	3
French Guiana	Presumed and confirmed	1 632	1 209	900	875	448	434	258	597
	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	468
	RDT examined	-	-	-	-	-	-	-	-
	Confirmed with RDT	944	704	499	551	206	137	58	129
	Imported cases	-	-	-	-	-	60	41	43
Guatemala	Presumed and confirmed	7 384	6 817	5 346	6 214	5 685	6 836	4 854	3 744
	Microscopy examined	235 075	195 080	186 645	153 731	250 964	295 246	333 535	372 158
	Confirmed with microscopy	7 384	6 817	5 346	6 214	4 931	5 538	4 854	3 744
	RDT examined	2 000	-	0	0	50 025	6 500	74 859	0
	Confirmed with RDT	0	-	0	0	-	1 298	-	0
	Imported cases	-	-	-	-	1	2	1	2
Guyana	Presumed and confirmed	22 935	29 506	31 656	31 479	12 354	9 984	12 367	13 936
	Microscopy examined	212 863	201 693	196 622	205 903	142 843	132 941	110 891	100 096
	Confirmed with microscopy	22 935	29 471	31 601	31 479	12 354	9 984	10 906	13 734
	RDT examined	-	35	-	0	0	0	5 409	-
	Confirmed with RDT	-	35	55	0	0	0	1 461	202
	Imported cases	-	-	-	-	-	-	411	-
Haiti	Presumed and confirmed	84 153	32 969	25 423	26 543	17 696	17 583	21 998	19 135
	Microscopy examined	270 427	184 934	167 726	165 823	134 766	69 659	61 210	62 539
	Confirmed with microscopy	84 153	32 969	25 423	20 957	10 893	5 224	4 339	2 119
	RDT examined	-	-	46	5 586	126 637	233 081	240 834	232 741
	Confirmed with RDT	-	-	-	-	6 803	12 359	17 659	16 724
	Imported cases	-	-	-	-	-	-	-	-
Honduras	Presumed and confirmed	9 685	7 618	6 449	5 428	3 482	3 575	4 097	1 287
	Microscopy examined	152 961	152 451	155 165	144 436	151 420	150 854	167 836	148 160
	Confirmed with microscopy	9 685	7 465	6 439	5 364	3 380	3 555	3 695	1 251
	RDT examined	4 000	4 000	4 000	237	1 427	3 052	14 930	17 376
	Confirmed with RDT	-	45	10	64	102	20	401	35
	Imported cases	-	-	-	-	2	0	3	10
Mexico	Presumed and confirmed	1 226	1 130	842	499	666	551	596	765
	Microscopy examined	1 192 081	1 035 424	1 025 659	1 017 508	900 578	867 853	798 568	644 174
	Confirmed with microscopy	1 226	1 130	842	499	664	551	596	765
	RDT examined	-	-	-	0	0	0	0	0
	Confirmed with RDT	-	-	-	0	0	0	0	0
	Imported cases	7	6	9	4	10	34	45	29
Nicaragua	Presumed and confirmed	692	925	1 235	1 196	1 163	2 307	6 284	10 949
	Microscopy examined	535 914	521 904	536 278	519 993	605 357	604 418	553 615	660 452
	Confirmed with microscopy	692	925	1 235	1 196	1 163	2 307	6 284	10 949
	RDT examined	18 500	14 201	16 444	19 029	0	-	800	2 680
	Confirmed with RDT	0	-	0	-	0	-	-	-
	Imported cases	-	-	-	34	21	29	12	3

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
AMERICAS									
Panama	Presumed and confirmed	418	354	844	705	874	562	811	689
	Microscopy examined	141 038	116 588	107 711	93 624	80 701	64 511	50 772	38 270
	Confirmed with microscopy	418	354	844	705	874	562	811	689
	RDT examined	–	0	0	0	0	0	0	0
	Confirmed with RDT	–	0	0	0	0	0	0	0
	Imported cases	–	–	–	9	10	16	42	40
Paraguay[3]	Presumed and confirmed	27	10	15	11	8	8	11	5
	Microscopy examined	62 178	48 611	31 499	24 806	24 832	6 687	3 192	8 014
	Confirmed with microscopy	27	10	15	11	8	8	10	5
	RDT examined	–	–	–	–	–	0	1	1 267
	Confirmed with RDT	–	–	–	–	–	0	1	0
	Imported cases	9	9	15	11	8	8	10	5
Peru	Presumed and confirmed	31 546	25 039	31 436	48 719	65 252	63 865	56 623	55 367
	Microscopy examined	744 627	702 894	758 723	863 790	864 413	865 980	566 230	388 699
	Confirmed with microscopy	31 545	25 005	31 436	48 719	65 252	61 865	56 623	55 367
	RDT examined	23	58	562	858	1 634	0	–	13 924
	Confirmed with RDT	1	34	–	–	–	–	–	2 325
	Imported cases	–	–	–	–	0	0	0	–
Suriname	Presumed and confirmed	1 771	795	569	729	729	376	327	551
	Microscopy examined	16 533	15 135	17 464	13 693	17 608	15 083	14 946	12 536
	Confirmed with microscopy	1 574	751	306	530	98	345	315	412
	RDT examined	541	1 025	4 008	6 043	15 489	153	8 498	9 498
	Confirmed with RDT	138	20	50	199	303	31	12	139
	Imported cases	–	–	–	204	–	274	251	414
Venezuela (Bolivarian Republic of)	Presumed and confirmed	45 155	45 824	52 803	78 643	91 918	137 996	242 561	411 586
	Microscopy examined	400 495	382 303	410 663	476 764	522 617	625 174	852 556	1 144 635
	Confirmed with microscopy	45 155	45 824	52 803	78 643	91 918	137 996	242 561	411 586
	RDT examined	–	–	–	–	–	–	80 000	–
	Confirmed with RDT	–	–	–	–	–	–	–	–
	Imported cases	–	–	–	1 677	1 210	1 594	1 948	2 941
EASTERN MEDITERRANEAN									
Afghanistan	Presumed and confirmed	392 463	482 748	391 365	319 742	290 079	350 044	392 551	320 045
	Microscopy examined	524 523	531 053	511 408	507 145	514 466	538 789	598 556	611 904
	Confirmed with microscopy	69 397	77 549	54 840	39 263	61 362	86 895	100 456	107 955
	RDT examined	–	0	0	0	–	–	94 975	161 925
	Confirmed with RDT	–	0	0	0	–	–	38 631	53 823
	Imported cases	–	–	–	–	–	–	–	–
Djibouti	Presumed and confirmed	1 010	230	27	1 684	9 439	9 557	13 804	14 671
	Microscopy examined	–	124	1 410	7 189	39 284	10 502	19 492	24 504
	Confirmed with microscopy	1 010	–	22	1 684	9 439	1 764	2 280	1 283
	RDT examined	–	–	–	–	–	–	–	50 104
	Confirmed with RDT	–	–	3	–	–	7 709	11 524	13 388
	Imported cases	–	–	–	–	–	–	–	–
Iran (Islamic Republic of)	Presumed and confirmed	3 031	3 239	1 629	1 373	1 243	799	705	939
	Microscopy examined	614 817	530 470	479 655	385 172	468 513	610 337	418 125	383 397
	Confirmed with microscopy	3 031	3 239	1 629	1 373	1 243	799	705	939
	RDT examined	–	–	0	–	–	–	–	–
	Confirmed with RDT	–	–	0	–	–	–	–	–
	Imported cases	1 184	1 529	842	853	867	632	612	867
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	2 190 418
	Microscopy examined	4 281 346	4 168 648	4 497 330	3 933 321	4 343 418	4 619 980	4 982 935	4 815 711
	Confirmed with microscopy	220 870	287 592	250 526	196 078	193 952	137 401	152 611	135 247
	RDT examined	279 724	518 709	410 949	628 504	779 815	691 245	1 223 880	1 643 311
	Confirmed with RDT	19 721	46 997	40 255	85 677	81 197	64 612	165 838	215 220
	Imported cases	–	–	–	–	–	–	–	–

Annex 3 - H. Reported malaria cases by method of confirmation, 2010–2017

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
EASTERN MEDITERRANEAN									
Saudi Arabia	Presumed and confirmed	1 941	2 788	3 406	2 513	2 305	2 620	5 382	3 151
	Microscopy examined	944 723	1 062 827	1 186 179	1 309 783	1 249 752	1 306 700	1 267 933	1 073 998
	Confirmed with microscopy	1 941	2 788	3 406	2 513	2 305	2 620	5 382	3 151
	RDT examined	-	-	0	-	-	-	-	-
	Confirmed with RDT	-	-	0	-	-	-	-	-
	Imported cases	1 912	2 719	3 324	2 479	2 254	2 537	5 110	2 974
Somalia	Presumed and confirmed	24 553	41 167	23 202	9 135	26 174	39 169	58 021	37 156
	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	226 894
	Confirmed with RDT	18 924	1 724	6 817	7 407	11 001	20 953	35 628	35 138
	Imported cases	-	-	-	-	-	-	-	-
Sudan	Presumed and confirmed	1 465 496	1 214 004	964 698	989 946	1 207 771	1 102 186	897 194	1 368 585
	Microscopy examined	-	-	-	-	-	3 586 482	3 236 118	2 426 329
	Confirmed with microscopy	625 365	506 806	526 931	592 383	579 038	586 827	387 308	582 747
	RDT examined	1 653 300	2 222 380	2 000 700	1 800 000	788 281	-	632 443	422 841
	Confirmed with RDT	95 192	-	-	-	489 468	-	187 707	132 779
	Imported cases	-	-	-	-	-	-	-	-
Yemen	Presumed and confirmed	198 963	142 147	165 678	149 451	122 812	104 831	144 628	114 004
	Microscopy examined	645 463	645 093	685 406	723 691	643 994	561 644	960 860	1 070 020
	Confirmed with microscopy	78 269	60 207	68 849	63 484	51 768	42 052	45 886	28 936
	RDT examined	97 289	108 110	150 218	157 457	141 519	121 464	174 699	560 449
	Confirmed with RDT	28 428	30 203	41 059	39 294	34 939	34 207	52 815	85 068
	Imported cases	-	-	-	-	-	-	-	-
EUROPEAN									
Armenia[3]	Presumed and confirmed	1	0	4	0	1	1	1	2
	Microscopy examined	31 026	-	-	-	-	1 213	465	350
	Confirmed with microscopy	1	0	4	0	1	2	2	2
	RDT examined	0	0	0	0	0	0	0	0
	Confirmed with RDT	0	0	0	0	0	0	0	0
	Imported cases	1	0	4	0	1	1	1	2
Azerbaijan[2]	Presumed and confirmed	52	8	4	4	2	1	1	1
	Microscopy examined	456 652	449 168	497 040	432 810	399 925	405 416	465 860	373 562
	Confirmed with microscopy	52	8	4	4	2	1	1	1
	RDT examined	0	0	0	0	0	0	0	0
	Confirmed with RDT	0	0	0	0	0	0	0	0
	Imported cases	2	4	1	4	2	1	1	1
Georgia[2]	Presumed and confirmed	0	6	5	7	6	5	7	8
	Microscopy examined	2 368	2 032	1 046	192	440	294	318	416
	Confirmed with microscopy	0	6	5	7	5	5	7	8
	RDT examined	-	-	-	-	-	0	0	0
	Confirmed with RDT	-	-	-	-	-	0	0	0
	Imported cases	0	5	4	7	5	5	7	8
Kyrgyzstan[3]	Presumed and confirmed	6	5	3	4	0	1	6	2
	Microscopy examined	30 190	27 850	18 268	54 249	35 600	75 688	62 537	8 459
	Confirmed with microscopy	6	5	3	4	0	1	6	2
	RDT examined	-	-	-	-	-	-	-	-
	Confirmed with RDT	-	-	-	-	-	-	-	-
	Imported cases	3	5	3	4	0	1	6	2
Tajikistan[2]	Presumed and confirmed	112	78	33	14	7	5	1	3
	Microscopy examined	173 523	173 367	209 239	213 916	200 241	188 341	198 766	191 284
	Confirmed with microscopy	112	78	33	14	7	5	1	3
	RDT examined	-	-	-	-	-	-	-	-
	Confirmed with RDT	-	-	-	-	-	-	-	-
	Imported cases	1	25	15	11	5	5	1	3

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
EUROPEAN									
Turkey[2]	Presumed and confirmed	90	132	376	285	249	221	209	2 014
	Microscopy examined	507 841	421 295	337 830	255 125	189 854	211 740	144 499	115 557
	Confirmed with microscopy	90	132	376	285	249	221	209	2 014
	RDT examined	–	–	–	–	–	–	–	–
	Confirmed with RDT	–	–	–	–	–	–	–	–
	Imported cases	81	128	376	251	249	221	208	214
Turkmenistan[3]	Presumed and confirmed	0	0	0	0	0	0	0	0
	Microscopy examined	81 784	–	–	–	–	83 675	85 536	84 264
	Confirmed with microscopy	0	0	0	0	0	0	0	0
	RDT examined	–	–	–	–	–	0	0	0
	Confirmed with RDT	–	–	–	–	–	0	0	0
	Imported cases	0	0	0	0	0	0	0	0
Uzbekistan[2]	Presumed and confirmed	5	1	1	3	1	0	0	0
	Microscopy examined	921 364	886 243	805 761	908 301	812 347	800 912	797 472	655 112
	Confirmed with microscopy	5	1	1	3	1	0	0	0
	RDT examined	–	–	–	–	–	0	0	0
	Confirmed with RDT	–	–	–	–	–	0	0	0
	Imported cases	2	1	1	3	1	0	0	0
SOUTH-EAST ASIA									
Bangladesh	Presumed and confirmed	91 227	51 773	29 518	3 864	10 216	6 608	4 787	4 912
	Microscopy examined	308 326	270 253	253 887	74 755	78 719	69 093	65 845	70 267
	Confirmed with microscopy	20 519	20 232	4 016	1 866	3 249	1 612	1 022	1 077
	RDT examined	152 936	119 849	35 675	19 171	46 482	53 713	73 128	80 251
	Confirmed with RDT	35 354	31 541	5 885	1 998	6 967	4 996	3 765	3 835
	Imported cases	–	–	–	–	–	129	109	19
Bhutan	Presumed and confirmed	487	207	82	45	41	104	74	62
	Microscopy examined	54 709	44 481	42 512	31 632	33 586	26 149	23 442	22 885
	Confirmed with microscopy	436	194	82	45	48	84	59	51
	RDT examined	–	–	–	–	–	47 938	95 399	19 250
	Confirmed with RDT	–	–	–	–	–	20	15	0
	Imported cases	–	–	0	23	0	70	56	38
Democratic People's Republic of Korea	Presumed and confirmed	13 520	16 760	23 537	15 673	11 212	7 409	5 113	4 626
	Microscopy examined	25 147	26 513	39 238	71 453	38 201	29 272	22 747	16 835
	Confirmed with microscopy	13 520	16 760	21 850	14 407	10 535	7 010	4 890	4 463
	RDT examined	–	–	0	0	0	61 348	182 980	172 499
	Confirmed with RDT	–	–	0	0	0	12	143	140
	Imported cases	–	–	0	0	0	205	0	51
India	Presumed and confirmed	1 599 986	1 310 656	1 067 824	881 730	1 102 205	1 169 261	1 087 285	844 558
	Microscopy examined	108 679 429	108 969 660	109 033 790	113 109 094	124 066 331	121 141 970	124 933 348	110 769 742
	Confirmed with microscopy	1 599 986	1 310 656	1 067 824	881 730	1 102 205	1 169 261	1 087 285	306 768
	RDT examined	10 600 000	10 500 384	13 125 480	14 782 104	14 562 000	19 699 260	19 606 260	15 208 057
	Confirmed with RDT	–	–	–	–	–	–	–	537 790
	Imported cases	–	–	–	–	–	–	–	–
Indonesia	Presumed and confirmed	2 205 293	2 092 187	2 051 425	343 527	1 575 907	217 025	218 450	261 617
	Microscopy examined	1 335 445	962 090	1 429 139	1 447 980	1 300 835	1 224 504	1 092 093	1 045 994
	Confirmed with microscopy	465 764	422 447	417 819	343 527	252 027	217 025	218 450	261 617
	RDT examined	255 734	250 709	471 586	260 181	249 461	342 946	365 765	395 685
	Confirmed with RDT	–	–	–	–	–	–	–	–
	Imported cases	–	–	–	–	–	–	–	–
Myanmar	Presumed and confirmed	693 124	567 452	480 586	333 871	205 658	182 768	110 146	29 249
	Microscopy examined	275 374	312 689	265 135	138 473	151 258	99 025	122 078	45 574
	Confirmed with microscopy	103 285	91 752	75 192	26 509	12 010	6 782	6 717	2 320
	RDT examined	729 878	795 618	1 158 420	1 162 083	1 415 837	2 564 707	3 063 167	619 177
	Confirmed with RDT	317 523	373 542	405 394	307 362	193 648	175 986	103 429	17 299
	Imported cases	–	–	–	–	–	345	–	–

Annex 3 - H. Reported malaria cases by method of confirmation, 2010–2017

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
SOUTH-EAST ASIA									
Nepal	Presumed and confirmed	96 383	71 752	70 272	38 113	26 526	20 621	10 687	4 268
	Microscopy examined	102 977	95 011	152 780	100 336	127 130	63 946	84 595	163 323
	Confirmed with microscopy	3 115	1 910	1 659	1 197	1 469	1 112	1 009	1 293
	RDT examined	17 887	25 353	22 472	32 989	48 444	49 649	52 432	48 625
	Confirmed with RDT	779	1 504	433	777	-	725	-	329
	Imported cases	-	1 069	592	-	667	521	502	670
Sri Lanka[3]	Presumed and confirmed	736	175	93	95	49	36	41	57
	Microscopy examined	1 001 107	985 060	948 250	1 236 580	1 069 817	1 142 466	1 072 396	1 089 290
	Confirmed with microscopy	736	175	93	95	49	21	-	38
	RDT examined	-	-	-	-	-	13 671	18 347	15 487
	Confirmed with RDT	-	-	-	-	-	1	1	0
	Imported cases	52	51	70	95	49	36	41	57
Thailand	Presumed and confirmed	32 480	24 897	32 569	33 302	37 921	14 135	11 522	9 952
	Microscopy examined	1 695 980	1 354 215	1 130 757	1 830 090	1 756 528	1 358 953	1 302 834	1 117 648
	Confirmed with microscopy	22 969	14 478	32 569	33 302	37 921	14 135	11 301	7 154
	RDT examined	81 997	96 670	-	-	-	10 888	158 173	31 898
	Confirmed with RDT	9 511	10 419	-	-	-	0	221	188
	Imported cases	-	-	-	-	-	9 890	5 724	4 020
Timor-Leste	Presumed and confirmed	119 072	36 064	6 148	1 042	342	80	95	30
	Microscopy examined	109 806	82 175	64 318	56 192	30 515	30 275	35 947	37 705
	Confirmed with microscopy	40 250	19 739	5 211	1 025	342	80	94	30
	RDT examined	85 643	127 272	117 599	121 991	86 592	90 835	114 385	91 470
	Confirmed with RDT	7 887	-	-	-	0	0	0	-
	Imported cases	-	-	-	-	-	-	0	13
WESTERN PACIFIC									
Cambodia	Presumed and confirmed	49 356	57 423	45 553	24 130	26 278	33 930	23 492	36 932
	Microscopy examined	90 175	86 526	80 212	54 716	48 591	49 357	42 802	38 188
	Confirmed with microscopy	14 277	13 792	10 124	4 598	5 288	7 423	3 695	5 908
	RDT examined	103 035	130 186	108 974	94 600	92 525	114 323	123 893	130 057
	Confirmed with RDT	35 079	43 631	30 352	16 711	19 864	26 507	19 797	31 024
	Imported cases	-	-	-	-	-	-	-	-
China[2]	Presumed and confirmed	7 855	4 498	2 716	4 127	2 921	3 116	3 143	2 675
	Microscopy examined	7 115 784	9 189 270	6 918 657	5 554 960	4 403 633	4 052 588	3 194 915	2 409 280
	Confirmed with microscopy	4 990	3 367	2 603	4 086	2 921	3 088	3 129	2 666
	RDT examined	-	-	-	-	-	-	-	-
	Confirmed with RDT	-	-	-	-	-	-	-	-
	Imported cases	-	-	2 399	4 007	2 864	3 055	3 125	2 672
Lao People's Democratic Republic	Presumed and confirmed	23 047	17 904	46 819	41 385	48 071	36 056	11 753	9 336
	Microscopy examined	150 512	213 578	223 934	202 422	133 916	110 084	89 998	110 450
	Confirmed with microscopy	4 524	6 226	13 232	10 036	8 018	4 167	1 597	1 549
	RDT examined	127 790	77 825	145 425	133 337	160 626	173 919	133 464	163 856
	Confirmed with RDT	16 276	11 306	32 970	28 095	40 053	31 889	9 626	7 779
	Imported cases	-	-	-	-	-	0	-	-
Malaysia	Presumed and confirmed	6 650	5 306	4 725	3 850	3 923	2 311	2 302	4 114
	Microscopy examined	1 619 074	1 600 439	1 566 872	1 576 012	1 443 958	1 066 470	1 153 108	1 046 163
	Confirmed with microscopy	6 650	5 306	4 725	3 850	3 923	2 311	2 302	4 114
	RDT examined	-	-	-	-	-	-	0	0
	Confirmed with RDT	-	-	-	-	-	-	0	0
	Imported cases	831	1 142	924	865	766	435	428	423
Papua New Guinea	Presumed and confirmed	1 379 787	1 151 343	878 371	1 125 808	644 688	553 103	728 798	881 697
	Microscopy examined	198 742	184 466	156 495	139 972	83 257	112 864	146 242	139 910
	Confirmed with microscopy	75 985	70 603	67 202	70 658	68 114	64 719	80 472	70 449
	RDT examined	20 820	27 391	228 857	468 380	475 654	541 760	772 254	857 326
	Confirmed with RDT	17 971	13 457	82 993	209 336	213 068	233 068	398 025	407 891
	Imported cases	-	-	-	-	-	-	-	-

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
WESTERN PACIFIC									
Philippines	Presumed and confirmed	19 106	9 617	8 154	7 720	4 972	8 301	6 690	3 827
	Microscopy examined	301 031	327 060	332 063	317 360	287 725	224 843	255 302	171 424
	Confirmed with microscopy	18 560	9 552	7 133	5 826	3 618	5 694	2 860	874
	RDT examined	–	–	–	1 523	28 598	35 799	66 536	113 140
	Confirmed with RDT	–	–	–	688	1 285	2 572	3 820	2 953
	Imported cases	–	–	–	–	–	18	55	69
Republic of Korea	Presumed and confirmed	1 772	838	555	443	638	699	673	515
	Microscopy examined	–	–	–	–	–	–	219	143
	Confirmed with microscopy	1 772	838	555	443	638	699	219	143
	RDT examined	–	–	–	–	–	–	–	–
	Confirmed with RDT	–	–	–	–	–	–	–	–
	Imported cases	56	64	47	50	78	65	67	79
Solomon Islands	Presumed and confirmed	95 006	80 859	57 296	53 270	51 649	50 916	84 513	68 676
	Microscopy examined	212 329	182 847	202 620	191 137	173 900	124 376	152 690	89 061
	Confirmed with microscopy	35 373	23 202	21 904	21 540	13 865	14 793	26 187	15 978
	RDT examined	17 300	17 457	13 987	26 216	26 658	40 750	92 109	133 560
	Confirmed with RDT	4 331	3 455	2 479	4 069	4 539	9 205	28 244	36 505
	Imported cases	–	–	–	–	–	–	–	–
Vanuatu	Presumed and confirmed	16 831	5 764	3 435	2 381	982	697	2 147	1 072
	Microscopy examined	29 180	19 183	16 981	15 219	18 135	4 870	6 704	9 187
	Confirmed with microscopy	4 013	2 077	733	767	190	15	225	120
	RDT examined	10 246	12 529	16 292	13 724	17 435	9 794	14 501	21 126
	Confirmed with RDT	4 156	2 743	2 702	1 614	792	408	1 643	952
	Imported cases	–	–	–	–	–	0	0	1
Viet Nam	Presumed and confirmed	54 297	45 588	43 717	35 406	27 868	19 252	10 446	8 411
	Microscopy examined	2 760 119	2 791 917	2 897 730	2 684 996	2 357 536	2 204 409	2 082 986	2 009 233
	Confirmed with microscopy	17 515	16 612	19 638	17 128	15 752	9 331	4 161	4 548
	RDT examined	7 017	491 373	514 725	412 530	416 483	459 332	408 055	603 161
	Confirmed with RDT	–	–	–	–	–	–	–	1 594
	Imported cases	–	–	–	–	–	–	–	–

	2010	2011	2012	2013	2014	2015	2016	2017
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	146 085 911	150 233 064
Americas	678 373	493 900	469 448	439 651	393 349	451 399	550 974	773 503
Eastern Mediterranean	6 368 813	5 952 125	5 835 454	4 946 571	5 326 080	5 385 450	3 628 226	4 094 969
European	266	230	426	317	266	233	218	16
South-East Asia	4 852 308	4 171 923	3 762 054	1 651 262	2 970 077	1 618 047	1 448 181	1 159 344
Western Pacific	1 653 707	1 379 140	1 091 341	1 298 520	811 990	708 381	873 957	1 017 255
Total	**116 698 707**	**112 202 340**	**122 072 121**	**132 793 087**	**139 838 369**	**141 685 004**	**152 587 467**	**157 278 151**

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 included in this listing for historical purposes.

Annex 3 - I. Reported malaria cases by species, 2010–2017

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
AFRICAN									
Algeria	Suspected	12 224	11 974	15 790	12 762	8 690	8 000	6 628	6 469
	No *Pf*	7	4	48	14	5	0	0	0
	No *Pv*	4	0	11	2	0	0	0	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	1	0	0	23	13	0	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	11 050 353
	No *Pf*	-	-	-	-	-	-	-	-
	No *Pv*	-	-	-	-	-	-	-	-
	No Mixed	-	-	-	-	-	-	-	-
	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	2 306 653
	No *Pf*	-	68 745	0	-	1 044 235	1 268 347	1 324 576	1 696 777
	No *Pv*	-	0	0	-	0	0	0	0
	No Mixed	-	0	0	-	-	-	-	-
	No Other	-	0	0	-	-	-	-	-
Botswana	Suspected	12 196	1 141	308	506	1 485	1 298	12 986	12 605
	No *Pf*	1 046	432	193	456	1 346	326	703	1 891
	No *Pv*	0	0	0	0	0	0	0	2
	No Mixed	-	-	-	-	-	-	12	9
	No Other	-	-	-	-	-	-	-	0
Burkina Faso	Suspected	6 037 806	5 446 870	7 852 299	7 857 296	9 272 755	9 783 385	11 992 686	14 384 948
	No *Pf*	-	-	-	-	-	-	-	-
	No *Pv*	-	-	-	-	-	-	-	-
	No Mixed	-	-	-	-	-	-	-	-
	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	12 336 328
	No *Pf*	-	-	-	-	-	-	-	-
	No *Pv*	-	-	-	-	-	-	-	-
	No Mixed	-	-	-	-	-	-	-	-
	No Other	-	-	-	-	-	-	-	-
Cabo Verde	Suspected	47	26 508	8 715	10 621	6 894	3 117	8 393	20 430
	No *Pf*	47	7	1	22	72	7	48	0
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	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	3 345 967
	No *Pf*	-	-	-	-	-	592 351	810 367	1 191 257
	No *Pv*	-	-	-	-	-	0	0	0
	No Mixed	-	-	-	-	-	-	0	0
	No Other	-	-	-	-	-	-	0	0
Central African Republic	Suspected	66 484	221 980	468 986	491 074	625 301	1 218 246	1 807 206	1 480 085
	No *Pf*	-	-	-	-	295 088	598 833	1 032 764	383 309
	No *Pv*	-	-	-	-	0	0	0	0
	No Mixed	-	-	-	-	0	-	-	-
	No Other	-	-	-	-	0	-	-	-
Chad	Suspected	743 471	528 454	730 364	1 272 841	1 737 195	1 641 285	2 032 301	2 943 595
	No *Pf*	-	-	-	-	-	-	-	-
	No *Pv*	-	-	-	-	-	-	-	-
	No Mixed	-	-	-	-	-	-	-	-
	No Other	-	-	-	-	-	-	-	-
Comoros	Suspected	159 976	135 248	168 043	185 779	103 545	101 330	94 388	190 825
	No *Pf*	33 791	21 387	43 681	45 669	2 203	1 300	1 066	2 274
	No *Pv*	528	334	637	72	0	0	0	0
	No Mixed	0	0	0	363	0	0	0	0
	No Other	880	557	1 189	363	0	0	0	0

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
AFRICAN									
Congo	Suspected	446 656	277 263	117 640	209 169	290 346	300 592	466 254	322 916
	No *Pf*	-	37 744	120 319	43 232	66 323	51 529	171 847	127 939
	No *Pv*	-	0	0	0	0	0	0	0
	No Mixed	-	0	0	0	0	0	0	0
	No Other	-	0	0	0	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	6 346 291
	No *Pf*	-	-	-	2 506 953	3 712 831	3 375 904	3 471 024	3 274 683
	No *Pv*	-	-	-	0	0	0	0	0
	No Mixed	-	-	-	0	0	0	0	0
	No Other	-	-	-	0	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	21 072 322
	No *Pf*	0	0	0	0	-	-	-	-
	No *Pv*	0	0	0	0	-	-	-	-
	No Mixed	0	0	0	0	-	-	-	-
	No Other	0	0	0	0	-	-	-	-
Equatorial Guinea	Suspected	83 639	40 704	45 792	44 561	57 129	68 058	318 779	91 217
	No *Pf*	53 813	22 466	15 169	13 129	17 452	-	-	-
	No *Pv*	0	0	0	0	0	-	-	-
	No Mixed	-	-	-	-	-	-	-	-
	No Other	-	-	-	-	-	-	-	-
Eritrea	Suspected	96 792	97 479	138 982	134 183	121 755	111 950	106 403	121 064
	No *Pf*	9 785	10 263	12 121	12 482	23 787	14 510	20 704	21 849
	No *Pv*	3 989	4 932	9 204	7 361	6 780	4 780	2 999	9 185
	No Mixed	63	94	346	1 391	166	70	543	429
	No Other	57	19	346	83	35	12	5	23
Eswatini	Suspected	1 722	797	626	669	711	651	1 386	3 212
	No *Pf*	87	189	192	253	389	157	209	724
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	0	1	0	0	0	0
Ethiopia	Suspected	5 420 110	5 487 972	5 962 646	9 243 894	7 457 765	5 987 580	6 611 801	6 471 958
	No *Pf*	732 776	814 547	946 595	1 687 163	1 250 110	1 188 627	1 142 235	1 059 847
	No *Pv*	390 252	665 813	745 983	958 291	868 705	678 432	576 269	470 892
	No Mixed	73 801	-	-	-	-	-	-	-
	No Other	0	-	-	-	-	-	-	-
Gabon	Suspected	233 770	178 822	238 483	256 531	256 183	285 489	202 989	212 092
	No *Pf*	2 157	-	-	26 432	26 117	-	23 915	35 244
	No *Pv*	720	-	-	0	0	-	0	0
	No Mixed	55	-	-	0	0	-	0	0
	No Other	2 015	-	-	0	1 570	-	0	0
Gambia	Suspected	492 062	261 967	862 442	889 494	603 424	891 511	844 821	591 226
	No *Pf*	64 108	190 379	271 038	240 792	99 976	240 382	153 685	69 931
	No *Pv*	0	0	0	0	0	0	0	-
	No Mixed	-	-	-	-	-	-	-	-
	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	14 026 149
	No *Pf*	926 447	593 518	3 755 166	1 629 198	3 415 912	4 319 919	4 421 788	4 266 541
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	0	0	0	0	0	0	83 654	82 153
	No Other	102 937	31 238	0	0	0	0	29 725	0
Guinea	Suspected	1 092 554	1 276 057	1 220 574	775 341	1 595 828	1 254 937	1 503 035	2 134 543
	No *Pf*	20 936	5 450	191 421	63 353	660 207	810 979	992 146	1 335 323
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	-	-	-	0	-	-	-	-
	No Other	-	-	-	0	-	-	-	-

Annex 3 - I. Reported malaria cases by species, 2010–2017

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
AFRICAN									
Guinea-Bissau	Suspected	195 006	300 233	237 398	238 580	309 939	385 678	381 196	461 621
	No *Pf*	-	-	-	-	-	-	-	89 784
	No *Pv*	-	-	-	-	-	-	-	0
	No Mixed	-	-	-	-	-	-	-	-
	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	14 013 376
	No *Pf*	898 531	1 002 805	1 453 471	2 335 286	2 808 931	1 499 027	2 783 846	3 215 116
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	-	-	-	-	-	-	-	-
	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	2 033 806
	No *Pf*	212 927	577 641	1 407 455	1 244 220	864 204	2 086 600	1 191 137	1 760 966
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	0	-	-	0	0	0	0	0
	No Other	0	-	-	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	2 008 783
	No *Pf*	-	-	-	-	-	-	-	-
	No *Pv*	-	-	-	-	-	-	-	-
	No Mixed	-	-	-	-	-	-	-	-
	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	10 530 601
	No *Pf*	-	-	-	-	2 905 310	3 585 315	4 730 835	4 901 344
	No *Pv*	-	-	0	0	0	0	0	0
	No Mixed	-	-	-	-	-	-	-	-
	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	3 333 079
	No *Pf*	-	-	-	-	-	-	-	-
	No *Pv*	-	-	-	-	-	-	-	-
	No Mixed	-	-	-	-	-	-	-	-
	No Other	-	-	-	-	-	-	-	-
Mauritania	Suspected	250 073	162 820	172 374	135 985	203 991	219 184	192 980	214 087
	No *Pf*	-	-	-	-	-	-	-	-
	No *Pv*	-	-	-	-	-	-	-	-
	No Mixed	-	-	-	-	-	-	-	-
	No Other	-	-	-	-	-	-	-	-
Mayotte	Suspected	2 023	1 214	1 463	82	15	-	12	-
	No *Pf*	138	38	21	9	1	-	12	-
	No *Pv*	3	2	2	0	0	-	-	-
	No Mixed	31	0	4	-	0	-	-	-
	No Other	19	0	2	-	0	-	-	-
Mozambique	Suspected	6 097 263	7 059 112	6 170 561	8 200 849	12 240 045	14 241 392	15 453 655	15 905 956
	No *Pf*	878 009	663 132	927 841	2 998 874	7 117 648	7 718 782	8 520 376	8 921 081
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	-	-	-	-	-	-	-	-
	No Other	-	-	-	-	-	-	-	-
Namibia	Suspected	39 855	74 407	10 844	34 002	186 972	209 083	310 192	618 291
	No *Pf*	556	335	194	136	15 914	12 050	329	364
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	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	3 819 436
	No *Pf*	601 455	757 449	817 072	1 426 696	3 828 486	2 267 867	3 961 178	2 638 580
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	17 123	21 370	22 399	46 068	78 102	0	0	0
	No Other	17 123	21 370	25 270	5 102	39 066	4 133	186 989	0

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
AFRICAN									
Nigeria	Suspected	3 873 463	5 221 656	11 789 970	21 659 831	19 555 575	17 388 046	20 173 207	22 982 775
	No *Pf*	523 513	–	–	–	–	–	–	–
	No *Pv*	0	–	–	–	–	–	–	–
	No Mixed	–	–	–	–	–	–	–	–
	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	7 558 378
	No *Pf*	638 669	208 858	483 470	962 618	1 623 176	–	–	2 927 780
	No *Pv*	0	0	–	–	0	–	–	0
	No Mixed	–	–	–	–	0	–	–	–
	No Other	–	–	–	–	0	–	–	–
Sao Tome and Principe	Suspected	58 961	117 279	126 897	108 634	91 445	84 348	121 334	96 612
	No *Pf*	2 219	6 363	10 700	9 242	1 754	2 055	2 234	2 239
	No *Pv*	14	4	1	1	0	0	0	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	6	0	0	0	1	0	0
Senegal	Suspected	1 043 632	900 903	897 943	1 119 100	1 079 536	1 421 221	1 559 054	2 035 693
	No *Pf*	343 670	277 326	281 080	345 889	265 624	491 901	347 635	395 706
	No *Pv*	0	0	–	0	0	0	0	0
	No Mixed	–	–	1	0	0	0	0	0
	No Other	–	–	1	0	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	2 935 447
	No *Pf*	218 473	25 511	1 537 322	1 701 958	1 374 476	1 483 376	1 775 306	1 651 236
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	–	–	–	–	0	0	0	0
	No Other	–	–	–	–	0	0	0	0
South Africa	Suspected	276 669	382 434	152 561	603 932	543 196	35 982	63 277	56 257
	No *Pf*	2 181	6 906	3 109	8 645	11 563	554	3 104	22 061
	No *Pv*	0	14	5	0	0	0	0	0
	No Mixed	12	0	0	0	0	1	0	0
	No Other	5	15	7	0	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	4 938 773
	No *Pf*	–	112 024	–	–	0	0	7 619	1 488 005
	No *Pv*	–	0	–	–	0	0	0	0
	No Mixed	–	–	–	–	–	0	0	0
	No Other	–	–	–	–	–	0	0	–
Togo	Suspected	1 419 928	893 588	1 311 047	1 442 571	1 756 700	1 756 701	1 845 454	2 042 498
	No *Pf*	224 080	237 282	260 526	272 847	1 130 234	1 113 910	1 174 116	1 208 957
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	0	0	0	8	0	0	0	0
	No Other	7	23	9	8	17	17	9 149	77
Uganda	Suspected	15 332 293	12 522 232	16 845 771	26 145 615	19 201 136	22 095 860	28 697 683	25 117 278
	No *Pf*	1 565 348	231 873	2 662 258	1 502 362	3 631 939	7 137 662	9 385 132	11 667 831
	No *Pv*	15 812	0	0	–	0	0	0	0
	No Mixed	47 435	0	0	–	0	0	0	0
	No Other	0	0	0	–	0	0	0	0
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	18 389 229
	No *Pf*	2 338	4 489	2 730	1 710	1 119	412 433	5 015	1 733
	No *Pv*	0	0	0	0	0	0	0	–
	No Mixed	0	0	201	69 511	0	–	–	1 606
	No Other	0	0	201	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	18 121 926
	No *Pf*	–	–	0	0	0	411 741	–	–
	No *Pv*	–	–	0	0	0	0	–	–
	No Mixed	–	–	212 636	69 459	106 609	–	–	–
	No Other	–	–	–	–	106 609	–	–	–

Annex 3 - I. Reported malaria cases by species, 2010–2017

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
AFRICAN									
Zanzibar	Suspected	272 077	455 718	536 750	527 957	310 703	345 929	259 861	267 303
	No *Pf*	2 338	4 489	2 730	1 673	2 235	1 874	5 015	1 733
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	0	0	201	52	155	175	89	1 606
	No Other	0	0	0	0	0	0	0	10
Zambia	Suspected	4 229 839	4 607 908	4 695 400	5 465 122	7 859 740	8 116 962	9 627 862	10 952 323
	No *Pf*	-	-	-	-	4 077 547	4 184 661	4 851 319	5 505 639
	No *Pv*	-	-	-	-	0	0	0	0
	No Mixed	-	-	-	-	-	-	-	-
	No Other	-	-	-	-	-	-	-	-
Zimbabwe	Suspected	912 618	480 011	727 174	1 115 005	1 420 946	1 384 893	1 224 374	1 110 705
	No *Pf*	249 379	319 935	276 963	422 633	535 931	391 651	279 988	315 624
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	-	0	-	-	-	0	0	0
	No Other	-	0	-	-	-	0	-	0
AMERICAS									
Argentina[2]	Suspected	2 547	7 872	7 027	4 913	5 691	3 862	3 479	2 114
	No *Pf*	0	0	0	0	0	0	0	0
	No *Pv*	26	0	0	0	0	0	0	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0	0
Belize	Suspected	27 366	22 996	20 789	25 351	24 122	26 367	20 936	26 995
	No *Pf*	0	0	0	0	0	0	0	0
	No *Pv*	149	72	33	20	19	9	4	5
	No Mixed	1	0	0	0	0	0	0	2
	No Other	0	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	151 697
	No *Pf*	1 557	526	385	959	325	77	4	0
	No *Pv*	13 694	7 635	8 141	6 346	7 060	6 785	5 535	4 572
	No Mixed	35	17	11	37	16	12	3	0
	No Other	0	0	0	0	0	0	0	0
Brazil	Suspected	2 711 433	2 477 821	2 349 341	1 893 797	1 756 460	1 590 403	1 364 917	1 695 805
	No *Pf*	47 406	32 100	31 913	25 928	21 295	14 762	13 160	18 610
	No *Pv*	283 435	231 368	203 018	137 887	117 009	122 746	110 341	169 834
	No Mixed	3 642	3 606	7 722	5 015	939	683	669	1 032
	No Other	183	143	105	32	28	38	8	27
Colombia	Suspected	521 342	418 159	416 767	327 081	403 532	332 706	296 091	265 077
	No *Pf*	32 900	14 650	17 612	17 650	20 067	27 875	47 232	29 558
	No *Pv*	83 255	44 701	44 283	33 345	20 129	19 002	32 635	22 132
	No Mixed	1 434	754	672	690	567	739	2 742	1 115
	No Other	48	16	9	11	5	0	0	0
Costa Rica	Suspected	15 599	10 690	7 485	16 774	4 420	7 373	5 160	9 680
	No *Pf*	0	0	0	0	0	0	0	0
	No *Pv*	110	11	4	0	0	0	4	12
	No Mixed	0	0	1	0	0	0	0	0
	No Other	0	0	2	0	0	0	0	0
Dominican Republic	Suspected	495 637	477 555	506 583	502 683	416 729	324 787	302 600	265 535
	No *Pf*	2 480	1 614	950	474	459	631	690	341
	No *Pv*	2	2	2	0	0	0	0	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0	0
Ecuador	Suspected	488 830	460 785	459 157	397 628	370 825	261 824	311 920	306 894
	No *Pf*	258	290	78	160	40	184	403	309
	No *Pv*	1 630	929	466	208	202	434	788	963
	No Mixed	0	0	0	0	0	0	0	3
	No Other	0	0	0	0	0	0	0	0

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
AMERICAS									
El Salvador[2]	Suspected	115 256	100 884	124 885	103 748	106 915	89 267	81 904	70 022
	No *Pf*	0	1	0	0	0	0	0	0
	No *Pv*	17	8	15	6	6	2	12	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0	0
French Guiana	Suspected	14 373	14 429	13 638	22 327	14 651	11 558	9 457	597
	No *Pf*	987	584	382	304	136	32	29	33
	No *Pv*	476	339	257	220	129	203	99	409
	No Mixed	561	496	381	348	182	3	3	5
	No Other	5	5	2	345	1	0	0	0
Guatemala	Suspected	237 075	195 080	186 645	153 731	300 989	301 746	408 394	372 158
	No *Pf*	30	64	54	101	24	43	4	3
	No *Pv*	7 163	6 707	5 278	6 062	5 593	5 487	4 849	3 739
	No Mixed	5	3	14	51	67	8	0	1
	No Other	0	0	0	0	0	0	0	0
Guyana	Suspected	212 863	201 728	196 622	205 903	142 843	132 941	116 300	100 096
	No *Pf*	11 244	15 945	16 722	13 655	3 943	3 219	4 046	5 141
	No *Pv*	8 402	9 066	11 244	13 953	7 173	6 002	6 923	7 645
	No Mixed	3 157	4 364	3 607	3 770	1 197	731	930	1 078
	No Other	132	96	83	101	41	32	57	72
Haiti	Suspected	270 427	184 934	167 772	176 995	261 403	302 740	302 044	295 572
	No *Pf*	84 153	32 969	25 423	20 957	17 696	17 583	21 998	18 843
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0	0
Honduras	Suspected	156 961	156 559	159 165	144 673	152 847	153 906	182 767	165 536
	No *Pf*	866	585	560	1 113	562	904	1 309	128
	No *Pv*	8 759	7 044	5 865	4 269	2 881	2 642	2 745	1 149
	No Mixed	120	34	24	46	37	29	40	0
	No Other	0	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	644 174
	No *Pf*	0	0	0	0	0	0	0	0
	No *Pv*	1 226	1 124	833	495	656	517	551	736
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0	0
Nicaragua	Suspected	554 414	536 105	552 722	539 022	605 357	604 418	554 415	663 132
	No *Pf*	154	150	236	208	155	338	1 285	1 836
	No *Pv*	538	775	999	954	985	1 937	4 965	9 080
	No Mixed	0	0	0	0	2	4	22	33
	No Other	0	0	0	0	0	0	0	0
Panama	Suspected	141 038	116 588	107 711	93 624	80 701	64 511	50 772	38 270
	No *Pf*	20	1	1	0	0	0	21	1
	No *Pv*	398	353	843	696	864	546	748	648
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0	0
Paraguay[3]	Suspected	62 178	48 611	31 499	24 806	24 832	6 687	3 193	9 281
	No *Pf*	0	0	0	0	0	0	0	0
	No *Pv*	18	1	0	0	0	0	0	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	0	1	0	0	0	0
Peru	Suspected	744 650	702 952	759 285	864 648	866 047	867 980	566 230	402 623
	No *Pf*	2 291	2 929	3 399	7 890	10 416	12 569	15 319	13 173
	No *Pv*	29 169	21 984	28 030	40 829	54 819	49 287	41 287	42 044
	No Mixed	83	89	102	213	0	0	0	148
	No Other	3	3	7	11	17	9	17	2

Annex 3 - I. Reported malaria cases by species, 2010–2017

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
AMERICAS									
Suriname	Suspected	17 133	16 184	21 685	19 736	33 425	15 236	23 444	22 034
	No *Pf*	638	310	115	322	165	17	6	1
	No *Pv*	817	382	167	322	78	61	69	17
	No Mixed	83	21	11	85	158	3	1	1
	No Other	36	17	2	0	0	0	0	0
Venezuela (Bolivarian Republic of)	Suspected	400 495	382 303	410 663	476 764	522 617	625 174	932 556	1 144 635
	No *Pf*	10 629	9 724	10 978	22 777	21 074	24 018	46 503	69 076
	No *Pv*	32 710	34 651	39 478	50 938	62 850	100 880	179 554	316 401
	No Mixed	0	0	0	4 882	6 769	11 491	14 531	26 080
	No Other	60	6	23	46	15	13	25	29
EASTERN MEDITERRANEAN									
Afghanistan	Suspected	847 589	936 252	847 933	787 624	743 183	801 938	946 995	932 096
	No *Pf*	6 142	5 581	1 231	1 877	3 000	4 004	6 369	6 907
	No *Pv*	63 255	71 968	53 609	43 369	58 362	82 891	132 407	154 468
	No Mixed	0	0	0	0	1 566	-	311	403
	No Other	0	0	0	0	0	-	-	-
Djibouti	Suspected	1 010	354	1 410	7 189	39 284	10 586	19 492	74 608
	No *Pf*	1 010	-	20	0	-	-	11 781	9 290
	No *Pv*	0	-	0	0	-	-	2 041	5 381
	No Mixed	0	-	0	0	-	-	0	0
	No Other	0	-	0	0	-	-	0	0
Iran (Islamic Republic of)	Suspected	614 817	530 470	479 655	385 172	468 513	630 886	418 125	383 397
	No *Pf*	166	152	44	72	21	8	7	2
	No *Pv*	1 656	1 502	711	426	351	157	87	55
	No Mixed	25	56	32	22	4	1	1	-
	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	8 298 973
	No *Pf*	73 857	73 925	95 095	46 067	33 391	30 075	41 376	61 627
	No *Pv*	143 136	205 879	228 215	283 661	232 332	163 872	250 279	275 490
	No Mixed	0	0	2 901	10 506	9 426	8 066	26 794	13 350
	No Other	0	0	0	0	0	0	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	1 073 998
	No *Pf*	29	69	82	34	51	83	270	172
	No *Pv*	0	0	0	0	0	0	2	5
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	0	6	0	0	0	0
Somalia	Suspected	220 698	99 403	53 658	69 192	79 653	119 008	241 381	228 912
	No *Pf*	5 629	189	-	-	-	-	-	-
	No *Pv*	0	-	-	-	-	-	-	-
	No Mixed	0	-	-	-	-	-	-	-
	No Other	0	-	-	-	-	-	-	-
Sudan	Suspected	2 398 239	2 929 578	2 438 467	2 197 563	1 207 771	1 102 186	4 190 740	3 502 229
	No *Pf*	-	-	-	-	-	-	333 009	580 145
	No *Pv*	-	-	-	-	-	-	82 175	58 335
	No Mixed	-	-	-	-	-	-	32 557	82 399
	No Other	-	-	-	-	-	-	24 105	-
Yemen	Suspected	835 018	804 940	891 394	927 821	821 618	711 680	1 181 486	1 676 469
	No *Pf*	77 271	59 689	109 504	102 369	86 428	75 898	45 469	109 849
	No *Pv*	966	478	398	408	267	334	347	1 833
	No Mixed	30	7	2	0	12	27	70	2 322
	No Other	2	33	4	0	0	-	-	-

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
EUROPEAN									
Armenia[3]	Suspected	31 026	–	–	–	–	1 213	465	350
	No *Pf*	0	0	0	0	0	0	0	0
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	1	0	0	0	0	0
Azerbaijan[2]	Suspected	456 652	449 168	497 040	432 810	399 925	405 416	465 860	373 562
	No *Pf*	0	0	0	0	0	0	0	0
	No *Pv*	50	4	3	0	0	0	0	0
	No Mixed	0	0	0	0	0	0	–	0
	No Other	0	0	0	0	0	0	0	0
Georgia[2]	Suspected	2 368	2 032	1 046	192	440	294	318	416
	No *Pf*	0	0	0	0	0	0	0	0
	No *Pv*	0	1	1	0	0	0	0	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0	0
Kyrgyzstan[3]	Suspected	30 190	27 850	18 268	54 249	35 600	75 688	62 537	8 459
	No *Pf*	0	0	0	0	0	0	0	0
	No *Pv*	3	0	0	0	0	0	0	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0	0
Tajikistan[2]	Suspected	173 523	173 367	209 239	213 916	200 241	230 397	233 336	232 502
	No *Pf*	0	0	0	0	0	0	0	0
	No *Pv*	111	65	18	7	2	0	0	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0	0
Turkey[2]	Suspected	507 841	421 295	337 830	255 125	189 854	211 740	144 499	115 557
	No *Pf*	0	0	0	0	0	0	0	0
	No *Pv*	9	4	219	34	5	0	0	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0	0
Turkmenistan[3]	Suspected	81 784	–	–	–	–	83 675	85 536	84 264
	No *Pf*	0	0	0	0	0	0	0	0
	No *Pv*	0	0	0	0	0	0	0	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0	0
Uzbekistan[2]	Suspected	921 364	886 243	805 761	908 301	812 347	800 912	797 472	655 112
	No *Pf*	0	0	0	0	0	0	0	0
	No *Pv*	3	0	0	0	0	0	0	0
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	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	150 518
	No *Pf*	52 012	49 084	9 428	3 597	8 981	5 279	3 460	4 210
	No *Pv*	3 824	2 579	396	262	489	477	418	520
	No Mixed	37	110	36	5	746	723	800	163
	No Other	0	0	0	0	0	0	0	0
Bhutan	Suspected	54 760	44 494	42 512	31 632	33 586	74 087	118 841	42 146
	No *Pf*	140	87	33	14	17	13	1	0
	No *Pv*	261	92	47	9	31	21	13	11
	No Mixed	35	15	0	0	0	0	1	0
	No Other	0	0	0	–	0	0	0	0

Annex 3 - I. Reported malaria cases by species, 2010–2017

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
SOUTH-EAST ASIA									
Democratic People's Republic of Korea	Suspected	25 147	26 513	40 925	72 719	38 878	91 007	205 807	189 357
	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	2 184
	No Mixed	0	0	0	0	0	0	0	-
	No Other	0	0	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	144 539 608	125 977 799
	No *Pf*	830 779	662 748	524 370	462 079	720 795	774 627	706 257	525 637
	No *Pv*	765 622	645 652	534 129	417 884	379 659	390 440	375 783	315 028
	No Mixed	3 585	2 256	9 325	1 767	1 751	4 194	5 245	3 893
	No Other	3 585	2 256	9 325	1 767	-	0	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	1 441 679
	No *Pf*	220 077	200 662	199 977	170 848	126 397	103 315	118 844	143 926
	No *Pv*	187 583	187 989	187 583	150 985	107 260	94 267	81 748	95 694
	No Mixed	21 964	31 535	29 278	20 352	16 410	13 105	16 751	18 899
	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	674 381
	No *Pf*	70 941	59 604	314 650	223 303	138 311	110 539	62 917	12 987
	No *Pv*	29 944	28 966	135 386	99 037	61 830	65 590	43 748	6 153
	No Mixed	2 054	3 020	30 419	12 255	5 511	6 632	3 476	474
	No Other	346	162	27 917	25	5	7	4	5
Nepal	Suspected	213 353	188 702	243 432	169 464	200 631	132 379	146 705	214 594
	No *Pf*	550	0	108	273	81	67	61	25
	No *Pv*	2 349	908	1 480	1 659	693	504	433	587
	No Mixed	216	30	0	22	58	20	13	11
	No Other	0	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	1 104 796
	No *Pf*	6	3	4	0	0	0	0	0
	No *Pv*	668	119	19	0	0	0	0	0
	No Mixed	5	2	0	0	0	0	0	0
	No Other	0	2	0	0	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	1 152 156
	No *Pf*	9 401	5 710	11 553	14 449	13 743	3 291	1 774	846
	No *Pv*	13 401	8 608	17 506	15 573	20 513	4 655	2 671	4 802
	No Mixed	147	147	298	196	588	57	109	36
	No Other	20	13	3 172	3 084	3 077	19	1 244	10
Timor-Leste	Suspected	266 384	225 772	182 854	178 200	117 107	121 110	150 333	129 175
	No *Pf*	28 350	14 261	1 962	373	118	33	51	5
	No *Pv*	11 432	3 758	2 288	512	139	24	10	3
	No Mixed	468	1 720	0	140	85	23	33	8
	No Other	0	0	0	0	0	0	0	0
WESTERN PACIFIC									
Cambodia	Suspected	193 210	216 712	194 263	152 137	142 242	163 680	166 695	168 245
	No *Pf*	8 213	7 054	14 896	7 092	8 332	17 830	12 156	20 328
	No *Pv*	4 794	5 155	19 575	11 267	10 356	13 146	9 816	15 207
	No Mixed	1 270	1 583	4 971	2 418	6 464	2 954	1 520	1 397
	No Other	0	0	4 971	0	0	2 498	-	0
China[2]	Suspected	7 118 649	9 190 401	6 918 770	5 555 001	4 403 633	4 052 616	3 194 929	2 409 280
	No *Pf*	1 269	1 370	16	8	6	1	0	0
	No *Pv*	3 675	1 907	179	71	50	26	3	0
	No Mixed	26	40	44	119	0	0	0	0
	No Other	20	50	60	0	0	6	0	0

WHO region Country/area		2010	2011	2012	2013	2014	2015	2016	2017
WESTERN PACIFIC									
Lao People's Democratic Republic	Suspected	280 549	291 775	369 976	339 013	294 542	284 003	223 992	274 314
	No *Pf*	4 393	5 770	37 692	24 538	23 928	14 430	4 255	4 550
	No *Pv*	122	442	7 634	12 537	22 625	20 804	6 795	4 590
	No Mixed	8	0	769	956	1 517	822	173	193
	No Other	1	14	769	1	1	0	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	1 046 163
	No *Pf*	1 344	634	651	422	177	110	67	18
	No *Pv*	3 387	1 750	915	385	241	84	178	59
	No Mixed	145	120	48	42	33	22	9	1
	No Other	943	1 660	2 187	194	120	26	12	7
Papua New Guinea	Suspected	1 505 393	1 279 140	1 113 528	1 454 166	922 417	909 940	1 168 797	1 400 593
	No *Pf*	56 735	59 153	58 747	119 469	120 641	118 452	183 686	163 160
	No *Pv*	13 171	9 654	7 108	7 579	78 846	62 228	95 328	113 561
	No Mixed	4 089	1 164	769	1 279	79 574	115 157	197 711	200 186
	No Other	1 990	632	609	1 279	2 125	1 950	1 772	1 433
Philippines	Suspected	301 577	327 125	333 084	320 089	316 323	280 222	321 838	284 564
	No *Pf*	11 824	6 877	4 774	4 968	3 760	834	366	3 258
	No *Pv*	2 885	2 380	2 189	1 357	5 881	882	1 503	551
	No Mixed	214	166	113	83	0	0	0	81
	No Other	175	127	57	67	5 320	826	534	60
Republic of Korea	Suspected	1 772	838	555	443	638	699	0	0
	No *Pf*	27	20	36	0	0	0	0	0
	No *Pv*	1 691	754	473	383	557	627	602	436
	No Mixed	0	0	0	0	0	0	0	0
	No Other	0	0	0	0	0	0	0	0
Solomon Islands	Suspected	284 931	254 506	249 520	245 014	233 803	192 044	274 881	238 814
	No *Pf*	22 892	14 454	14 748	13 194	9 835	10 478	16 607	15 400
	No *Pv*	12 281	8 665	9 339	11 628	7 845	12 150	33 060	30 169
	No Mixed	200	83	232	446	724	1 370	4 718	6 881
	No Other	200	0	232	0	0	0	46	13
Vanuatu	Suspected	48 088	32 656	33 273	28 943	35 570	14 938	21 484	30 313
	No *Pf*	1 545	770	1 257	1 039	279	150	186	273
	No *Pv*	2 265	1 224	1 680	1 342	703	273	1 682	798
	No Mixed	193	81	470	0	0	0	0	0
	No Other	10	2	0	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	2 614 663
	No *Pf*	12 763	10 101	11 448	9 532	8 245	4 327	2 323	2 858
	No *Pv*	4 466	5 602	7 220	6 901	7 220	4 756	1 750	1 608
	No Mixed	286	909	970	695	287	234	73	70
	No Other	0	0	0	0	0	14	15	12

Pf: *Plasmodium falciparum*; *Pv*: *Plasmodium vivax*.

The number of *Pf*, *Pv*, mixed and other cases (respectively No *Pf*, No *Pv*, No Mixed 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 included in this listing for historical purposes.

Annex 3 - J. Reported malaria deaths, 2010–2017

WHO region Country/area	2010	2011	2012	2013	2014	2015	2016	2017
AFRICAN								
Algeria	1	0	0	0	0	0	0	0
Angola	8 114	6 909	5 736	7 300	5 714	7 832	15 997	13 967
Benin	964	1 753	2 261	2 288	1 869	1 416	1 646	2 182
Botswana	8	8	3	7	22	5	*3*	*17*
Burkina Faso	9 024	7 001	7 963	6 294	5 632	5 379	3 974	4 144
Burundi	2 677	2 233	2 263	3 411	2 974	3 799	5 853	4 414
Cabo Verde	1	*1*	*0*	*0*	*2*	*0*	*1*	*1*
Cameroon	4 536	3 808	3 209	4 349	4 398	3 440	2 639	3 195
Central African Republic	526	858	1 442	1 026	635	1 763	2 668	3 689
Chad	886	1 220	1 359	1 881	1 720	1 572	1 686	2 088
Comoros	53	19	17	15	0	1	0	3
Congo	–	892	623	2 870	271	435	733	229
Côte d'Ivoire	1 023	1 389	1 534	3 261	4 069	2 604	3 340	3 222
Democratic Republic of the Congo	23 476	23 748	21 601	30 918	25 502	39 054	33 997	27 458
Equatorial Guinea	30	52	77	66	–	28	109	–
Eritrea	27	12	30	6	15	12	21	8
Eswatini	8	1	3	4	4	5	3	20
Ethiopia	1 581	936	*1 621*	*358*	*213*	*662*	*510*	*356*
Gabon	182	74	134	273	159	309	101	218
Gambia	151	440	289	262	170	167	79	54
Ghana	3 859	3 259	2 855	2 506	2 200	2 137	1 264	599
Guinea	735	743	979	108	1 067	846	867	1 174
Guinea-Bissau	296	472	370	418	357	477	191	296
Kenya	26 017	713	785	360	472	15 061	603	–
Liberia	1 422	–	1 725	1 191	2 288	1 379	1 259	758
Madagascar	427	398	552	641	551	841	443	370
Malawi	8 206	6 674	5 516	3 723	4 490	3 799	4 000	3 613
Mali	3 006	2 128	1 894	1 680	2 309	1 544	1 344	1 050
Mauritania	211	77	106	25	19	39	315	67
Mayotte	*0*	*0*	*0*	*0*	*0*	*0*	*0*	–
Mozambique	3 354	3 086	2 818	2 941	3 245	2 467	1 685	1 114
Namibia	63	36	4	21	61	45	65	57
Niger	3 929	2 802	2 825	2 209	2 691	2 778	2 226	2 316
Nigeria	4 238	3 353	7 734	7 878	6 082	–	–	–
Rwanda	670	380	459	409	496	516	715	376
Sao Tome and Principe	14	19	7	11	0	0	0	0
Senegal	553	472	649	815	500	0	0	0
Sierra Leone	8 188	3 573	3 611	4 326	2 848	1 107	1 345	1 298
South Africa	83	54	72	105	174	110	34	274
South Sudan[1]	1 053	406	1 321	1 311	–	–	–	3 483
Togo	1 507	1 314	1 197	1 361	1 205	1 205	847	995
Uganda	8 431	5 958	6 585	7 277	5 921	6 100	5 635	5 111
United Republic of Tanzania	15 867	11 806	7 820	8 528	5 373	6 313	5 046	3 685
Mainland	15 819	11 799	7 812	8 526	5 368	6 311	5 045	3 684
Zanzibar	48	7	8	2	5	2	1	1
Zambia	4 834	4 540	3 705	3 548	3 257	2 389	1 827	1 425
Zimbabwe	255	451	351	352	406	200	351	*0*
AMERICAS								
Argentina[2]	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Belize	0	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Bolivia (Plurinational State of)	0	0	0	0	1	*0*	*0*	*0*
Brazil	76	70	60	40	36	35	35	30
Colombia	42	23	24	10	17	*0*	*0*	*0*
Costa Rica	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Dominican Republic	15	10	8	5	*4*	*3*	*1*	*1*
Ecuador	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
El Salvador[2]	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
French Guiana	1	2	2	3	0	*0*	*0*	*0*
Guatemala	0	0	0	1	1	1	0	*0*
Guyana	24	36	35	14	11	12	13	11
Haiti	8	5	6	10	9	15	13	12
Honduras	3	2	1	1	2	0	*0*	*1*
Mexico	0	*0*	*0*	*0*	*0*	*0*	*0*	*0*

WHO region Country/area	2010	2011	2012	2013	2014	2015	2016	2017
AMERICAS								
Nicaragua	1	1	2	0	*0*	*0*	*0*	*1*
Panama	1	0	1	0	0	*0*	*0*	*0*
Paraguay	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Peru	0	1	7	4	4	5	7	*10*
Suriname	1	1	0	1	1	*0*	*0*	*0*
Venezuela (Bolivarian Republic of)	18	16	10	6	5	8	1	-
EASTERN MEDITERRANEAN								
Afghanistan	22	40	36	24	32	49	47	10
Djibouti	0	0	0	17	28	23	5	-
Iran (Islamic Republic of)	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Pakistan	-	4	260	244	56	34	33	113
Saudi Arabia	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Somalia	6	5	10	23	14	27	13	20
Sudan	1 023	612	618	685	823	868	984	1 446
Yemen	92	75	72	55	23	14	65	37
EUROPEAN								
Armenia[3]	0	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Azerbaijan[2]	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Georgia[2]	*0*	*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*	*0*
Turkey[2]	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Turkmenistan[3]	0	0	0	0	0	0	0	0
Uzbekistan[2]	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
SOUTH-EAST ASIA								
Bangladesh	37	36	11	15	45	9	17	13
Bhutan	2	1	1	*0*	*0*	*0*	*0*	*0*
Democratic People's Republic of Korea	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
India	1 018	754	519	440	562	384	331	194
Indonesia	432	388	252	385	217	157	161	47
Myanmar	788	581	403	236	92	37	21	30
Nepal	6	2	0	0	0	0	*0*	*0*
Sri Lanka[3]	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Thailand	80	43	37	47	38	33	27	11
Timor-Leste	58	16	3	3	1	0	*0*	*0*
WESTERN PACIFIC								
Cambodia	151	94	45	12	18	10	3	1
China[2]	19	33	*0*	*0*	*0*	*0*	*0*	*0*
Lao People's Democratic Republic	24	17	44	28	4	2	1	*2*
Malaysia	*13*	*12*	*12*	*10*	*4*	*4*	*2*	*10*
Papua New Guinea	616	523	381	307	203	163	306	273
Philippines	30	12	16	12	10	20	*7*	*3*
Republic of Korea	*1*	*2*	*0*	*0*	*0*	*0*	*0*	*0*
Solomon Islands	34	19	18	18	23	13	20	27
Vanuatu	1	1	0	0	0	*0*	*0*	*0*
Viet Nam	21	14	8	6	6	3	2	5
REGIONAL SUMMARY								
African	150 486	104 068	104 105	116 333	99 381	117 836	103 422	93 326
Americas	190	167	156	95	91	79	70	66
Eastern Mediterranean	1 143	736	996	1 048	976	1 015	1 147	1 626
European	0	0	0	0	0	0	0	0
South-East Asia	2 421	1 821	1 226	1 126	955	620	557	295
Western Pacific	910	727	524	393	268	215	341	321
Total	155 150	107 519	107 007	118 995	101 671	119 765	105 537	95 634

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 included in this listing for historical purposes.

Notes

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ISBN 978 92 4 156565 3