World malaria report 2024

Addressing inequity in the global malaria response

World Health Organization

World malaria report 2024

Addressing inequity in the global malaria response

World Health Organization

World malaria report 2024: addressing inequity in the global malaria response

ISBN 978-92-4-010444-0 (electronic version)
ISBN 978-92-4-010445-7 (print version)

Suggested citation. World malaria report 2024: addressing inequity in the global malaria response. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO.

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

Design and layout: Claude Cardot
Cover design: Lushomo

Map production: WHO Global Malaria Programme and WHO GIS Centre for Health, DNA/DDI

Contents

Foreword

Each year, the world malaria report serves as a vital tool to evaluate global progress and gaps in the fight against malaria. This year's report provides a snapshot of efforts to control and eliminate the disease in 83 countries.

In the wake of the COVID-19 pandemic, many countries continue to grapple with challenges to malaria control, including fragile health systems, weak surveillance and chronic funding shortfalls, as well as the spread of antimalarial drug resistance and the invasion of *Anopheles stephensi*, a mosquito species that thrives in urban areas. Compounding these challenges are the overlapping impacts of conflict, climate change and displacement.

Pervasive health inequities continue to hinder progress. Many people at risk of malaria still lack access to the essential services they need to prevent, detect and treat the disease. This year's world malaria report includes a special chapter on the importance of reaching underserved populations.

The burden of malaria, and the challenges to addressing it, are most acute in Africa, where 11 countries bear about two thirds of the world's malaria burden. Together, these countries are part of a targeted initiative – "high burden to high impact (HBHI)" – aimed at accelerating progress against the disease. Between 2017 and 2023, mortality rates in these countries fell by 13%.

Other countries have also shown that real progress is possible. Since 2015, nine countries have been certified as malaria free by the World Health Organization (WHO), including five over the past 2 years: Azerbaijan, Belize, Cabo Verde, Egypt and Tajikistan. Together, they demonstrate that, with sustained commitment and investment, malaria elimination is attainable in all countries.

Technological advances hold the promise of further gains. As of December 2024, 17 countries had introduced WHO-recommended malaria vaccines through routine childhood immunization, and more countries are readying their own rollouts. A new generation of nets that provide better protection than pyrethroid-only nets are becoming more widely available.

In March 2024, ministers of health from the 11 HBHI African countries committed to ending malaria in the Yaoundé Declaration. Their pledge – "no one should die from malaria" – is a powerful reminder of what is at stake. Now, this commitment needs funding and concrete actions to save lives.

Malaria remains a formidable challenge. By working together, tailoring interventions to local settings, harnessing innovation and maintaining a relentless focus, we can regain momentum and move towards our shared vision of a malaria free future.

Dr Tedros Adhanom Ghebreyesus
Director-General
World Health Organization

Acknowledgements

The World Health Organization (WHO) gratefully acknowledges the many experts and agencies who contributed to the planning, development and review of the *World malaria report 2024*.

Leadership, coordination and main technical contributions

The development of the *World malaria report 2024* was coordinated by Laura Anderson, who was the lead author of the report, and supervised by Arnaud Le Menach, who leads the Strategic Information and Response Unit. The following WHO/Global Malaria Programme (GMP) staff made significant technical contributions: Amy Barrette, Chan Yuen Ching, Zhang Chunzhe, Tamara Ehler, Beatriz Galatas, Mwalenga Nghipumbwa, Mujahid Nouredayem, Charlotte Rasmussen, Alastair Robb, Silvia Schwarte, Saira Stewart and Ryan Williams. Elkhan Gasimov contributed to the chapter on malaria elimination, and Maru Aregawi significantly contributed to the chapter "Impact of humanitarian emergencies worldwide on malaria control" and provided information for the section on high burden to high impact countries. Seth Irish contributed to the section on insecticide resistance and *Anopheles stephensi*. Mwalenga Nghipumbwa and Alastair Robb were the lead authors for the chapter on gender equality, human rights and health equity; the chapter was coordinated by Daniel Ngamije. Laurent Bergeron provided programmatic support for overall management of the project. The editorial committee for the report comprised Daniel Ngamije, Andrea Bosman, Elkhan Gasimov, Seth Irish and Alastair Robb.

External experts

WHO is grateful to the following external experts for their contributions, in collaboration with WHO staff where mentioned:

- The estimates of *Plasmodium falciparum* parasite prevalence, *P. falciparum* case incidence, effective treatment with an antimalarial drug, insecticide-treated mosquito net (ITN) coverage and coverage of indoor residual spraying of insecticide were produced for sub-Saharan Africa by the Malaria Atlas Project (MAP – led by Peter Gething at Curtin University and The Kids Research Institute, Australia). Daniel Weiss led the production of estimates provided for this report, with contributions from Jailos Lubinda, Adam Saddler, Michael McPhail, Annie Browne, Paulina Dzianach, Hunter Baggen, Sarah Hafsia, Rubi Jayaseelen, Camilo Vargas-Ruiz, Joseph Harris, Jennifer Rozier, Mauricio Van Den Berg, Tasmin Symons, Susan Rumisha, Punam Amratia and Tolu Okitika. MAP is funded by the Bill & Melinda Gates Foundation (United States of America [USA]). Malaria data acquisition and maps for country and regional profiles were created by the MAP data engineering team, with contributions from Paul Castle, Joseph Harris, Jennifer Rozier, Mauricio Van Den Berg and Camilo Vargas-Ruiz.
- Patrick Walker (Imperial College London, United Kingdom of Great Britain and Northern Ireland [United Kingdom]) contributed to the analysis of exposure to malaria infection during pregnancy and attributable low birthweight.
- Matt Gordon (Global Fund to Fight AIDS, Tuberculosis and Malaria [Global Fund], Switzerland) supported the analysis from the Global Fund. Ahmer Akhtar (United Kingdom Department for International Development) and Stephanie Oum and Adam Wexler (KFF, USA) provided information on financial contributions for malaria control from the United Kingdom and the USA, respectively. Impact Global Health Ltd (Australia) used its G-FINDER data in the analysis of financing for malaria research and development, with Madeleine Kearney, Paul Barnsley, Maya Goldstein, Emmanuelle Bomo and Andrew Tuttle contributing material for that section of the report.
- John Milliner (Milliner Global Associates, USA) provided the information on the number of ITNs delivered by manufacturers. Data were collected by the Alliance for Malaria Prevention Net Mapping Project.

- Céline Audibert and André-Marie Tchouatieu (Medicines for Malaria Venture [MMV], Switzerland) and Paul Milligan (London School of Hygiene & Tropical Medicine, United Kingdom) contributed to updating the section on seasonal malaria chemoprevention (SMC) with recent information on implementation. The SMC map was developed by Paul Milligan using data provided to the MMV by national malaria programmes (NMPs) in each country, and with support from Céline Audibert (MMV, Switzerland), Nnenna Ogbulafor and Emmanuel Shekaru (National Malaria Programme, Nigeria), Christian Rassi (Malaria Consortium, United Kingdom), Issaka Sagara (Malaria Research and Training Center, Mali) and Mady Sissoko (Programme National de Lutte Contre le Paludisme, Mali).
- Kathleen Strong (WHO Department of Maternal, Newborn, Child and Adolescent Health and Ageing), Bochen Cao (WHO Division of Data, Analytics and Delivery for Impact) and Jamie Perin (Johns Hopkins University, USA) prepared the malaria cause of death fraction and the estimates of malaria mortality in children aged under 5 years, on behalf of the Child and Adolescent Causes of Death Estimation group.
- The burden estimation analysis used R code and packages written by John Aponte (PATH, Switzerland).
- Rebecca Thomson (WHO consultant, United Kingdom) contributed to the section on *pfhrp2/3* gene deletions.
- Marian Warsame (WHO consultant, Sweden) contributed to the section on antimalarial drug resistance.
- Tessa Knox (WHO consultant, Australia) contributed to the section on insecticide resistance.
- Abdisalan Noor (Harvard School of Public Health, USA) provided valuable insights into the review of malaria burden estimates.
- Outside WHO, for the chapter on gender equality, human rights and health equity, WHO is grateful to Deborah Atobrah, Duah Dwomoh, Irene Kretchy and Benjamin Kobina Kwansa (Centre for Gender Studies and Advocacy, University of Ghana) for the compilation and consolidation of the literature review and preliminary analysis of malaria indicator survey data; Alistair Shaw and Thea Willis (Global Fund), Meera Venkatesan and Avery Avrakotos (United States President's Malaria Initiative [PMI]), Maelle Ba (Speak Up Africa), Kiri Rundle (Goodbye Malaria), George Jagoe and Katya Halil (MMV) and Olivia Ngou (Civil Society for Malaria Elimination [CS4ME]) for the technical engagements; and the NMP of the Niger for their agreement to showcase their experience in this section.

External reviewers

WHO is grateful to Justin Cohen (Clinton Health Access Initiative, USA), Jaline Gerardin (Northwestern University, USA) and Corine Karema (Quality and Equity Health Care, Rwanda) for the independent review of all sections and for providing comments for improvement.

Other WHO technical staff

The following staff from WHO headquarters, and from WHO regional or country offices, also contributed to the report:

- Eliane Furrer, Kristen Kelleher and Mary Hamel (WHO Immunization, Vaccines and Biologicals Product and Delivery Research) provided information on the rollout of the malaria vaccine.
- Evelyn Boy-Mena, Anna Coates, Emilie Di Grazia, Rachel Mary Hammons, Theadora Swift Koller and Pauliina Nykanen-Rettaroli (WHO Gender Equality, Human Rights and Health Equity) provided technical support for the development and review of the chapter on gender equality, human rights and health equity. The chapter was reviewed by Ahmadreza Hosseinpoor, Katherine Kirkby (WHO Monitoring, Forecasting & Inequalities); Saverio Bellizzi, Daniel Mić and Miriam Orcutt (WHO Health and Migration Programme); Mélanie Gréaux (WHO – Sensory Functions, Disability and Rehabilitation); Faraz Khalid, Kira Koch, Shamsuzzoha Babar Syed, Tova Tampe and Patrick Louis F. Zuber (WHO Universal Health Coverage – Life Course [UHL]/Primary Health Care [PHC]/Policy and Partnership); Gabriela Flores Pentzke Saint-Germain and Matthew Jowett (WHO UHL/Health Financing and Economics); Dorothy Fosah Achu (WHO Regional Office for Africa); James Kelley (WHO Regional Office for the Western Pacific); Roberto Montoya

(WHO Regional Office for the Americas); Risintha Premaratne and Anju Pandey (WHO Regional Office for South-East Asia); and Ghasem Zamani (WHO Regional Office for the Eastern Mediterranean).

- Mujahid Nouredayem (WHO/GMP) analysed the household survey data, and Samuel Oppong (WHO consultant, now NMP, Ghana) extracted the standard estimates from the demographic and health surveys programme STATcompiler and assisted in the analysis of the gender equality, human rights and health equity country-submitted data.
- Bochen Cao, Wahyu Retno Mahanani and Haidong Wang (WHO Division of Data, Analytics and Delivery for Impact) undertook statistics review.
- Edith Patouillard, Hapsatou Toure and Anna Vassall (WHO Department of Health Systems Governance and Financing) undertook review of economic evaluation and analysis.
- Egle Granziera and Claudia Nannini (WHO Office of the Legal Counsel) provided legal review.
- Kathleen Krupinski (WHO Division of Data, Analytics and Delivery for Impact) undertook map production.
- Newton Opiyo (WHO Department of Quality Assurance, Norms and Standards) provided overall technical review.

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:

- Dorothy Fosah Achu, Ebenezer Sheshi Baba, Steve Kubenga Banza, Emmanuel Chanda and Jackson Sillah (WHO Regional Office for Africa);
- Dismas Baza, Sharmila Lareef, Koku Mawule Davi, Spes Ntabangana, Adiele Onyeze, Dhruv Pandey, Mansour Ranjbar Kahkha and Abderrahmane Kharchi Tfeil (WHO Regional Office for Africa Tropical and Vector-Borne Diseases and WHO Multi-Country Assignment Teams);
- Maria Paz Ade, Jean S.F. Alexandre, Janina Chavez, Blanca Escribano, Roberto Montoya and Dennis Navarro Costa (WHO Regional Office for the Americas);
- Samira Al-Eryani, Lina Azkoul and Ghasem Zamani (WHO Regional Office for the Eastern Mediterranean);
- Stela Bivol (WHO Regional Office for Europe);
- Risintha Premaratne (WHO Regional Office for South-East Asia); and
- James Kelley, Pascal Ringwald and Rady Try (WHO Regional Office for the Western Pacific and Mekong Malaria Elimination Programme).

NMP specialists and WHO country staff

The following specialists, from NMPs or WHO, collected and reviewed data from malaria endemic and malaria free countries and areas:

Abdul Basit Noorzai, Abdulali Ahmadi, Hizbullah Fetrat, Ahmad Mureed Muradi, Lutfullah Noori and Naimullah Safi (Afghanistan); Lammali Karima and Houria Khelifi (Algeria); Fernanda Francisco Guimaraes and Fernanda Isabel Martins da Graça do Espirito Santo Alves (Angola); Teri Ann Joseph (Antigua and Barbuda); María Florencia Perez, Julieta Siches and Carla Tabachi (Argentina); Karine Gevorgyan (Armenia); Nazifa Mursalova (Azerbaijan); Charlo Bain and Sasha Peiris (Bahamas); Md Jahangir Alam, Anupama Hazarika and Md Nazrul Islam (Bangladesh); Keisha Catlyn (Barbados); Jean Dennis Galdzdin and Prabhjot Singh (Barbados and the eastern Caribbean countries); Kim Bautista and Joseph Job (Belize); Aissan Codjo Julien and Telesphore Houansou (Benin); Tobgyel Drukpa, Sonam Wangdi and Ugyen Zangpo (Bhutan); Alex Cornejo, María Jesús Sánchez and Jorge Luis Medrano Mancilla (Bolivia [Plurinational State of]); Mpho Mogopa (Botswana); Miguel Angel Aragon Lopez, Renata Castro Barros, Eliandra Castro de Oliveira, Anderson Coutinho da Silva, Jessica de Oliveira Sousa, Gilberto Gilmar Moresco, Ana Carolina Laraia Ciarlini, Mateus Gaudencio de Sousa, Marcela Lima Dourado, Jose Manoel de Souza Marques, Daniela Michele de Moura Rocha Pires, Ronan Rocha Coelho, Sheila Rodovalho, Edilia Samela Freitas Santos, Geovani San Miguel Nascimento, Pablo Sebastian Tavares Amaral, Pablo Secato Fontoura and Alexander Vargas (Brazil);

Sidzabda Christian Bernard Kompaore (Burkina Faso); Juvenal Manirampa (Burundi); Antonio Lima Moreira (Cabo Verde); Siv Sovannaroth and Zhang Zaixing (Cambodia); Jean Fosso and Abomabo Moïse Hugue René (Cameroon); Jillian Blackmore (Canada); Aristide Desire Komangoya-Nzonzo (Central African Republic); Elkoussing Djovouna (Chad); Claudio Marcelo Canales and Javiera Fuentes Ceballos (Chile); Zhang Li (China); Ivan Mauricio Cardenas Cañón, Milton Cardozo Cruz and Guillermo Gonzalvez (Colombia); Ibrahim Fahad and Ahamada Nassuri (the Comoros); Antoine Loussambou (Congo); Gabriela Rey and Isaac Vargas Roldan (Costa Rica); Serge Alexis Aimain (Côte d'Ivoire); Susana Borroto and Carmelo Trujillo Machado (Cuba); Jang Chun Il, Yu Dongbao and O Nam Ju (Democratic People's Republic of Korea); Eric Mukomena Sompwe (Democratic Republic of the Congo); Samatar Kayad, Ifrah Ali Ahmed and Abdoulkader Ali Adoulfrah Mahamoud Youssouf (Djibouti); Shalauddin Ahmed (Dominica); Olivia Brathwaite, Yamira Del Villar, Massiel Encarnación Segura and Maria Yinet Santos Felix (Dominican Republic); Silvia Cruz Herbozo, Julio Rafael Rivera Bonilla and Valeska Stempliuk (Ecuador); Kelvin Francisco Alfaro Salguero and Angel Manuel Alvarez (El Salvador); Mathilde Riloha Rivas (Equatorial Guinea); Lemlem Kubrom, Selam Mihreteab and Assefah Zehiae Kassahun (Eritrea); Zulisile Zulu (Eswatini); Gudissa Bayissa, Ayalneh Melesse and Ayele Tiyou (Ethiopia); Pan American Health Organization Malaria Regional Program (French Guiana); Alain Mombo Mombo (Gabon); Momodou Kalleh (Gambia); Keziah L. Malm, Wahjib Mohammed and Felicia Owusu-Antwi (Ghana); Larissa A.X. Mark (Grenada); Ericka Lidia Chavez Vasquez, Adolfo Miranda, Ricardo Rosales and Daniel Vargas-Pacherrez (Guatemala); Nouman Diakite (Guinea); Mouhammed Ould Hamed (Guinea-Bissau); Rainier Escalada, Emmanuel Forlack-Allo and Olivia Valz (Guyana); Darlie Antoine and Harilala Ranaivoharimina (Haiti); Francisco Medina Ramos, Rosa Elena Mejía and Aida Soto (Honduras); Tanu Jain, Pranab Jyoti Bhuyan, Roop Kumari and Badri Thapa (India); Helen Dewi Prameswari, Herdiana Hasan Basri and Riskha Tiara Puspadewi (Indonesia); Elham Almasian, Firoozeh Goosheh, Minoo Mashayekhi, Fatemeh Nikpour, Ahmad Raeisi and Omid Zamani (Islamic Republic of Iran); Tyrone Roberts and Franka des Vignes (Jamaica); James Kiarie (Kenya); Phonephet Butphomvihane and Rita Reyburn (Lao People's Democratic Republic); Levi Hinneh, Tabadeh Peaches Collins-Kollah and Moses Jerounlon (Liberia); N'goran Raphael N'Dri, Henintsoa Rabarijaona and Urbain Rabibizaka (Madagascar); Austin Albert Gumbo (Malawi); Jenarun Jelip, Tam Jenn Zhueng and Deepa Gamage (Malaysia); Sarah Jamal and Sana Saleem (Maldives); Tako Ballo Aissata Kone (Mali); Mohamed Ainina Jed, Lemlih Baba, Zahra Fatimetou Fall and Sidina Mohamed Ghoulam (Mauritania); Ambdoul-Bar Idaroussi, Jean-François Lepère and Hassani Youssouf (Mayotte); Guillermo Carbajal Sandoval, Daniel Armando Carrillo García, Fabian Correa Morales, Santa Elizabeth Ceballos Liceaga, Mónica Guardo, Irma López Martínez, Gabriela Meneses Ruiz, Eric Piña, Gerardo Reyes Cabrera, Rosario Sánchez Arcos, Juan Manuel Serna Velázquez, Luisa Sosa Laso and Maria Nohemi Colin Soto (Mexico); Guidion Mathe (Mozambique); Shushil Dev Pant, Mya Myintzu, Shampa Nag, Nwe Ni Linn, Lae Shwesin Myint and Tet Toe Tun (Myanmar); Martha Katangolo (Namibia); Yadu Chandra Ghimire, Gokarna Dahal, Prabesh Ghimere and Subhash Lakhe (Nepal); Holvin Martín Gutierrez Pérez, Ángela Martínez, Oscar Martin Mesones Lapouble and Enrique Pérez Flores (Nicaragua); Abou Yahaya (Niger); Godwin Ntadom (Nigeria); Qasim Abbas, Hammad Habib, Qutbuddin Kakar, Muhammad Mukhtar, Aamir Raisani, Irshad Roghani, Muhammad Shafique, Mushtaque Shah and Munir-Ur-Rehman (Pakistan); Lizbeth Cerezo, Gloria Henao, Carmen Pérez Gonzáles and Anna Margarita Botello (Panama); John Deli and Rashid Abdur Mohammed (Papua New Guinea); Romeo Montoya and Martha R. Torales Ruotti (Paraguay); Moisés Alexander Apolaya Segura and Jorge Escobedo (Peru); Raffy Deray, Bayo Fatunmbi, Kate Lopez and Kim Patrick Tebajo (Philippines); Seon-Young Lee (Republic of Korea); Aimable Mbituyumuremyi, Kabere S. Michee and Jules Mugabo Semahore (Rwanda); Hazel Laws (Saint Kitts and Nevis); Shamanti Labban (Saint Vincent and the Grenadines); Jose Alvaro Leal Duarte and Jessica Da Veiga Dos S. De S. Soares (Sao Tome and Principe); Mohammed Hassan Al-Zahrani (Saudi Arabia); Medoune Ndiop (Senegal); Thomas K. Ansumana and Louisa Ganda (Sierra Leone); Albino Bobogare and Ross Hutton (Solomon Islands); Abdi Abdillahi Ali, Jamal Amran, Abdifatah Ahmed Barre, Abdikarim Hussein Hassan, Ali Abdirahman Osman and Fahim Isse Yusuf (Somalia); Ednah Baloyi, Ziyanda Fekema, Patrick Moonasar and Mbavhalelo Bridget Shandukani (South Africa); Khoti Gausi and Joseph Panyuan Puok (South Sudan); Champa Aluthweera, Kumudu Gunasekera, Jeevanie Harishchandra, Thiraj Haputhanthri and Shilanthi Senevirathna (Sri Lanka); Ahmed Abdalla, Mariam Adam, Khansa Ahmed, Hewida Fathalrhman and Mujahid Nouredayem (Sudan); Loretta Hardjopawiro, Oscar Martin Mesones Lapouble and Edison Soto (Suriname); Akramjon Abdurasulovich Sherakov (Tajikistan); Deyer Gopinath,

Auttagorn Junmartong, Suravadee Kitchakarn, Kanitta Pankeaw, Pornpimon Pradit, Wanna Srisatjarak and Prayuth Sudathip (Thailand); Joana Dircia do Nascinemto, Juliana do Rosario, Silvia Guterres, Debashish Kundu and Raul Sarmento (Timor-Leste); Somiabalo P. Atekpe and Damdjigle Bigarime (Togo); Sasha Walrond and Sasha Peiris (Turks and Caicos Islands); Charles Katureebe and Ronald Kimuli (Uganda); Jovin Kitau, Khalifa Munisi and Ali Mwatima Suleiman (United Republic of Tanzania); Sally Cossio and Gustavo Gagliano (Uruguay); Johnny Nausien and Amandeep Singh (Vanuatu); Rodolfo Mejías and Frankin Hernandez (Bolivarian Republic of Venezuela); Annie Chu and Nguyen Quy Anh (Viet Nam); Ryboon Saeed Alamodi, Ryboon Saeed Barbaied, Adel Aljassri, Methaq Alsadah, Abdallah Awash, Moamer Badi and Yasser Abdullah Baheshm (Yemen); Japhet Chiwaula and Freddie Masaninga (Zambia); and Precious Paidamoyo Andifasi, Anderson Chimusoro, Pfungwa Dhliwayo and Ottias Tapfumanei (Zimbabwe).

Financial contributions

Funding for the production of this report was gratefully received from the Bill & Melinda Gates Foundation; Gavi, the Vaccine Alliance; the Global Fund; the Government of China; the Ministry for Europe and Foreign Affairs, France; the Spanish Agency for International Development Cooperation; and Unitaid.

Abbreviations and acronyms

ACT	artemisinin-based combination therapy
AIDS	acquired immunodeficiency syndrome
AL	artemether–lumefantrine
AMFm	Affordable Medicines Facility for malaria
ANC	antenatal care
ANC1	first ANC visit
AQ	amodiaquine
AS	artesunate
CDC	Centers for Disease Control and Prevention
CLM	community-led monitoring
COPEMA	Coalition of Parliamentarians for Ending Malaria in Africa
COVID-19	coronavirus disease
CQ	chloroquine
CRS	creditor reporting system
DAC	Development Assistance Committee
DoD	Department of Defense
DHA	dihydroartemisinin
dhfr	dihydrofolate reductase (gene)
dhps	dihydropteroate synthase (gene)
DHS	demographic and health survey
E-2025	malaria eliminating countries for 2025
FCDO	Foreign, Commonwealth and Development Office
Gavi	Gavi, the Vaccine Alliance
GDP	gross domestic product
Global Fund	Global Fund to Fight AIDS, Tuberculosis and Malaria
GMP	Global Malaria Programme
GMS	Greater Mekong subregion
GNI	gross national income
GTS	*Global technical strategy for malaria 2016–2030*
HBHI	high burden to high impact
HEAT	Health Equity Assessment Toolkit
HIDR	Health Inequality Data Repository
HRP2	histidine-rich protein 2
HRP3	histidine-rich protein 3
iDES	integrated drug efficacy surveillance
IDMC	Internal Displacement Monitoring Centre
IDP	internally displaced person
IMF	International Monetary Fund
IPTp	intermittent preventive treatment of malaria in pregnancy
IPTp1	first dose of IPTp
IPTp2	second dose of IPTp
IPTp3	third dose of IPTp
IPTp4	fourth dose of IPTp
IRS	indoor residual spraying
ITN	insecticide-treated mosquito net
IVCC	Innovative Vector Control Consortium
LLIN	long-lasting insecticidal net
LMIC	low- and middle-income countries
MICS	multiple indicator cluster survey
MIS	malaria indicator survey
MME	Mekong Malaria Elimination
MQ	mefloquine
MVIP	Malaria Vaccine Implementation Programme
MVPE	malaria vaccine pilot evaluation
NMP	national malaria programme
OECD	Organisation for Economic Co-operation and Development
PAHO	Pan American Health Organization
PBO	pyrethroid–piperonyl butoxide
pfhrp	*Plasmodium falciparum* histidine-rich protein (gene)
PfKelch13	*Plasmodium falciparum* Kelch13 (gene)
PHC	primary health care
PPQ	piperaquine
PY	pyronaridine
R&D	research and development
R21	R21/Matrix-M
RDT	rapid diagnostic test
RTS,S	RTS,S/AS01
SAGER	sex and gender equity in research
SDG	Sustainable Development Goal
SMC	seasonal malaria chemoprevention
SNT	subnational tailoring
SP	sulfadoxine–pyrimethamine
TES	therapeutic efficacy studies
UN	United Nations
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization
WHO-CHOICE	WHO-CHOosing Interventions that are Cost-Effective

This year's report at a glance

Key events and new recommendations

- In March 2024, a Malaria Ministerial Conference was co-hosted by the World Health Organization (WHO) and the Government of Cameroon, during which the ministers of health from the 11 high burden to high impact (HBHI) African countries (Burkina Faso, Cameroon, the Democratic Republic of the Congo, Ghana, Mali, Mozambique, the Niger, Nigeria, the Sudan, Uganda and the United Republic of Tanzania) signed the Yaoundé Declaration, pledging their "unwavering commitment" to the principle that "no one should die from malaria given the tools and systems available".
- In April 2024, the WHO Global Malaria Programme published a new operational strategy outlining its priorities for the period 2024–2030 and its four strategic objectives to control and eliminate malaria.
- New recommendations in vector control published by WHO between February and July 2024 include lessons learned from India, the Islamic Republic of Iran and Sri Lanka on how to tackle *Anopheles stephensi*; an updated operational manual on indoor residual spraying (IRS), with an expanded scope that encompasses malaria and other vector-borne diseases to support integrated disease control; and the use of two new types of insecticide-treated mosquito nets (ITNs) with dual active ingredients aimed at combating the challenge of insecticide resistance.
- In October 2023, WHO recommended a second vaccine, R21/Matrix-M (R21), to complement the ongoing rollout of the first malaria vaccine, RTS,S/AS01 (RTS,S), resulting in sufficient vaccine supply to prevent malaria among children living in areas of risk.
- WHO has updated the *Response plan to* pfhrp2 *gene deletions*, which includes new recommendations on use of near-patient glucose-6-phosphate dehydrogenase tests to guide the use of tafenoquine and new regimens of primaquine as anti-relapse treatment of *Plasmodium vivax* and *P. ovale* infections.
- Other WHO publications include new guidance on using a community-based delivery approach to increase intermittent preventive treatment of malaria in pregnancy (IPTp) with sulfadoxine–pyrimethamine (SP) coverage in pregnant women and girls, an updated field guide for seasonal malaria chemoprevention (SMC) deployment, an evidence review of the effects and safety of antimalarial medicines during the first trimester of pregnancy, a field guide for the deployment of rectal artesunate as pre-referral treatment for suspected malaria in young children, and a strategy for containing outbreaks and preventing re-establishment of malaria in malaria free countries.

Burden of disease

- Globally, in 2023, the number of malaria cases was estimated at 263 million, with an incidence of 60.4 cases per 1000 population at risk. This is an increase of 11 million cases from the previous year and a rise in incidence from 58.6 cases per 1000 population at risk in 2022. The WHO African Region continues to carry the heaviest burden of the disease, accounting for an estimated 94% of malaria cases worldwide in 2023. The WHO Eastern Mediterranean Region has experienced a 57% increase in incidence since 2021, rising to 17.9 cases per 1000 population at risk in 2023. The top five countries carrying the heaviest estimated burden of malaria cases in 2023 were Nigeria (26%), the Democratic Republic of the Congo (13%), Uganda (5%), Ethiopia (4%) and Mozambique (4%).

- Globally, in 2023, the number of deaths was estimated at 597 000, with a mortality rate of 13.7 per 100 000. The number of malaria deaths and the mortality rate steadily decreased from 622 000 and 14.9 deaths per 100 000, respectively, in 2020. The WHO African Region continues to carry the heaviest burden of mortality, with 95% of estimated malaria deaths worldwide.
- Between 2000 and 2023, an estimated 2.2 billion malaria cases and 12.7 million malaria deaths were averted worldwide, with 1.7 billion cases and 12 million deaths prevented in the WHO African Region alone. In 2023 alone, more than 177 million cases and more than 1 million deaths were averted globally.
- In 2023, the 11 HBHI countries (excluding India, and including the Sudan) were responsible for 66% of global malaria cases and 68% of deaths. Between 2017, the year before the inception of the HBHI initiative, and 2023, estimated malaria cases in these 11 countries increased by 13.8%, from 152 million to 173 million, and estimated deaths increased by 2.3%, from 399 000 to 408 000. India exited the HBHI group officially in 2024 due to significant progress in reducing the malaria incidence and mortality observed in its high endemic states.
- In 2023, in 33 moderate-to-high transmission countries in the WHO African Region, there were an estimated 36 million pregnancies, of which 12.4 million (34%) were infected with malaria. Accounting for the current impact of IPTp, it is estimated that low birthweight was averted in about 551 000 neonates. If third dose of IPTp coverage increased to 90%, then low birthweight would be averted in an additional 175 000 neonates.

The *Global technical strategy for malaria 2016–2030* (GTS)

- The GTS calls for a reduction in malaria case incidence and mortality rate of at least 40% by 2020, 75% by 2025 and 90% by 2030, from a 2015 baseline.
- The GTS and Sustainable Development Goal 2025 and 2030 targets for malaria morbidity and mortality are unlikely to be met, as the 2023 global malaria incidence is nearly three times higher than needed to reach the target. Although malaria mortality has decreased, it remains more than twice the target level.
- Of the 93 countries that were malaria endemic in 2015, 26% (including those that are now certified malaria free) met the GTS morbidity milestone for 2023, 34% made progress in reducing malaria case incidence but by less than the expected target, 15% had similar incidence to 2015 and 26% experienced an increase in case incidence.
- Of the 93 countries that were malaria endemic in 2015, 38% met the GTS mortality milestone for 2023, 40% achieved reductions in mortality rate but progress was below the expected target, 4% remained at the same level in 2023 as in 2015, and rates increased in 17% of countries.
- The WHO South-East Asia Region met the GTS 2020 milestones for both mortality and morbidity and remains on track to meet the GTS 2025 and 2030 targets.

Elimination

- In 2023 and 2024, notable progress was made in malaria elimination. The number of malaria endemic countries decreased from 85 in 2022 to 83, as a result of Timor-Leste and Saudi Arabia maintaining zero indigenous cases for 3 consecutive years. Furthermore, by 2024, a total of 26 countries that were malaria endemic in 2000 successfully reported zero indigenous cases for 3 consecutive years.
- In 2023, Azerbaijan, Belize, Cabo Verde and Tajikistan were certified malaria free. In 2024, Egypt also achieved malaria free status, marking it as the third country in the WHO Eastern Mediterranean Region to do so. Additionally, Georgia and Türkiye have submitted their applications for malaria free certification.

- Despite progress in elimination efforts, the countries in the malaria eliminating countries for 2025 (E-2025) initiative experienced an increase in malaria cases, predominantly driven by the Comoros, accounting for one third of all reported indigenous cases, followed by Panama and Thailand.
- Within the Mekong Malaria Elimination programme, Myanmar remains the primary contributor of malaria cases, accounting for 95% of all indigenous cases and 99% of *P. falciparum* infections in the Greater Mekong subregion (GMS).
- In 2023, global cases of *P. knowlesi* increased by 18.9%, totalling 3290 reported cases, with indigenous cases rising by 22% from the previous year. Malaysia remains the principal contributor, accounting for 87.4% of these cases and reporting all 14 indigenous deaths due to *P. knowlesi*.
- The resurgence of malaria in the Islamic Republic of Iran in 2022, after 4 years of zero indigenous cases, highlights the persistent risks of reintroduction and re-establishment. This situation underscores the importance of sustained political commitment, robust surveillance systems, timely responses to detected cases, rigorous intervention strategies and cross-border cooperation, particularly in areas with high transmission risk, to maintain malaria free status and prevent re-establishment.

Humanitarian emergencies

- In 2023, humanitarian emergencies due to conflict, violence and natural disasters disproportionately affected populations in malaria endemic countries. Conflict and violence affected 43 endemic countries, with a total of 51.3 million internally displaced persons (IDPs) in these countries, of whom 23.5 million were in HBHI countries. Meanwhile, 51 endemic countries were affected by natural disasters, resulting in 5.8 million IDPs, including about 483 000 in HBHI countries. Additionally, 22.7 million of the 37.3 million registered refugees globally originated from malaria endemic countries.
- Displacement due to conflict, violence and disaster affects populations in situations of vulnerability, particularly in malaria endemic regions. IDPs and refugees often face barriers to accessing health care. Women, girls and young children are among the most affected during crises, being at higher risk of malnutrition and violence, which increase their vulnerability to diseases like malaria.
- Natural disasters, such as floods, hurricanes and droughts, drive displacement and can disrupt malaria control efforts by damaging infrastructure and limiting access to health services. For instance, Cyclone Freddy in Malawi cut off access by damaging roads and bridges, hampering the delivery of essential services to affected communities.

Interventions

- Data from manufacturers indicate an increase in the uptake of non-standard ITNs in sub-Saharan Africa. Pyrethroid–piperonyl butoxide (PBO) ITNs made up 58% of ITNs delivered in 2023, compared with 51% in 2022; dual active ingredient ITNs made up 20% of all ITNs delivered in 2023, compared with 8% in 2022. Population-level coverage of ITNs in sub-Saharan Africa increased in 2023, with an estimated 73% of households in sub-Saharan Africa owning at least one ITN, compared with 68% in 2015, and 52% of the population sleeping under an ITN, compared with 46% in 2015.
- IRS was implemented in 42 malaria endemic countries, but the percentage of the population at risk protected by IRS remains low, at 1.6% in 2023. However, the coverage of those targeted for IRS reached 88.4%.
- SMC was implemented in 19 countries in 2023, with implementation for the first time in Côte d'Ivoire and Madagascar. The average number of children receiving at least one dose of SMC continues to increase, with 53 million children treated in 2023 compared with 49 million in 2022. The average number of children receiving at least one dose was highest in Nigeria, where 28.6 million children were treated per cycle.

- Among the 34 countries conducting IPTp in the WHO African Region, the percentage of women and girls attending antenatal care reached 80% in 2023 – the highest ever recorded. Although there was a slight increase in the coverage of first, second and third doses of IPTp, from 64%, 54% and 42% in 2022 to 67%, 55% and 44% in 2023, respectively, coverage for receiving the three doses remains well below the target of 80%.
- Between 2010 and 2023, data reported by manufacturers indicated 4.4 billion sales of rapid diagnostic tests (RDTs) for malaria and 4.5 billion artemisinin-based combination therapy (ACT) treatment courses delivered. National malaria programmes distributed 345 million RDTs and 235 million ACTs in 2023, mostly in sub-Saharan Africa. Analysis of household surveys conducted in sub-Saharan Africa between 2005 and 2023 found that ACT use among children who sought care and who were treated with an antimalarial drug increased from 38% at baseline (2005–2011) to 71% in the latest surveys (2017–2023), suggesting an increase in the use of the recommended first-line treatment for *P. falciparum* infection.
- Two malaria vaccines, RTS,S and R21, are now recommended for use in malaria endemic areas, with priority given to areas of moderate-to-high transmission. The RTS,S malaria vaccine was initially piloted in Ghana, Kenya and Malawi, where more than 6 million doses were delivered to 2 million children between 2019 and 2023. An evaluation of impact demonstrated a 13% reduction in all-cause mortality (excluding injury) and a 22% reduction in hospitalizations for severe malaria among children age-eligible for vaccination during the period of vaccine scale-up. These reductions demonstrate the important additional impact that can be gained when malaria vaccine is included in the mix of malaria prevention tools. As of early December 2024, 17 countries had introduced WHO-recommended malaria vaccines through routine childhood immunization, and additional countries have expressed plans to introduce the malaria vaccine with support from Gavi, the Vaccine Alliance, and WHO next year.

Biological threats

- Most RDTs used to detect *P. falciparum* malaria target the histidine-rich protein 2 (HRP2) antigen. *P. falciparum* parasites that do not express HRP2 may escape detection by these RDTs. First reported in 2010 in Peru, deletions in the *P. falciparum* histidine-rich protein 2 (*pfhrp2*) gene have since been reported in 41 endemic countries in Africa, Asia and the Middle East. Prevalence in most countries for which data are available remains low; however, it exceeds 15% in Brazil, Djibouti, Eritrea, Nicaragua and Peru. New reports confirming *pfhrp2/3* gene deletions were received in 2023 from Burkina Faso, Chad, Togo and Indonesia. Countries are encouraged to continue conducting surveillance to ensure effective use of RDTs.
- The emergence and spread of artemisinin partial resistance, along with the threat of resistance to ACT partner drugs, remains a significant concern. In Africa, artemisinin partial resistance is now confirmed in Eritrea, Rwanda, Uganda and the United Republic of Tanzania and is suspected in Ethiopia, the Sudan, Namibia and Zambia. Although studies generally show high efficacy of ACTs, concerns remain regarding both the quality and coverage of efficacy data. In the GMS, elimination is within reach in some countries where resistance was once a major threat. However, in Myanmar and western Thailand, an increase in malaria cases in areas previously affected by resistance is cause for concern. In South America, piperaquine resistance has emerged in countries within the Guiana Shield, undermining the efficacy of dihydroartemisinin–piperaquine. Surveillance of therapeutic efficacy according to the WHO protocol is crucial to ensure that the first-line antimalarial treatments recommended in national treatment policies remain effective.
- In malaria endemic countries, resistance to pyrethroids remains widespread, with resistance confirmed in 55 of the 64 countries where it was monitored between 2018 and 2023. Resistance to neonicotinoids has also been reported in five of the 16 countries where it was monitored. Countries are encouraged to continue to test the susceptibility of mosquitoes to the insecticides used in their vector control interventions and to adopt pyrethroid-PBO or dual active ingredient ITNs to improve the effectiveness of ITNs against mosquitoes resistant to pyrethroids.

- The spread of *An. stephensi* remains a threat: following its detection in Djibouti in 2012, the invasive vector has now been detected in Eritrea, Ethiopia, Ghana, Kenya, Nigeria, Somalia, Sri Lanka, the Sudan and Yemen. No new countries were identified in 2023; however, *An. stephensi* was detected in new sites in Kenya. Given rapid urbanization, the spread of this vector in African cities could increase the risk of malaria transmission. Research institutions and implementation partners are encouraged to continue to report the detection of *An. stephensi* to ministries of health and to WHO, to inform national and global responses.

Investments in malaria programmes and research

- In 2023, global funding for malaria control and elimination totalled US$ 4.0 billion across 90 countries, slightly lower than the US$ 4.1 billion in 2022 but higher than the US$ 3.5 billion available in 2021. The WHO African Region received 75% of this funding, owing to its high malaria burden.
- Domestic funding in malaria endemic countries rose to 37% in 2023, up from 33% in 2021. The majority of international funding came from the United States of America, the United Kingdom of Great Britain and Northern Ireland, France, Germany and Japan. The Global Fund to Fight AIDS, Tuberculosis and Malaria maintained its position as the largest and most prominent international funding source for malaria, contributing US$ 1.5 billion.
- A funding gap of US$ 4.3 billion remains, with only 48% of the GTS target of US$ 8.3 billion for 2023 covered. Without significant increases, only 60% of the per capita funding needed to meet GTS targets is expected to be reached by 2030.
- Per capita funding trends varied across WHO regions: while the WHO African Region saw stable funding with increased domestic contributions, the Eastern Mediterranean Region recently experienced a 42% rise. In contrast, the WHO South-East Asia and Western Pacific regions have seen substantial funding declines since 2010.
- Malaria research and development (R&D) funding reached US$ 690 million in 2023, up 9% from 2022, with nearly half of this growth coming from new participants in the G-FINDER survey. This marks a positive shift in malaria R&D after 4 years of decline, with all areas seeing growth, except for biologics, which fell 45% to US$ 15 million following a 2022 peak. Vaccine R&D funding reached US$ 148 million, the highest level since 2019, driven by new funders and a US$ 23 million rebound from the Bill & Melinda Gates Foundation. The United States National Institutes of Health (US$ 201 million) and the Bill & Melinda Gates Foundation (US$ 181 million) were the largest funders of R&D.

Gender equality, human rights and health equity

- Malaria significantly affects people and communities living in poverty and situations of vulnerability, further impoverishing families and households, reducing productivity, discouraging investment and weakening national economies. An effective response requires an intersectional approach that integrates gender equality, human rights and health equity, and action on social and environmental determinants of health. Health systems need to be enhanced to ensure high-quality interventions are available and acceptable for all, and the active participation of affected populations and communities is needed in decision-making processes at all levels.
- Effectively addressing malaria requires understanding the intersection of various factors – biological, environmental, social, structural and economic vulnerabilities. Determinants such as, but not limited to, socioeconomic status, gender, disability, ethnicity (including Indigeneity) and migrant status can increase an individual's risk of malaria and the barriers they face in accessing services and malaria interventions. Additionally, persistent health inequities, driven by discrimination and social exclusion, disproportionately affect populations living in poverty. To overcome these barriers, it is essential to address the underlying

determinants of health and build or strengthen health systems to ensure timely access to appropriate interventions and services.

- In some sub-Saharan African countries, malaria prevalence among children aged under 5 years is highest in households living in poverty and declines with increasing economic status, emphasizing the significant impact of wealth on malaria risk.
- Harmful gender norms and relations often lead to economic, educational and informational inequities, particularly for women. Low levels of education, restricted financial resources and a lack of influence in household decision-making among women impede the ability of a woman to protect both herself and her child from infection and prevent her from accessing prompt diagnosis and treatment. Pregnant women and adolescent girls who have attained higher education are more likely to have completed three or more doses of IPTp with sulfadoxine–pyrimethamine and to use an ITN, compared with those who have little formal education.
- Men and boys, typically engaged in high-risk outdoor activities and occupations, can face increased malaria exposure; however, societal expectations often deter them from seeking prompt medical attention. In the Pan American Health Organization (PAHO) region, men and boys consistently accounted for more malaria cases and deaths between 2018 and 2023.
- Indigenous Peoples, migrants and persons with disabilities face unique barriers to accessing health care and interventions – including for malaria. For example, in 2023, Indigenous Peoples accounted for 31% of all malaria cases and 41% of all malaria-related deaths in the PAHO region. Globally, Indigenous women and adolescent girls face significant challenges in accessing antenatal care, often missing out on preventive malaria treatment, heightening health risks for both themselves and their children.
- Addressing overlapping vulnerabilities will require a gender-transformative, equity-oriented and human rights approach. Primary health care, as a foundation of health systems, must ensure that health care is affordable, accessible and of good quality, while fostering community participation and promoting a multisectoral response that addresses the root causes of malaria, such as poverty and gender inequities.
- Findings to date indicate that currently available disaggregated data lack the detail needed to adequately understand inequities faced by specific population groups. Incorporating qualitative data provides critical context, capturing social determinants and cultural dynamics that quantitative data alone cannot reveal. For example, in the WHO African Region, only 49% of countries can disaggregate data by sex, and in the Eastern Mediterranean Region, only 38% of countries can disaggregate data by age beyond children aged under 5 or over 5 years.
- Research and innovation should focus on equity, involving affected communities in the design and implementation of interventions to ensure they are suited to the context in which they will be equitably delivered and appropriately used.

1 Introduction

The world malaria report, published annually by the World Health Organization (WHO), offers an in-depth analysis of trends in malaria control and elimination across the globe. The initial draft was developed by a core team within the WHO Global Malaria Programme (WHO/GMP) following a thorough data collection, review and analysis process involving staff from the national malaria programme (NMP) and WHO at all levels of the Organization. The consolidated draft was shared for engagement with multiple external stakeholders and financial and technical partners. External reviewers contributed to the report, and WHO assessed their declarations of interest; no conflicts were identified. External reviewers also provided feedback which was used at the discretion of WHO to refine the draft before a comprehensive internal WHO executive clearance process.

This year's report draws on 2023 data from 83 malaria endemic countries, including the territory of French Guiana. The report presents trends in malaria morbidity and mortality globally and by region, as well as progress towards the milestones and targets of the WHO *Global technical strategy for malaria 2016–2030* (GTS). It tracks investments in malaria programmes and research, advancements and gaps across all intervention areas (including prevention, diagnosis, treatment and elimination) and biological threats. This chapter provides an overview of the context behind the data, including priority initiatives, guidance and strategic areas of focus for WHO in the period 2023–2024.

1.1 Priority initiatives

1.1.1 Malaria Ministerial Conference

The Malaria Ministerial Conference, co-hosted by WHO and the Government of Cameroon on 6 March 2024, sought to reinvigorate malaria responses in high-burden African countries by leveraging political commitment, scientific innovation and community engagement. The pivotal meeting brought together more than 400 stakeholders, including ministers of health and senior representatives from malaria endemic countries in Africa, global health leaders, scientists, civil society and other partners.

At the end of the meeting and in the weeks that followed, ministers of health from the 11 high burden to high impact (HBHI) African countries (Burkina Faso, Cameroon, the Democratic Republic of the Congo, Ghana, Mali, Mozambique, the Niger, Nigeria, the Sudan, Uganda and the United Republic of Tanzania) signed the Yaoundé Declaration, pledging their "unwavering commitment" to the principle that "no one should die from malaria given the tools and systems available". To this end, ministers further committed to seven key actions:

- strengthening political will;
- ensuring the strategic use of information for action;
- providing better technical guidance;
- enhancing coordination and multisectoral action;
- strengthening national health systems;
- building collaborative partnerships for resource mobilization, research and innovation; and
- ensuring a functional malaria accountability mechanism.

Successful implementation of the Yaoundé Declaration will rely on efforts by countries to translate these pledges into concrete actions and resources that save lives. WHO is supporting the development of a monitoring and evaluation and accountability framework to monitor progress towards the Yaoundé commitments.

> *"In signing the Yaoundé Declaration, the Honourable Ministers have helped lay a foundation that will ensure a brighter future for children across Africa. Together, and with all stakeholders united, we can change the story of malaria for families and communities across the African continent."*
>
> Dr Jérôme Salomon, Assistant Director-General, Universal Health Coverage/ Communicable and Noncommunicable Diseases, WHO

1.1.2 WHO Global Malaria Programme operational strategy

Global malaria partners recognize the need to complement both the powerful pledges captured in the Yaoundé Declaration and the commitments of all WHO Member States enshrined in the GTS. With a presence in 150 countries, WHO is placed to help shape the malaria ecosystem and achieve impact at country level.

In April 2024, the WHO/GMP published a new operational strategy outlining its priorities for the period 2024–2030 and its four strategic objectives to control and eliminate malaria: developing and disseminating norms and standards; stimulating the development and timely introduction of new tools and innovation; promoting the use of strategic information for impact; and providing technical leadership for the global malaria response (*1*).

These strategic objectives are supported by five transversal enablers: i) complementarity across the three levels of WHO; ii) cross-division and departmental coordination; iii) partner engagement; iv) internal transformation and talent retention; and v) predictable financing.

WHO/GMP has developed detailed operational plans that outline specific activities to be completed within defined time periods. It will monitor and track progress across these activities to ensure the consistent delivery of the strategy. Progress reports will be shared annually with donors and partners.

"Malaria is a preventable and fully treatable disease. With adequate investments, the right mix of interventions and robust commitment from stakeholders, we can build a healthier future for all."

Dr Daniel Ngamije, Director, WHO/GMP

1.2 New and updated WHO malaria guidance

In response to ever-increasing financial constraints, WHO has developed a set of "guiding principles" for prioritizing high-impact malaria interventions – a collaborative effort with NMPs and partners (*2*). The guidance, published in May 2024, aims to support malaria programmes in defining the most appropriate mix of interventions in resource-limited settings.

Throughout 2023 and 2024, WHO published other critical guidance and reports across a range of technical areas.

1.2.1 Vector control

In recent years, *Anopheles stephensi* has presented a new challenge for malaria control in the African continent, with detections of the invasive mosquito species reported, to date, in eight countries. In July 2024, WHO published a summary of lessons learned from three countries in Asia that have been working to control *An. stephensi* over many decades: India, the Islamic Republic of Iran and Sri Lanka (*3*).

While indoor residual spraying (IRS) has been widely used to kill malaria-carrying *Anopheles* mosquitoes, it can also kill insects that transmit other deadly and debilitating diseases, such as dengue, Chikungunya, yellow fever, Zika virus disease, leishmaniasis and Chagas disease. In February 2024, WHO published an updated operational manual on IRS with an expanded scope that encompasses malaria and other vector-borne diseases (*4*), with the aim of supporting integrated disease control.

In March 2023, WHO published recommendations on two new types of insecticide-treated mosquito nets (ITNs): 1) pyrethroid–chlorfenapyr nets combine a pyrethroid and a pyrrole insecticide to enhance the killing effect of the net; and 2) pyrethroid–pyriproxyfen nets combine a pyrethroid with an insect growth regulator, which disrupts mosquito growth and reproduction (*5*). These dual active ingredient nets were designed to provide greater protection against malaria than pyrethroid-only nets.

1.2.2 Chemoprevention

Although intermittent preventive treatment of malaria in pregnancy with sulfadoxine–pyrimethamine (IPTp-SP) is a long-standing WHO recommendation, less than half (44%) of eligible pregnant women and girls in 34 African countries benefited from the recommended three or more doses of the preventive therapy in 2023. A WHO field guide (*6*), published in January 2024, aims to increase IPTp-SP coverage using a community-based delivery approach through trained community health workers, complementing the provision of IPTp-SP at antenatal care (ANC) clinics.

Seasonal malaria chemoprevention (SMC) is a safe and cost-effective strategy for preventing malaria among young children in areas where the disease is highly seasonal, with most cases occurring during the rainy season. An updated WHO field guide (*7*), published in May 2023, builds on more than 10 years of SMC deployment and reflects the latest WHO guidance on this intervention, introduced in the *WHO guidelines for malaria* in June 2022.

1.2.3 Vaccines

In October 2023, WHO recommended a second vaccine, R21/Matrix-M (R21), to prevent malaria among children living in areas of risk (*8*). The addition of R21 to complement the ongoing rollout of the first malaria vaccine, RTS,S/AS01 (RTS,S), is expected to result in sufficient vaccine supply to benefit all children living in areas where malaria is a major public health problem.

1.2.4 Case management

WHO has updated the *Response plan to* pfhrp2 *gene deletions* (*9*) and the master protocol for surveillance of *pfhrp2/3* gene deletions (*10*) to support the early detection of *pfhrp* deletions and response to their spread. The latest update of the *WHO guidelines for malaria* includes new recommendations on use of near-patient glucose-6-phosphate dehydrogenase tests to guide the use of tafenoquine and new regimens of primaquine as anti-relapse treatment of *P. vivax* and *P. ovale* infections (*11*). WHO has also recently released *Multiple first-line therapies as part of the response to antimalarial drug resistance: an implementation guide* (*12*), to inform country plans for implementing this new approach in malaria treatment policy.

Malaria in pregnancy is associated with negative health outcomes for both the mother and infant; it not only contributes significantly to childhood illness and death, but also heightens the risk of adverse events for pregnant women and girls and their developing fetuses. A WHO publication released in April 2024 presents an evidence review of the effects and safety of artemisinin and non-artemisinin antimalarial medicines during the first trimester of pregnancy (*13*).

Prompt, effective antimalarial treatment and supportive care can substantially reduce the rate of mortality from severe malaria. In November 2023, WHO published a field guide that aims to support the effective deployment of rectal artesunate as a pre-referral treatment for suspected severe malaria among young children (*14*).

1.2.5 Elimination

A series of three WHO reports released in 2023 and 2024 detail the strategies to contain outbreaks, eliminate the disease and prevent malaria's return in Sri Lanka, Uzbekistan and Kyrgyzstan (*15-17*). These three countries were awarded WHO malaria free certification, in 2016 for Sri Lanka and Kyrgyzstan, and in 2018 for Uzbekistan, after facing resurgence challenges before elimination. The reports highlight effective policies and offer lessons for other countries aiming to eliminate the disease.

1.3 Introduction of new, high-impact tools

1.3.1 Vaccines

In December 2023, WHO added R21 to its list of prequalified vaccines, marking another milestone in the global malaria response. R21 is the second malaria vaccine to be prequalified by WHO, following the prequalification of RTS,S in July 2022. The WHO-led prequalification process ensures that vaccines and other medical products meet global standards of quality, safety and efficacy.

In 2024, Ghana, Kenya and Malawi continued to offer the malaria vaccine through the routine childhood immunization platform, with support from Gavi, the Vaccine Alliance (Gavi), WHO and other partners. By early November 2024, an additional 13 countries were offering malaria vaccines subnationally. More countries are planning introductions in the coming months, and others are preparing for scale-up, prioritizing areas of moderate and high transmission. Demand for the vaccine remains high, and supply is sufficient to meet demand.

The scale-up of malaria vaccines in Africa is expected to save tens of thousands of young lives every year. As with all malaria prevention tools, the highest impact will be achieved when the vaccines are introduced as part of a mix of WHO-recommended malaria interventions that are tailored to the local context.

1.3.2 New-generation nets

The broader availability and use of dual active ingredient ITNs have also offered fresh hope for malaria control efforts in sub-Saharan Africa. According to the New Nets Project (*18*) – a collaborative initiative between the Innovative Vector Control Consortium, the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) and Unitaid – clinical trials and pilot studies found that dual active ingredient ITNs improved malaria control by 20–50% compared with standard pyrethroid-only nets; the studies were conducted between 2019 and 2022 in 17 countries in sub-Saharan Africa reporting insecticide resistance.

1.4 Climate and inequity in the global malaria response

The 2023 edition of the world malaria report featured a special focus on the intersection between malaria and climate change. In a warming world, rising temperatures and changing weather patterns continue to affect the health, security and livelihoods of people across the globe. Populations in situations of vulnerability in Africa are particularly affected by the most severe impacts of climate change, and many of these same communities are also at high risk of contracting malaria.

Extreme weather events can have a major impact on malaria burden. In Pakistan, for example, extreme rainfall affected large areas of the country, with evidence indicating that climate change intensified the severity of the monsoon season. Following the floods, a major malaria epidemic ensued, leading to a fivefold increase in malaria cases in 2022, compared with the previous year. Extreme weather events are expected to become even more severe and more common as a result of climate change.

This year's world malaria report introduces, for the first time, a dedicated chapter highlighting the need for a more inclusive and effective response to malaria, with an emphasis on reaching those in situations of greatest vulnerability to the disease. Many people at highest risk are still unable to access the needed interventions for prevention, detection and treatment of malaria. The situation is further exacerbated by conflict, climate variability and migration, among other challenges.

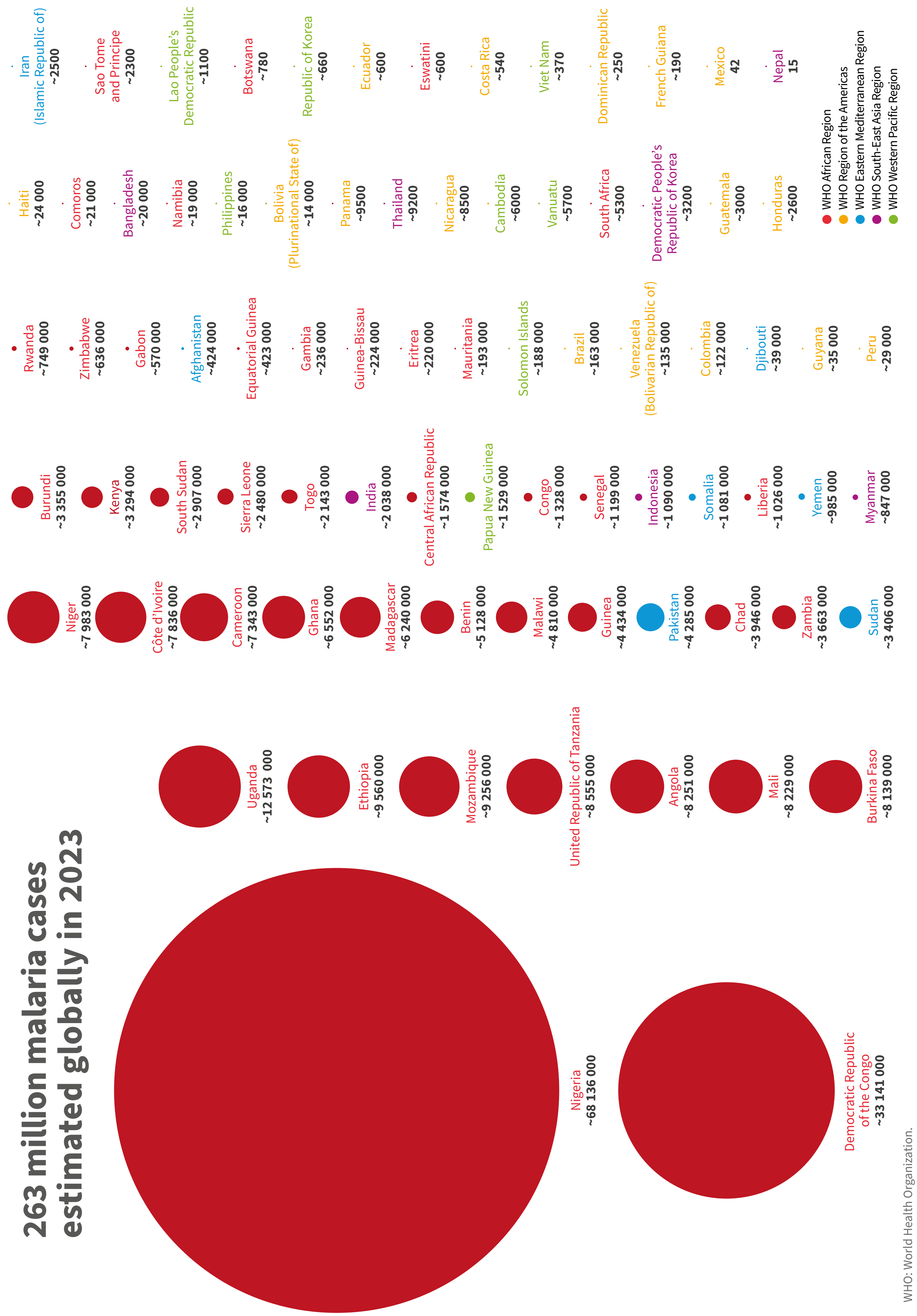
2 Global trends in the burden of malaria

This chapter presents the number of clinical malaria cases and deaths estimated to have occurred in the period 2000–2023, and the malaria case incidence and mortality rate. These estimates were used to compute the number of cases and deaths averted, globally and by WHO region, since 2000. This chapter also presents estimates of the prevalence of exposure to malaria during pregnancy and the burden of low birthweights averted under different scenarios of IPTp coverage.

The methods used to estimate the burden of malaria cases and deaths depend on the quality of the national surveillance systems and the availability of data over time (see **Annex 1**). Most of the global malaria burden is accounted for by countries with moderate to high transmission in sub-Saharan Africa (**Fig. 2.1**); however, these countries generally have weak surveillance systems. Case estimates for these countries are calculated using an approach that transforms modelled community parasite prevalence into case incidence. Each year, population estimates are updated in line with United Nations (UN) population growth projections (*19*). As these population estimates change, the estimated incidence that was previously reported may also change. Malaria deaths for these countries are estimated from a cause of death fraction (*20, 21*) for malaria that is applied to the trends in all-cause mortality in children aged under 5 years (*22, 23*). For countries with stronger surveillance systems, either reported national cases are used without adjustments or cases are estimated by adjusting reported cases for rates of treatment seeking, testing and reporting. Where adjustments are applied to reported cases, malaria deaths are estimated by applying species-specific case fatality rates to the estimated number of *P. falciparum* and *P. vivax* cases.

Between 2020 and 2022, but not in 2023, estimates for both cases and deaths included the impact of disruptions to essential malaria services during the coronavirus disease (COVID-19) pandemic (as reported by countries through the WHO global pulse surveys on continuity of essential health services during the pandemic) (*24*).

Fig. 2.1. Estimated number of malaria cases per country and area in 2023 *Source: WHO database*.



2.1 Global estimates of malaria cases and deaths, 2000–2023

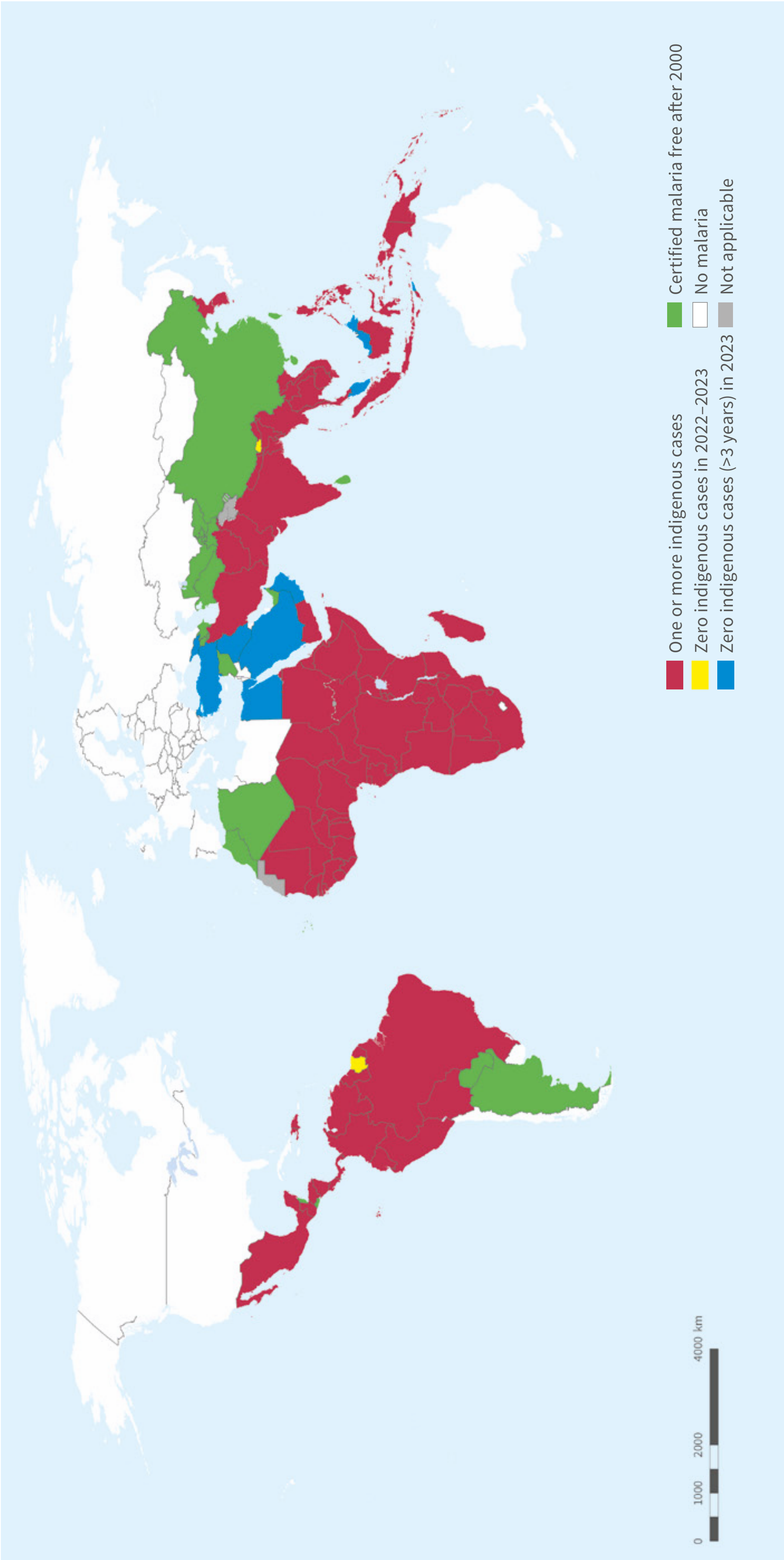
Globally in 2023, there were almost 263 million estimated malaria cases (between lower and upper bounds of 238 million and 294 million, respectively) (**Table 2.1**) in 83 malaria endemic countries (including the territory of French Guiana) (**Fig. 2.2**), an increase of 11 million cases compared with 2022. Between 2000 and 2019, the number of annual estimated malaria cases remained stable, varying between 227 million and 248 million across the 108 countries that were malaria endemic in 2000. Since 2020, the number of estimated malaria cases has steadily increased, and most of this increase occurred in countries in the WHO African Region (89.7%) and the WHO Eastern Mediterranean Region (15.5%). The main countries contributing to the increase in cases between 2022 and 2023 were Ethiopia (+4.5 million), Madagascar (+2.7 million), Pakistan (+1.6 million), Nigeria (+1.4 million) and the Democratic Republic of the Congo (+600 000).

Table 2.1. Global estimated malaria cases and deaths, 2000–2023[a] *Source: WHO estimates*.

	Number of cases (000)				Number of deaths		
Year	Point	Lower bound	Upper bound	% *P. vivax*	Point	Lower bound	Upper bound
2000	**238 000**	223 000	258 000	6.1%	**861 000**	831 000	901 000
2001	**245 000**	229 000	266 000	6.9%	**870 000**	838 000	914 000
2002	**243 000**	226 000	264 000	6.5%	**838 000**	808 000	881 000
2003	**248 000**	231 000	271 000	7.1%	**809 000**	778 000	853 000
2004	**250 000**	231 000	278 000	7.4%	**805 000**	769 000	862 000
2005	**250 000**	232 000	275 000	7.6%	**766 000**	735 000	815 000
2006	**245 000**	227 000	269 000	6.6%	**773 000**	740 000	822 000
2007	**241 000**	223 000	263 000	6.3%	**751 000**	718 000	793 000
2008	**240 000**	223 000	261 000	6.1%	**713 000**	682 000	753 000
2009	**246 000**	227 000	270 000	6.0%	**723 000**	688 000	770 000
2010	**248 000**	229 000	273 000	6.2%	**700 000**	664 000	754 000
2011	**241 000**	223 000	264 000	6.3%	**662 000**	631 000	706 000
2012	**237 000**	220 000	258 000	5.8%	**617 000**	587 000	657 000
2013	**231 000**	215 000	249 000	4.6%	**588 000**	558 000	631 000
2014	**227 000**	211 000	246 000	3.6%	**585 000**	550 000	638 000
2015	**226 000**	210 000	245 000	2.9%	**578 000**	543 000	635 000
2016	**229 000**	212 000	248 000	3.1%	**577 000**	542 000	634 000
2017	**237 000**	219 000	257 000	2.6%	**574 000**	539 000	638 000
2018	**234 000**	217 000	255 000	2.5%	**574 000**	535 000	647 000
2019	**236 000**	216 000	258 000	2.3%	**567 000**	527 000	649 000
2020	**247 000**	224 000	276 000	1.7%	**622 000**	578 000	736 000
2021	**249 000**	225 000	276 000	1.8%	**602 000**	559 000	716 000
2022	**252 000**	228 000	282 000	2.5%	**600 000**	555 000	726 000
2023	**263 000**	238 000	294 000	3.5%	**597 000**	548 000	723 000

P. vivax: *Plasmodium vivax*; WHO: World Health Organization.
[a] Estimated cases and deaths are shown with 95% upper and lower confidence intervals.

Fig. 2.2. Countries and areas with indigenous cases in 2000 and their status by 2023[a,b] *Source: WHO database.*



WHO: World Health Organization.

[a] Malaysia has a significant number of indigenous malaria cases caused by *Plasmodium knowlesi* infection.

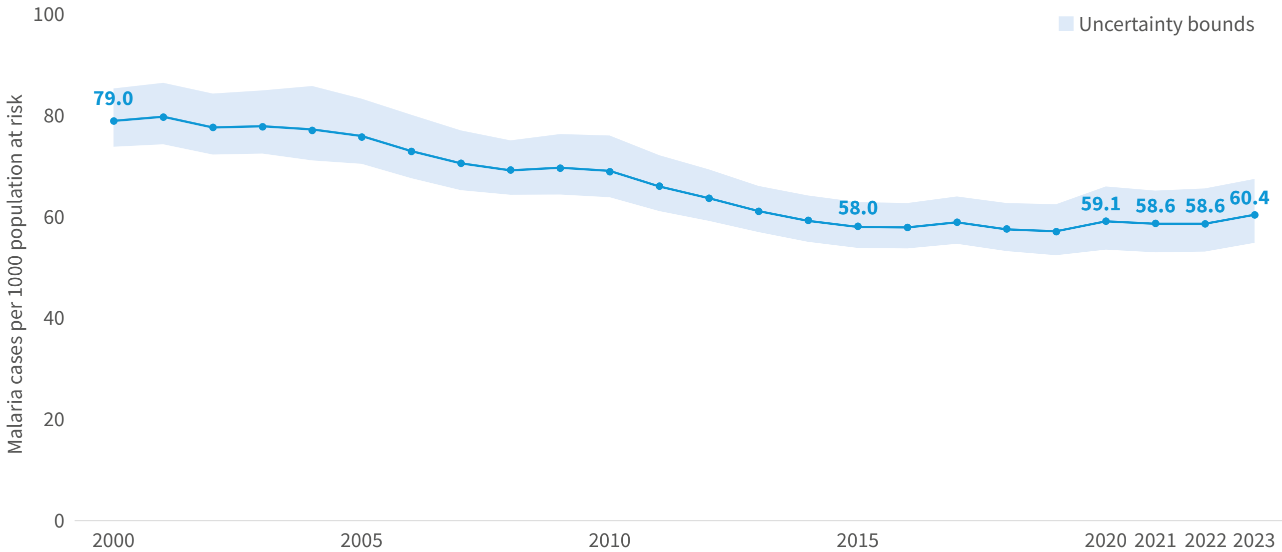
[b] Countries and areas with zero indigenous cases for at least 3 consecutive years are considered to have eliminated malaria. In 2023, Malaysia reported zero indigenous cases caused by human *Plasmodium* species[a] for the sixth consecutive year, and Saudi Arabia and Timor-Leste reported zero indigenous cases for the third consecutive year, ending the malaria epidemic. Cabo Verde and Belize were certified malaria free in 2023, following 4 years of zero malaria cases. Egypt has since been certified malaria free in 2024.

Malaria case incidence declined between 2000 and 2015, from 79.0 to 58.0 per 1000 population at risk. Between 2015 and 2022, incidence remained stable. In 2023, malaria case incidence slightly increased compared with 2022, from 58.6 to 60.4 per 1000 population at risk (**Fig. 2.3a**). While the incidence remained similar between 2022 and 2023 in Nigeria and the Democratic Republic of the Congo (meaning that the increase in cases is likely due to population growth only), the estimated incidence increased by 82%, 71% and 59% in Ethiopia, Madagascar and Pakistan, respectively.

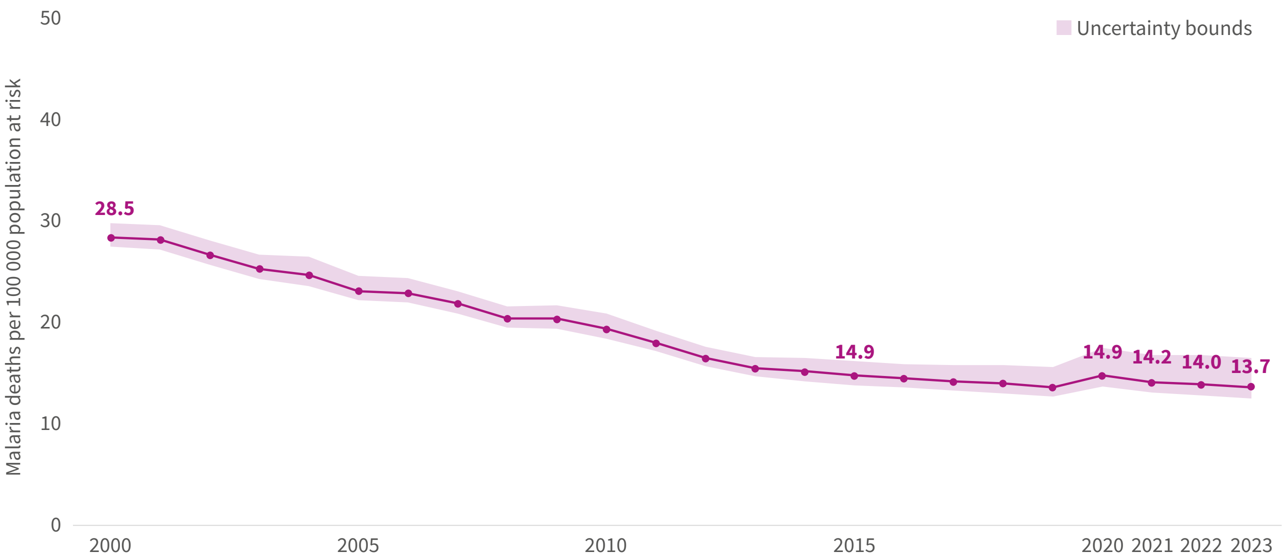
Since 2000, malaria deaths declined steadily from 861 000 to 567 000 in 2019. In 2020, there was an increase of 55 000 malaria deaths to an estimated 622 000 as a result of the COVID-19 pandemic (**Table 2.1**). Between 2021 and 2023, deaths declined again to 597 000. The malaria mortality rate followed a similar trend between 2000 and

Fig. 2.3. Global trends in a) malaria case incidence (cases per 1000 population at risk) and b) mortality rate (deaths per 100 000 population at risk), 2000–2023; and c) distribution of malaria cases and d) deaths, by country, 2023 *Source: WHO estimates.*

a)



b)

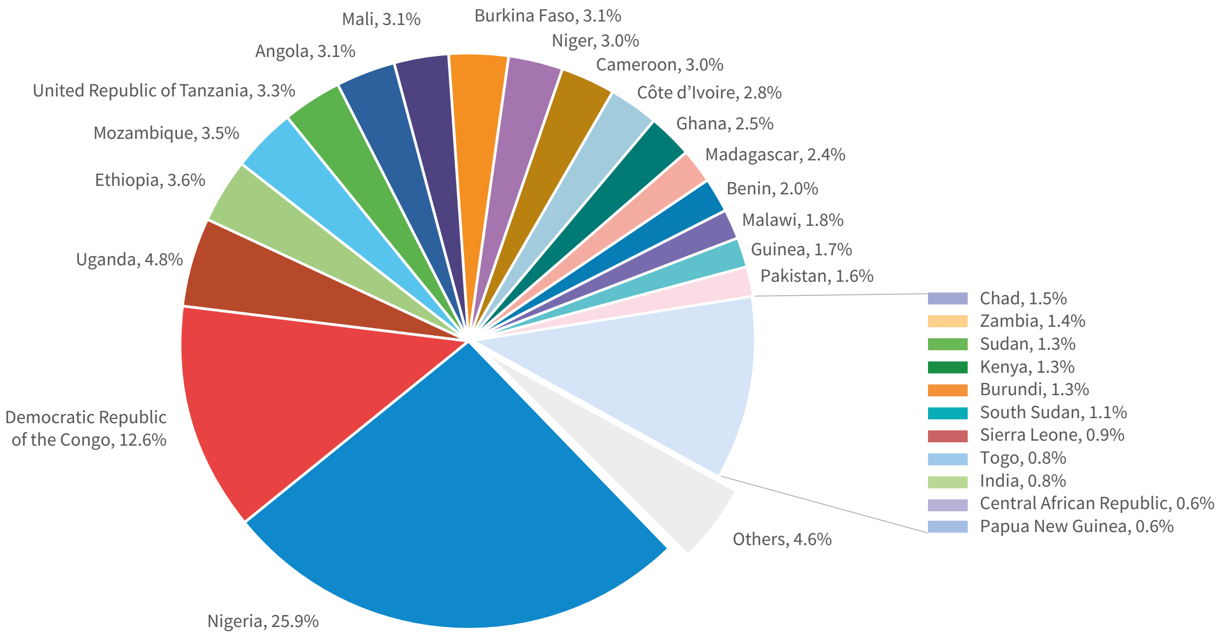


WHO: World Health Organization.

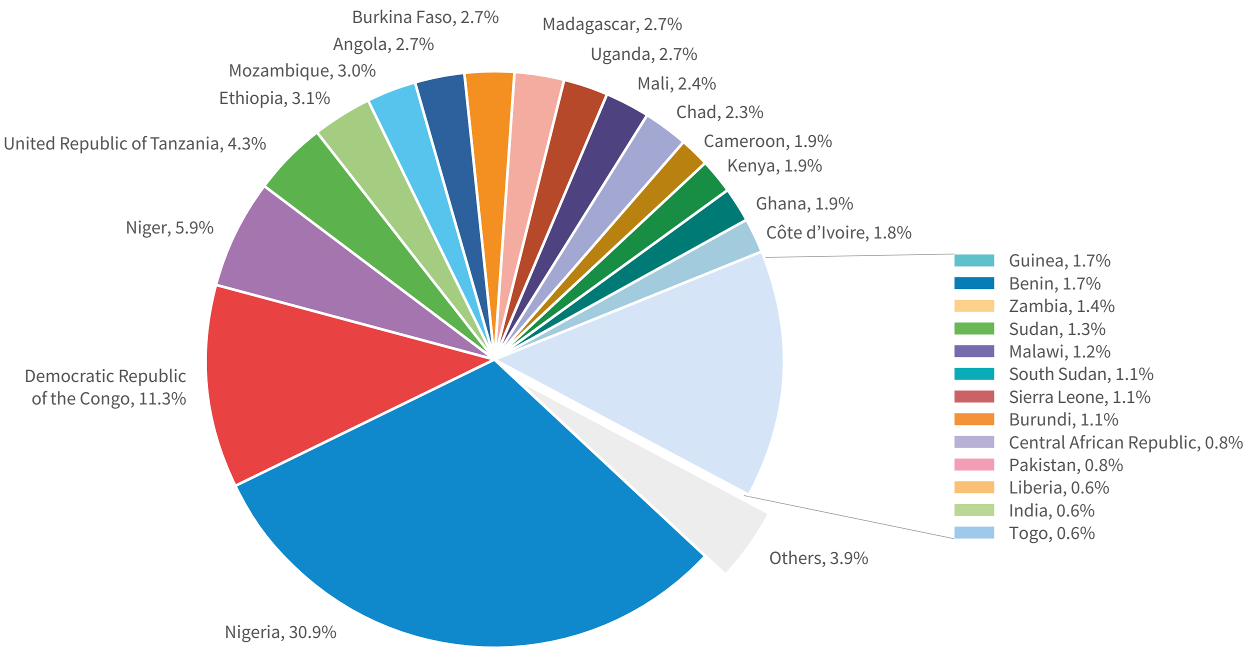
2023, declining from 28.5 to 13.7 per 100 000 population at risk. (**Fig. 2.3b**). The percentage of total malaria deaths among children aged under 5 years declined between 2000 and 2023, from 86.7% to 73.7%.

In 2023, 29 of the 83 countries (including the territory of French Guiana) that were malaria endemic accounted for almost 95% of malaria cases and 96% of deaths globally (**Fig. 2.3c-d**). Five countries – Nigeria (25.9%), the Democratic Republic of the Congo (12.6%), Uganda (4.8%), Ethiopia (3.6%) and Mozambique (3.5%) – accounted for just over half of all cases (**Fig. 2.3c**). Four countries accounted for just over half of all malaria deaths globally: Nigeria (30.9%), the Democratic Republic of the Congo (11.3%), the Niger (5.9%) and the United Republic of Tanzania (4.3%) (**Fig. 2.3d**). Nigeria accounted for 39.3% of global malaria deaths in children aged under 5 years.

c)



d)



2.2 Estimated malaria cases and deaths in the WHO African Region, 2000–2023

In 2023, there were 246 million cases and 569 000 deaths in the WHO African Region. Over the past 5 years, between 2019 and 2023, estimated malaria cases and deaths increased by 23 million and 24 000, respectively (**Table 2.2**), with a peak at 598 000 estimated deaths in 2020, linked to COVID-19. Since then, the number of estimated deaths has decreased by 29 000. This region accounted for about 94% of cases and 95% of deaths globally; 76% of all deaths in this region were among children aged under 5 years in 2023, compared with 91% in 2000.

Following similar trends, since 2000, malaria case incidence reduced from 356 to 227 cases per 1000 population at risk in 2023 (**Fig. 2.4a**). Over the past 5 years (2019–2023), while the incidence has remained similar, the increase in estimated cases is a result of a population at risk that is rapidly increasing and has nearly doubled in sub-Saharan Africa since the turn of the century. Between 2000 and 2023, the malaria mortality rate reduced by 63%, from 140 to 52 per 100 000 population at risk (**Fig. 2.4b**). In 2023, Botswana, the Comoros, Eritrea, Eswatini, and Sao Tome and Principe all reported fewer than 10 deaths (see **Annex 4-J**).

Since 2015, the rate of progress in both cases and deaths has stalled in several countries with moderate or high transmission (**Fig. 2.4a-b**).

Over the past 5 years, between 2019 and 2023, there were substantial increases in estimated case numbers in Nigeria (6.8 million), Ethiopia (6.9 million), Madagascar (4.2 million), the United Republic of Tanzania (1.9 million), the Democratic Republic of the Congo (1.8 million),

Table 2.2. Estimated malaria cases and deaths in the WHO African Region, 2000–2023[a] *Source: WHO estimates.*

	Number of cases (000)				Number of deaths		
Year	**Point**	**Lower bound**	**Upper bound**	**% *P. vivax***	**Point**	**Lower bound**	**Upper bound**
2000	**204 000**	189 000	222 000	0.0%	**805 000**	781 000	836 000
2001	**211 000**	195 000	230 000	0.9%	**815 000**	789 000	853 000
2002	**211 000**	195 000	230 000	0.9%	**787 000**	761 000	820 000
2003	**215 000**	198 000	236 000	1.1%	**758 000**	733 000	793 000
2004	**216 000**	197 000	244 000	1.2%	**751 000**	722 000	805 000
2005	**214 000**	197 000	237 000	0.8%	**712 000**	686 000	753 000
2006	**214 000**	196 000	236 000	1.0%	**723 000**	695 000	765 000
2007	**211 000**	195 000	233 000	1.0%	**704 000**	677 000	742 000
2008	**211 000**	195 000	230 000	0.8%	**666 000**	641 000	699 000
2009	**216 000**	199 000	237 000	1.0%	**673 000**	646 000	717 000
2010	**217 000**	200 000	241 000	1.2%	**650 000**	619 000	699 000
2011	**214 000**	197 000	235 000	1.4%	**618 000**	591 000	657 000
2012	**212 000**	196 000	232 000	1.5%	**578 000**	551 000	615 000
2013	**211 000**	196 000	229 000	1.2%	**556 000**	527 000	598 000
2014	**208 000**	192 000	226 000	0.7%	**551 000**	518 000	601 000
2015	**210 000**	194 000	229 000	0.6%	**550 000**	516 000	605 000
2016	**212 000**	195 000	231 000	0.4%	**546 000**	513 000	603 000
2017	**221 000**	204 000	241 000	0.4%	**548 000**	513 000	609 000
2018	**220 000**	202 000	241 000	0.2%	**551 000**	514 000	624 000
2019	**223 000**	203 000	245 000	0.3%	**545 000**	504 000	626 000
2020	**235 000**	211 000	263 000	0.3%	**598 000**	552 000	711 000
2021	**236 000**	213 000	264 000	0.3%	**578 000**	536 000	691 000
2022	**237 000**	213 000	265 000	0.5%	**573 000**	532 000	698 000
2023	**246 000**	221 000	277 000	1.1%	**569 000**	521 000	694 000

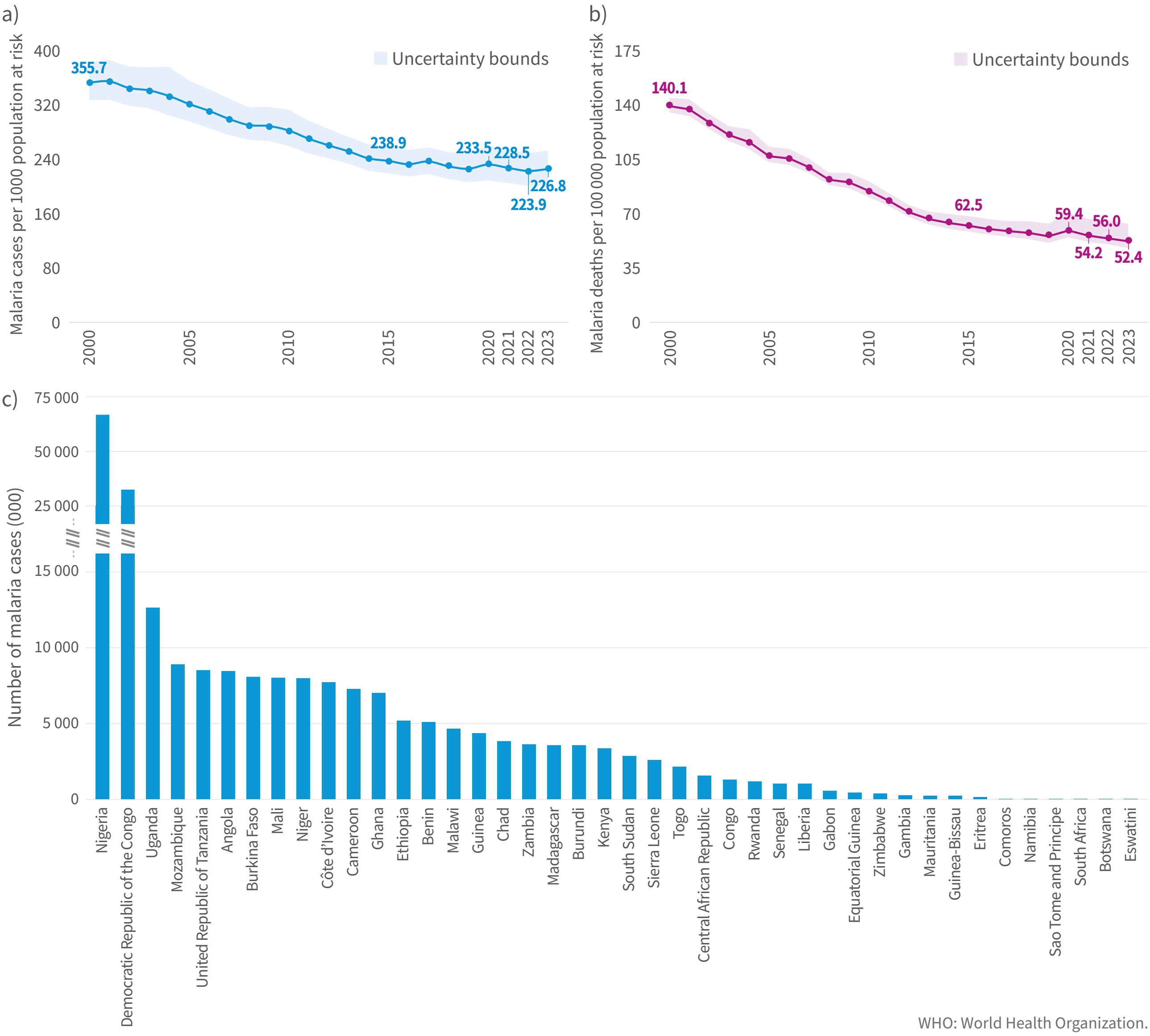
P. vivax: *Plasmodium vivax*; WHO: World Health Organization.

[a] Estimated cases and deaths are shown with 95% upper and lower confidence intervals.

Uganda (1.3 million), Mali (1.4 million) and Cameroon (1.2 million) (**Fig. 2.4c**). Over the past 2 years, Ethiopia has faced several challenges, including but not limited to suboptimal implementation of malaria prevention and control measures in conflict-affected areas, emergence of new vector *An. stephensi*, vector resistance to insecticides, and climate change and variability. Madagascar experienced extreme weather events, such as cyclones, heavy rain and flooding, which can provide ideal breeding conditions for the *Anopheles* mosquito, as well as disrupt infrastructure and prevent people from reaching health care (*25*). Between 2019 and 2023, Rwanda saw a consistent decrease in estimated malaria cases, from 4.9 million to 749 000. Several factors may explain this reduction. The government adopted a multisectoral approach, combining political engagement, local leadership ownership, and decentralization. The malaria control programme strengthened surveillance systems and used data to target interventions in the most at-risk areas and populations. This included the rollout of IRS in 12 high-endemic districts and the distribution of ITNs in areas with high and moderate transmission, while increasing the use of new-generation nets in response to reported pyrethroid resistance. Access to malaria diagnostics and treatment was expanded to include community care for adults, in addition to children. Public awareness campaigns promoting free malaria diagnosis and treatment services, the use of preventive measures, and community involvement in their implementation may have also contributed to the decline (personal communication).[1]

[1] Dr Aimable Mbituyumuremyi – Head of Malaria and other Parasitic diseases Division in Rwanda Biomedical Center (Ministry of Health, Rwanda), personal communication, October 2024.

Fig. 2.4. Trends in a) malaria case incidence (cases per 1000 population at risk) and b) mortality rate (deaths per 100 000 population at risk), 2000–2023; and c) malaria cases by country in the WHO African Region, 2023
Source: WHO estimates.



WHO: World Health Organization.

2.3 Estimated malaria cases and deaths in the WHO Region of the Americas, 2000–2023

Between 2000 and 2023, in the WHO Region of the Americas, malaria cases and incidence declined by 65.4% (from almost 1.6 million to 0.55 million) and 73.7% (from 13.5 to 3.6 cases per 1000 population at risk), respectively (**Table 2.3**, **Fig. 2.5a**). Over the same period, malaria deaths and the mortality rate reduced by 61.8% (from 896 to 342) and 71% (from 0.8 to 0.2 deaths per 100 000 population at risk), respectively (**Table 2.3**, **Fig. 2.5b**). In 2023, Brazil, the Bolivarian Republic of Venezuela and Colombia accounted for 76.8% of all cases in this region (**Fig. 2.5c**). Most of the cases in this region are due to *P. vivax* (72.1% in 2023).

In 2023, several countries experienced a reduction in case burden. In the Bolivarian Republic of Venezuela, although the number of cases increased significantly from 35 500 in 2000 to over 467 000 by 2019, they decreased by more than half to 223 000 cases in 2020. Over the past 3 years, the number has continued to decline, reaching about 135 000 in 2023. Several factors may have contributed to this reduction, including but not limited to the initially low population mobility resulting from COVID-19 pandemic restrictions, an increase in malaria diagnosis and treatment availability, and long-lasting insecticidal net (LLIN) distribution (with support from the Global Fund). Compared with 2022, Mexico (74% reduction), Nicaragua (58%), Ecuador (55%), Honduras (27%), the Dominican Republic (21%), Peru (18%) and Haiti (9%) also experienced a reduction in cases in 2023. Suriname reported zero indigenous cases for the second consecutive year in 2023. Several programmatic factors may explain the reduction in cases: countries such as Nicaragua, Ecuador and Mexico implemented effective programmes that expanded access to diagnostics and treatment, along with

Table 2.3. Estimated malaria cases and deaths in the WHO Region of the Americas, 2000–2023[a] *Source: WHO estimates.*

Year	Number of cases (000)				Number of deaths		
	Point	Lower bound	Upper bound	% *P. vivax*	Point	Lower bound	Upper bound
2000	**1 583**	1 424	1 752	71.5%	**896**	739	1 112
2001	**1 297**	1 169	1 430	67.3%	**805**	668	1 008
2002	**1 183**	1 077	1 297	67.9%	**732**	590	940
2003	**1 159**	1 066	1 263	68.5%	**709**	569	922
2004	**1 147**	1 067	1 236	69.5%	**685**	543	894
2005	**1 273**	1 201	1 359	70.3%	**659**	513	875
2006	**1 097**	1 031	1 174	68.3%	**563**	425	772
2007	**989**	908	1 073	70.2%	**496**	376	686
2008	**696**	643	761	71.1%	**461**	316	693
2009	**688**	636	752	70.5%	**452**	311	673
2010	**818**	745	900	70.9%	**492**	344	715
2011	**615**	569	672	68.9%	**459**	315	670
2012	**585**	545	635	68.9%	**425**	305	598
2013	**576**	531	629	64.1%	**467**	329	645
2014	**475**	444	511	69.8%	**346**	257	448
2015	**573**	530	620	70.1%	**385**	282	498
2016	**688**	637	748	67.3%	**523**	373	685
2017	**946**	878	1 029	73.9%	**665**	447	904
2018	**929**	861	1 012	78.1%	**572**	388	770
2019	**897**	827	984	77.2%	**509**	337	697
2020	**654**	604	710	68.2%	**415**	291	554
2021	**580**	540	626	71.3%	**330**	242	433
2022	**528**	491	569	72.6%	**322**	239	411
2023	**548**	506	594	72.1%	**342**	266	428

P. vivax: *Plasmodium vivax*; WHO: World Health Organization.

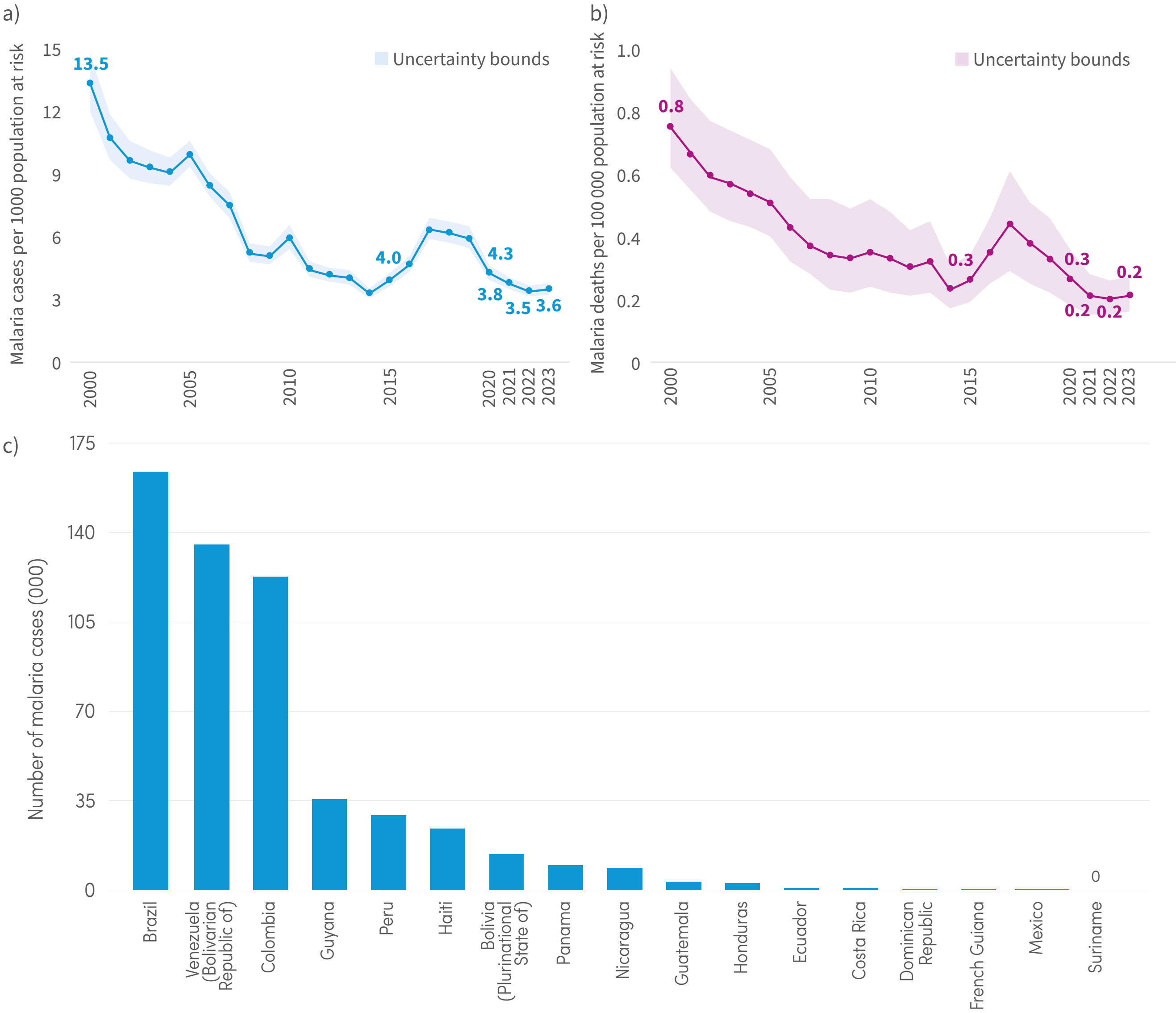
[a] Estimated cases and deaths are shown with 95% upper and lower confidence intervals.

strengthened surveillance efforts to enable early diagnosis and prompt response.

From 2022 to 2023, estimated cases increased in several countries and areas: French Guiana (up 800% to 189), Panama (up 100% to 9485), Guatemala (up 64.1%), Costa Rica (up 33.7%), Guyana (up 33.1%) and Colombia (up 20.4%). Colombia reported the highest number of *P. falciparum* malaria cases on the continent. In Costa Rica, cases have been rising since 2021, with over 80% now caused by *P. falciparum*, compared to previous years, when the majority were caused by *P. vivax*. In remote regions of the Amazon basin, gold-mining activities attract migrant and local populations with limited access to health care, increasing vulnerability to malaria and putting populations at risk of severe disease. This has likely sustained transmission in countries such as Guyana, Brazil, Colombia and the Bolivarian Republic of Venezuela, and disproportionately affected Indigenous Peoples and Afro-descendant populations. Indigenous Peoples experience substantial health inequities resulting in poorer health outcomes compared with the general population, including lower life expectancy and higher rates of diseases, along with increased maternal and infant mortality and malnutrition. These are worsened by stigma, poor access to quality health care, higher poverty rates and limited education (*26*). In Panama, transmission has risen along migration routes in the Darien region, an area receptive to malaria where populations have limited access to timely diagnosis and treatment.

Four countries – Argentina, Belize, El Salvador and Paraguay – were certified as malaria free in 2019, 2023, 2021 and 2018, respectively. There were few malaria-related deaths in the region, with an estimated 342 deaths in 2023, most being in adults (78%).

Fig. 2.5. Trends in a) malaria case incidence (cases per 1000 population at risk) and b) mortality rate (deaths per 100 000 population at risk), 2000–2023; and c) malaria cases by country in the WHO Region of the Americas, 2023 *Source: WHO estimates.*



WHO: World Health Organization.
Note: Suriname is still malaria endemic, with zero indigenous cases reported for the past 2 years.

2.4 Estimated malaria cases and deaths in the WHO Eastern Mediterranean Region, 2000–2023

Estimated malaria cases in the WHO Eastern Mediterranean Region reduced by 37.7% between 2000 and 2015, from 6.9 million to 4.3 million, before increasing by 137% between 2015 and 2023, to reach 10.2 million cases (**Table 2.4**). Between 2021 and 2023, there was an increase of 62%; this was mainly due to a large increase of 3.7 million malaria cases in Pakistan from a malaria outbreak caused by catastrophic flooding, which initially affected more than 30 million people (*27*). Other countries experienced significant increases, with the number of estimated cases in Afghanistan rising from 288 000 in 2022 to 424 000 in 2023. In 2023, 35.2% of the cases in this region were due to *P. vivax*, mainly in Afghanistan and Pakistan. Due to instabilities and serious security issues in the Sudan, incompleteness of reporting in Yemen, and concerns about data quality in Somalia, it has been difficult to obtain sufficiently reliable data to estimate the recent trends of the burden of malaria in these countries. As such, estimates have been based on data reported last year and should be interpreted with caution. WHO is supporting subnational burden estimation analyses in these countries for improved decision-making for malaria control.

Estimated malaria deaths reduced by about 39% between 2000 and 2015, from 13 500 to 8200, then increased to reach 18 300 deaths in 2023 (**Table 2.4**). There were increases in estimated deaths in Afghanistan, Djibouti, Pakistan, Somalia, the Sudan and Yemen. About half of the estimated deaths were in the Sudan, where 87% of cases are due to *P. falciparum*, which is responsible for almost all malaria-related fatalities and has a higher case fatality rate than *P. vivax*. In Pakistan, the largest increase in deaths was between 2021 and 2023, when deaths increased by 10 times from 460 to 4956. In 2022, flooding damaged

Table 2.4. Estimated malaria cases and deaths in the WHO Eastern Mediterranean Region, 2000–2023[a] *Source: WHO estimates.*

Year	Number of cases (000)				Number of deaths		
	Point	Lower bound	Upper bound	% *P. vivax*	Point	Lower bound	Upper bound
2000	**6 900**	5 400	10 900	27.4%	**13 500**	8 500	24 900
2001	**7 200**	5 600	11 800	27.2%	**14 100**	8 900	27 000
2002	**6 800**	5 200	12 100	28.1%	**13 200**	8 500	26 600
2003	**6 400**	5 000	11 200	29.0%	**12 300**	7 800	24 800
2004	**5 200**	4 200	8 700	25.1%	**10 500**	6 600	20 100
2005	**5 400**	4 200	9 400	22.3%	**11 200**	7 100	22 100
2006	**5 400**	4 200	10 100	20.4%	**11 400**	7 200	23 600
2007	**4 700**	3 700	6 500	24.4%	**9 600**	6 100	14 600
2008	**3 700**	2 900	5 100	28.9%	**7 100**	4 500	10 600
2009	**3 600**	2 800	5 300	29.7%	**6 900**	4 400	10 900
2010	**4 500**	3 400	6 500	28.9%	**8 600**	5 500	13 400
2011	**4 600**	3 400	6 600	39.2%	**7 800**	5 100	11 500
2012	**4 300**	3 300	6 100	33.1%	**7 900**	5 200	11 600
2013	**4 200**	3 300	5 600	34.3%	**7 500**	4 900	10 700
2014	**4 000**	3 300	5 100	31.2%	**7 500**	4 800	10 800
2015	**4 300**	3 500	5 700	30.1%	**8 200**	5 100	12 200
2016	**5 400**	4 200	7 000	36.1%	**9 500**	5 800	14 700
2017	**5 400**	4 100	7 400	30.0%	**10 300**	6 000	17 100
2018	**5 700**	4 200	8 100	26.4%	**11 300**	6 400	19 000
2019	**5 800**	4 200	8 300	21.8%	**12 000**	6 800	20 300
2020	**5 900**	4 200	8 500	17.5%	**12 900**	7 200	21 800
2021	**6 300**	4 500	9 000	17.8%	**13 600**	7 600	22 600
2022	**8 300**	6 400	11 300	29.2%	**16 000**	9 800	25 600
2023	**10 200**	8 100	13 300	35.2%	**18 300**	11 500	28 300

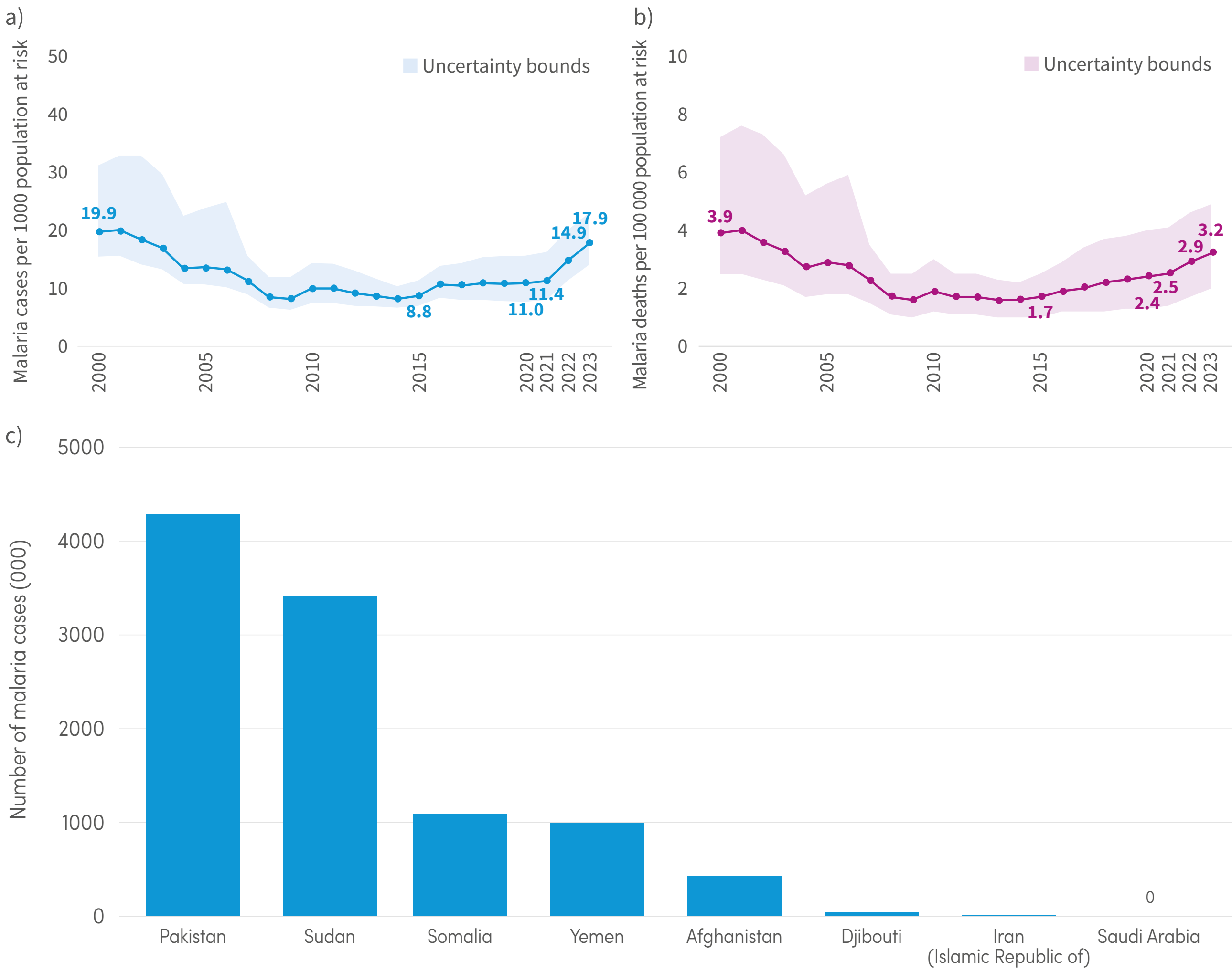
P. vivax: *Plasmodium vivax*; WHO: World Health Organization.

[a] Estimated cases and deaths are shown with 95% upper and lower confidence intervals.

more than 1000 health facilities in the country, resulting in millions of people lacking access to health care in affected districts (*27*). The floods have severely affected rural communities, particularly women, young children and the elderly, exacerbating existing spatial inequities in human development and access to services such as schools, health facilities and administrative centres (*28*).

Over the period 2000–2015, malaria case incidence declined from 19.9 to 8.8 cases per 1000 population at risk, and the mortality rate declined from 3.9 to 1.7 deaths per 100 000 population at risk (**Fig. 2.6a-b**). Following an increase in both incidence and mortality rate in 2016, trends remained stable until 2021. In 2023, however, there was an increase of 57.0% in estimated incidence compared with 2021, from 11.4 to 17.9 per 1000 population at risk, and an increase of 28.0% in mortality rate, from 2.5 to 3.2 per 100 000 population at risk. In 2023, Pakistan accounted for most of the estimated malaria cases in this region (41.9%), followed by the Sudan, Somalia, Yemen, Afghanistan and Djibouti (**Fig. 2.6c**). Despite having no indigenous cases for 4 consecutive years between 2018 and 2021, the Islamic Republic of Iran reported 1439 confirmed cases in 2022 and 2528 in 2023 (locally acquired cases, including both indigenous and introduced cases). The upsurge in cases in neighbouring Pakistan was a contributing factor to the increase in cases, particularly along the border area where there is frequent movement of people. Other contributing factors include flash flooding and mudslides, as well as lack of funding and difficulties in procuring commodities. Reduced resources resulted in the lack of, or delays in, diagnosis and treatment, in addition to difficulties in effectively carrying out case investigation and classification. As a result, it was not possible to distinguish accurately between indigenous and introduced cases. In 2023, Saudi Arabia reported zero indigenous malaria cases for the third consecutive year, ending the malaria epidemic. Iraq, Morocco, Oman and the Syrian Arab Republic last reported indigenous malaria cases in 2008, 2004, 2007 and 2004, respectively. In 2023, all countries in the region, apart from Djibouti, Pakistan, the Sudan and Yemen, reported zero malaria deaths.

Fig. 2.6. Trends in a) malaria case incidence (cases per 1000 population at risk) and b) mortality rate (deaths per 100 000 population at risk), 2000–2023; and c) malaria cases by country in the WHO Eastern Mediterranean Region, 2023 *Source: WHO estimates.*



WHO: World Health Organization.
Note: Saudi Arabia is no longer considered a malaria endemic country, with zero indigenous cases reported for at least 3 consecutive years.

2.5 Estimated malaria cases and deaths in the WHO European Region, 2000–2023

Since 2015, the WHO European Region has been free of malaria. The last country to report an indigenous malaria case was Tajikistan in 2014. Throughout the period 2000–2023, no malaria deaths were reported in the WHO European Region.

2.6 Estimated malaria cases and deaths in the WHO South-East Asia Region, 2000–2023

The WHO South-East Asia Region had eight malaria endemic countries in 2023, accounting for 4 million cases and contributing 1.5% of the burden of malaria cases globally (**Table 2.5**). In 2023, India accounted for half of all estimated malaria cases in the region, followed by Indonesia, which accounted for just under one third (**Fig. 2.7c**). Just over 48% of all estimated cases in the region were due to *P. vivax*.

From 2000 to 2023, malaria cases reduced by 82.4%, from 22.8 million in 2000, and incidence reduced by 87.0%, from 17.7 to 2.3 per 1000 population at risk (**Fig. 2.7a**). The decrease can mainly be accounted for by a decrease in India of 17.7 million estimated cases and a decrease in incidence by 93%, from 20 to 1.5 per 1000 population at risk. Sri Lanka was certified malaria free in 2016. Timor-Leste reported zero indigenous cases for the third consecutive year in

Table 2.5. Estimated malaria cases and deaths in the WHO South-East Asia Region, 2000–2023[a] *Source: WHO estimates.*

Year	Number of cases (000)				Number of deaths		
	Point	Lower bound	Upper bound	% *P. vivax*	Point	Lower bound	Upper bound
2000	**22 800**	18 500	28 700	47.6%	**35 000**	20 000	54 000
2001	**23 000**	18 800	28 900	50.4%	**34 000**	20 000	52 000
2002	**21 900**	17 600	27 700	49.8%	**33 000**	19 000	50 000
2003	**23 000**	18 600	29 000	52.2%	**33 000**	19 000	51 000
2004	**25 400**	20 200	32 500	51.9%	**37 000**	20 000	57 000
2005	**27 200**	21 200	36 100	53.7%	**38 000**	21 000	60 000
2006	**22 500**	17 300	30 400	51.4%	**33 000**	18 000	53 000
2007	**22 100**	17 000	29 900	49.5%	**33 000**	18 000	53 000
2008	**23 300**	17 700	32 400	47.4%	**36 000**	19 000	58 000
2009	**23 700**	17 700	32 700	45.2%	**37 000**	20 000	62 000
2010	**23 900**	18 600	32 000	44.7%	**38 000**	21 000	61 000
2011	**20 600**	16 100	27 900	45.9%	**32 000**	18 000	51 000
2012	**17 700**	14 000	23 500	47.7%	**27 000**	15 000	42 000
2013	**13 200**	10 400	17 300	46.1%	**20 000**	11 000	32 000
2014	**12 700**	10 100	17 100	35.0%	**23 000**	12 000	38 000
2015	**9 500**	8 100	11 800	34.7%	**17 000**	9 000	27 000
2016	**9 700**	8 000	12 600	35.0%	**17 000**	9 000	28 000
2017	**7 300**	6 100	9 300	37.2%	**13 000**	7 000	20 000
2018	**5 500**	4 600	6 800	50.1%	**8 000**	4 000	12 000
2019	**4 800**	4 000	5 800	50.5%	**7 000**	4 000	10 000
2020	**4 300**	3 700	5 300	36.3%	**8 000**	4 000	12 000
2021	**4 600**	3 900	5 800	40.1%	**8 000**	4 000	12 000
2022	**4 000**	3 500	5 900	46.5%	**6 000**	4 000	9 000
2023	**4 000**	3 400	6 700	48.2%	**6 000**	4 000	9 000

P. vivax: *Plasmodium vivax*; WHO: World Health Organization.

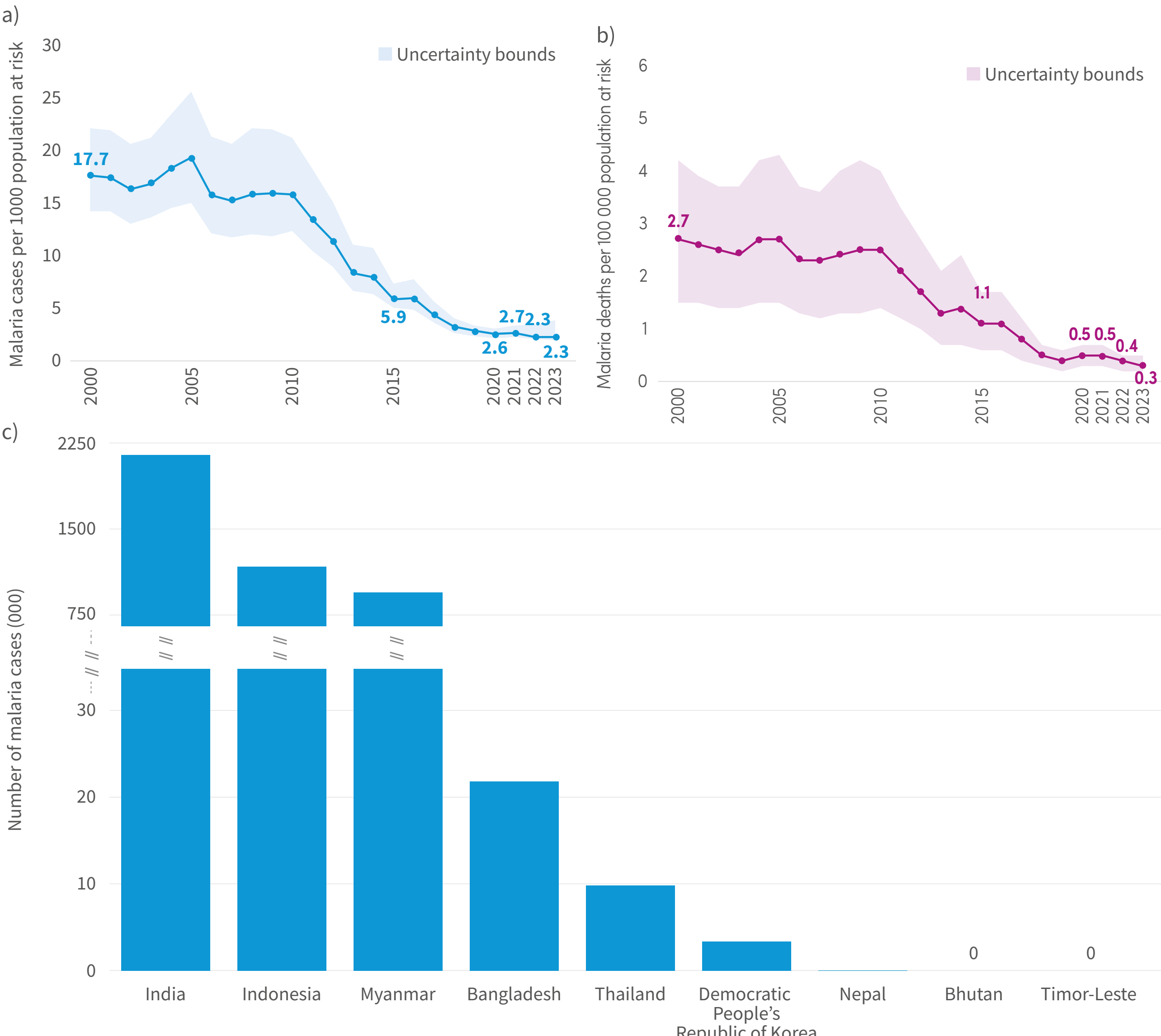
[a] Estimated cases and deaths are shown with 95% upper and lower confidence intervals.

2023. Bhutan reported zero indigenous cases for the second consecutive year, and Nepal reported only 15 indigenous cases (see **Annex 4-I**).

Between 2022 and 2023, decreases in estimated cases were seen in Bangladesh (9.2%), India (9.6%), Indonesia (5.7%) and Nepal (58.3%), whereas the Democratic People's Republic of Korea (47.9%), Myanmar (45.1 %) and Thailand (46.4%) all had an increase. Since 2019, in Myanmar, estimated cases have increased by more than 10 times, from 78 000 to 847 000. This increase is thought to be due to the current political and social instability that has weakened the country's focus on malaria prevention and control (*29*). In Thailand, bordering Myanmar, the number of reported indigenous cases has more than tripled between 2021 (2426 cases) and 2023 (9169 cases) (*30*), and reported imported cases to Thailand also significantly increased over the same period (2021–2023), from 800 to 7276 cases. Most of the imported cases are diagnosed and treated at the Thai border with Myanmar, where displaced populations from Myanmar can more easily access health care services. This situation has led to an increase in required commodities and resources for malaria diagnosis and treatment in Thailand.

Estimated malaria deaths reduced by 82.9%, from about 35 000 in 2000 to 6000 in 2023. Between 2000 and 2023, the malaria mortality rate reduced by 88.8%, from 2.7 to 0.3 per 100 000 population at risk (**Fig. 2.7b**). India and Indonesia accounted for about 88% of all estimated malaria deaths in this region in 2023. From 2022 to 2023, all countries in this region in which malaria deaths occurred reported a decrease in the malaria mortality rate, except for Myanmar and Thailand. Bhutan and Timor-Leste have reported zero malaria deaths since 2013 and 2015, respectively.

Fig. 2.7. Trends in a) malaria case incidence (cases per 1000 population at risk) and b) mortality rate (deaths per 100 000 population at risk), 2000–2023; and c) malaria cases by country in the WHO South-East Asia Region, 2023 *Source: WHO estimates.*



WHO: World Health Organization.

Notes: Timor-Leste is no longer considered a malaria endemic country, with zero indigenous cases reported for at least 3 consecutive years. Bhutan is still malaria endemic, with zero indigenous cases reported for the past 2 years.

2.7 Estimated malaria cases and deaths in the WHO Western Pacific Region, 2000–2023

Estimated malaria cases decreased by 48.1% between 2000 and 2021 in the WHO Western Pacific Region, from 2.7 million to 1.4 million. An increase of 36% was observed between 2021 and 2022, to 1.9 million cases (**Table 2.6**). Malaria cases decreased slightly in 2023 to 1.7 million. Malaria deaths decreased significantly between 2000 and 2021, by 57%, from about 6300 to 2700. Between 2021 and 2022, there was a 33% increase in deaths, to 3600. Deaths decreased again in 2023, to 3400. Increases in cases and deaths between 2021 and 2022 were mainly due to increases in Papua New Guinea, which may be explained by, among other factors, treatment seeking and testing rates (according to the malaria indicator survey of 2019–2020), stock-outs of commodities, human resource capacity and management constraints, unstable sources of domestic and external funding, and decreased bioefficacy of LLINs. Between 2022 and 2023, Solomon Islands and Vanuatu experienced increases in the number of estimated cases, by 15.1% and 113%, respectively. In 2023, the Republic of Korea also reported an increase in cases to 622, from 382 in 2022. The Philippines also had an increase of 90%, from 8160 cases in 2022 to 15 505 cases in 2023. Several factors may explain changes in malaria transmission, with some increases in cases potentially linked to improved surveillance and reporting systems. However, challenges remain in certain countries in the region, including health system weaknesses, limited access to health care, and shortages of antimalarial supplies. These challenges

Table 2.6. Estimated malaria cases and deaths in the WHO Western Pacific Region, 2000–2023[a] *Source: WHO estimates.*

Year	Number of cases (000)				Number of deaths		
	Point	Lower bound	Upper bound	% *P. vivax*	Point	Lower bound	Upper bound
2000	**2 678**	1 653	3 913	17.2%	**6 300**	3 700	10 300
2001	**2 360**	1 412	3 546	20.2%	**5 400**	3 000	9 100
2002	**2 109**	1 266	3 141	20.5%	**4 600**	2 400	7 800
2003	**2 301**	1 393	3 436	20.0%	**5 000**	2 700	8 500
2004	**2 670**	1 534	4 027	22.4%	**5 600**	2 900	9 700
2005	**2 280**	1 307	3 438	28.8%	**4 500**	2 300	7 900
2006	**2 442**	1 479	3 668	27.1%	**4 800**	2 600	8 200
2007	**1 836**	992	2 902	21.8%	**3 800**	1 800	7 100
2008	**1 666**	868	2 688	20.5%	**3 500**	1 600	6 600
2009	**2 218**	1 262	3 391	20.5%	**4 700**	2 200	8 700
2010	**1 671**	969	2 520	22.2%	**3 500**	1 700	6 300
2011	**1 418**	847	2 103	21.7%	**3 000**	1 500	5 400
2012	**1 694**	856	3 020	23.2%	**3 500**	1 400	7 100
2013	**1 753**	1 120	2 553	13.5%	**4 000**	1 800	7 300
2014	**2 011**	1 343	2 918	30.8%	**3 800**	1 900	6 700
2015	**1 245**	938	1 611	27.0%	**2 400**	1 300	4 000
2016	**1 471**	1 074	1 928	25.1%	**3 000**	1 400	5 000
2017	**1 578**	1 148	2 105	28.5%	**3 000**	1 600	5 100
2018	**1 694**	1 238	2 259	35.9%	**3 000**	1 500	5 100
2019	**1 577**	1 176	2 018	34.5%	**2 800**	1 400	4 800
2020	**1 651**	1 196	2 152	29.5%	**3 200**	1 400	5 500
2021	**1 429**	1 048	1 843	32.0%	**2 700**	1 200	4 600
2022	**1 856**	1 348	2 409	27.4%	**3 600**	1 700	6 300
2023	**1 747**	1 275	2 257	28.9%	**3 400**	1 600	5 800

P. vivax: *Plasmodium vivax*; WHO: World Health Organization.

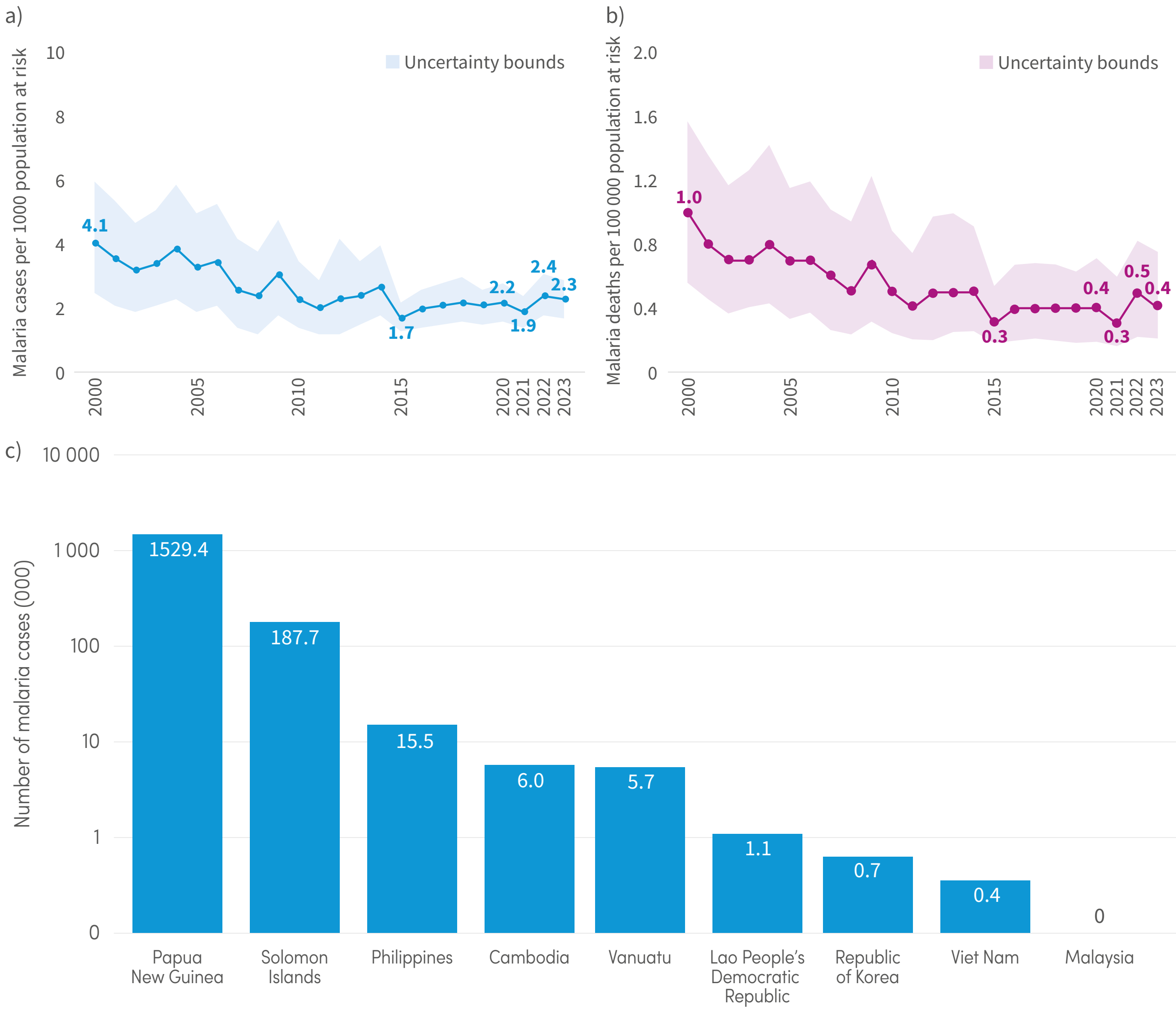
[a] Estimated cases and deaths are shown with 95% upper and lower confidence intervals.

are compounded by highly mobile populations and the warmer, wetter conditions in 2023, which may have created more favourable environments for malaria-transmitting mosquitoes, as seen in areas like the Demilitarized Zone in the Republic of Korea.

The proportion of cases in the region due to *P. vivax* has increased over time, from about 17.2% in 2000 to 28.9% of all cases in 2023, with effective malaria prevention and treatment contributing to reductions in the burden of *P. falciparum*.

In the period 2000–2023, malaria case incidence reduced from 4.1 to 2.3 cases per 1000 population at risk (**Fig. 2.8a**), and the malaria mortality rate reduced from 1.0 to 0.4 deaths per 100 000 population at risk (**Fig. 2.8b**). Papua New Guinea accounted for 87.5% of all cases in this region in 2023, followed by Solomon Islands, the Philippines and Cambodia (**Fig. 2.8c**). China was certified malaria free in 2021. Malaysia has had no cases of human malaria for 6 consecutive years, but for the past 7 years there has been an increase in the number of indigenous zoonotic *P. knowlesi* malaria cases, with 2879 cases reported in 2023. Five countries had fewer than 10 000 estimated cases in 2023: Cambodia (6012), the Lao People's Democratic Republic (1143), the Republic of Korea (662), Vanuatu (5748) and Viet Nam (373). Papua New Guinea accounted for 91.6% of all deaths in the region. There have been zero reported malaria deaths in the Republic of Korea and Vanuatu since 2012, Cambodia since 2018 and Viet Nam since 2019. No indigenous deaths due to human malaria have been reported in Malaysia since 2018; however, a small number of *P. knowlesi* malaria deaths have been reported every year since then, with 14 deaths occurring in 2023.

Fig. 2.8. Trends in a) malaria case incidence (cases per 1000 population at risk) and b) mortality rate (deaths per 100 000 population at risk), 2000–2023; and c) malaria cases by country in the WHO Western Pacific Region, 2023 *Source: WHO estimates.*



WHO: World Health Organization.
Note: Malaysia is no longer considered a malaria endemic country, with zero non-zoonotic indigenous cases reported for at least 3 consecutive years.

2.8 Malaria burden in HBHI countries

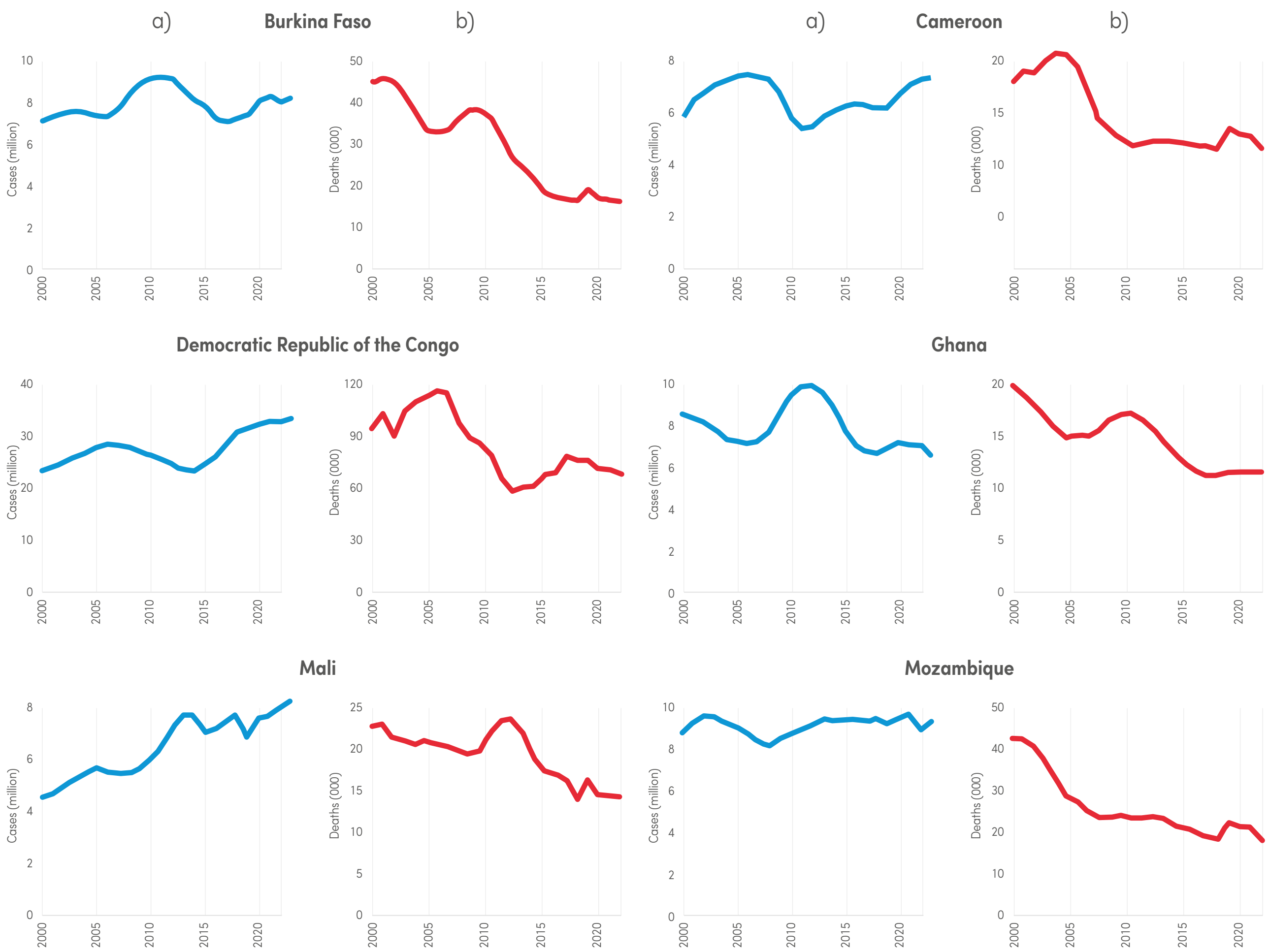
The HBHI initiative focuses on four key pillars: political will, strategic use of data, improved technical guidance and strong coordination. These efforts are supported by two enabling environments: integrated health systems and multisectoral action. HBHI is country-led, prioritizes tailored interventions, and aims to reduce malaria-related deaths swiftly.

Launched in 2018 by WHO and the RBM Partnership, the HBHI initially supported 11 high-burden countries (Burkina Faso, Cameroon, the Democratic Republic of the Congo, Ghana, India, Mali, Mozambique, the Niger, Nigeria, Uganda and the United Republic of Tanzania). These countries accounted for 70% of global malaria cases and 71% of deaths in 2017. The Sudan joined the group in 2022, but its full implementation has been hindered by conflict since early 2023, diverting all resources and focus to the unprecedented emergency response that has displaced millions of people as internally displaced persons (IDPs) and refugees.

India exited the HBHI group officially in 2024 due to significant progress in reducing the malaria incidence and mortality observed in its high-endemic states. Nationwide, the number of estimated malaria cases in India decreased from 6.4 million in 2017 (the year before the HBHI was introduced) to 2 million cases in 2023 (69% decrease). Similarly, the estimated malaria deaths decreased from 11 100 to 3500 (68% decrease) during the same period.

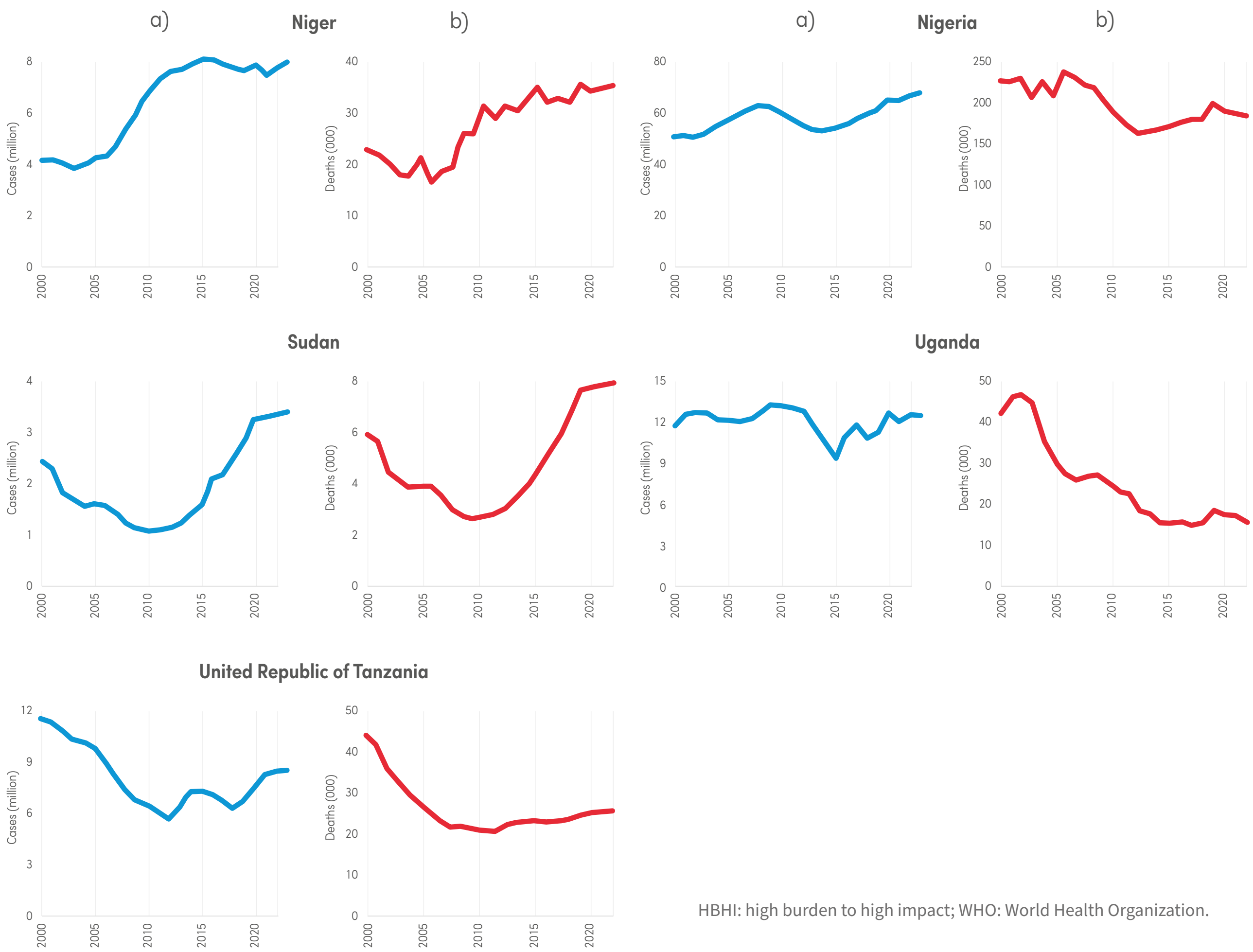
In 2023, the 11 HBHI countries (excluding India, and including the Sudan) were responsible for 66% of global malaria cases and 68% of deaths. Since 2017, the year before the inception of the HBHI initiative, estimated malaria cases in these 11 countries increased by 13.8%, from 152 million

Fig. 2.9. Estimated malaria a) cases and b) deaths in the 11 current HBHI countries, 2000–2023 *Source: WHO estimates.*



to 173 million in 2023. Malaria incidence decreased from 267 to 260 estimated cases per 1000 population at risk from 2017 to 2023, meaning that the increase in cases is primarily due to population growth. Estimated deaths increased by 2.3%, from 399 000 to 408 000 deaths, while mortality rate decreased by 13%, from 70.1 to 61.1 estimated deaths per 100 000 population at risk over the same period, 2017–2023. Deaths peaked at 444 000 in 2020 and remained high at 422 000 in 2021, before decreasing again. In 2023, the 10 HBHI countries within the WHO African Region accounted for 69% of estimated malaria cases and 70% of estimated deaths. In 2023, Nigeria accounted for 40% of estimated malaria cases and 46% of estimated malaria deaths within the 10 HBHI countries, while the Democratic Republic of the Congo accounted for 20% of estimated cases and 17% of estimated malaria deaths within the same countries. Within the WHO Eastern Mediterranean Region, in 2023, the Sudan accounted for 33% of estimated malaria cases and 44% of estimated deaths, although its overall contribution among the HBHI countries remains small (2% of total estimated cases) (**Fig. 2.9**).

Malaria cases increased in 2020, in the context of the COVID-19 pandemic, and remained high in 2022 and 2023. Factors such as population growth, conflicts and disasters may have disrupted health services and the effective implementation of intervention. Although incidence and mortality have decreased since 2017, it is unlikely that these 11 HBHI countries will meet the ambitious GTS goal of a 75% reduction in cases and deaths by 2025 (see **Chapter 3**). Key challenges include limited access to health care, ongoing conflicts and emergencies, the lasting impact of COVID-19 on service delivery, insufficient funding and suboptimal implementation capacity.

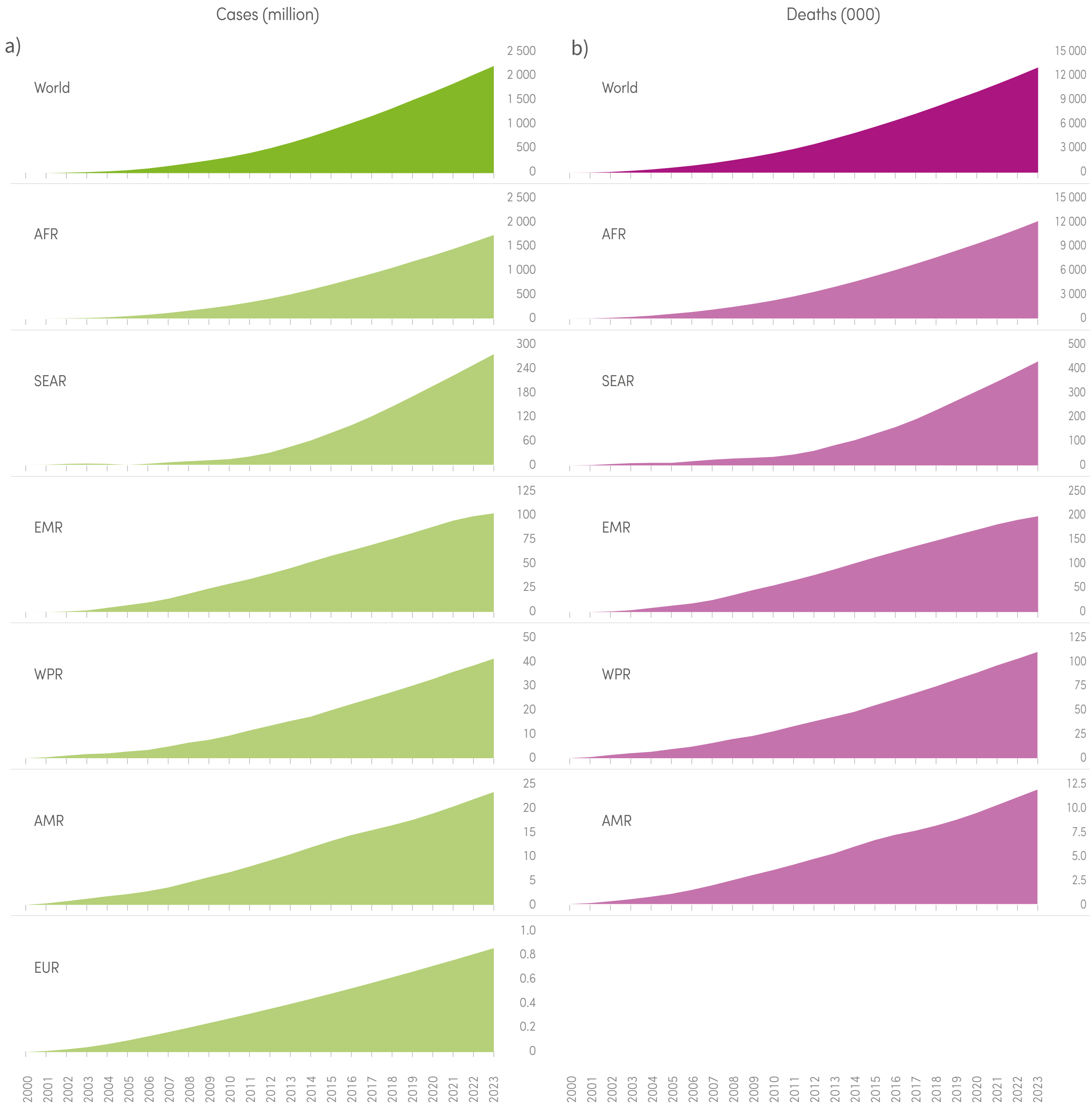


HBHI: high burden to high impact; WHO: World Health Organization.

2.9 Cases and deaths averted since 2000, globally and by WHO region

Cases and deaths averted over the period 2000–2023 were calculated by comparing the current annual estimated burden of malaria with the malaria case incidence and mortality rate from 2000, assuming that, as a comparison, they remained constant throughout the same period (see **Annex 1**). The analysis showed that 2.2 billion malaria

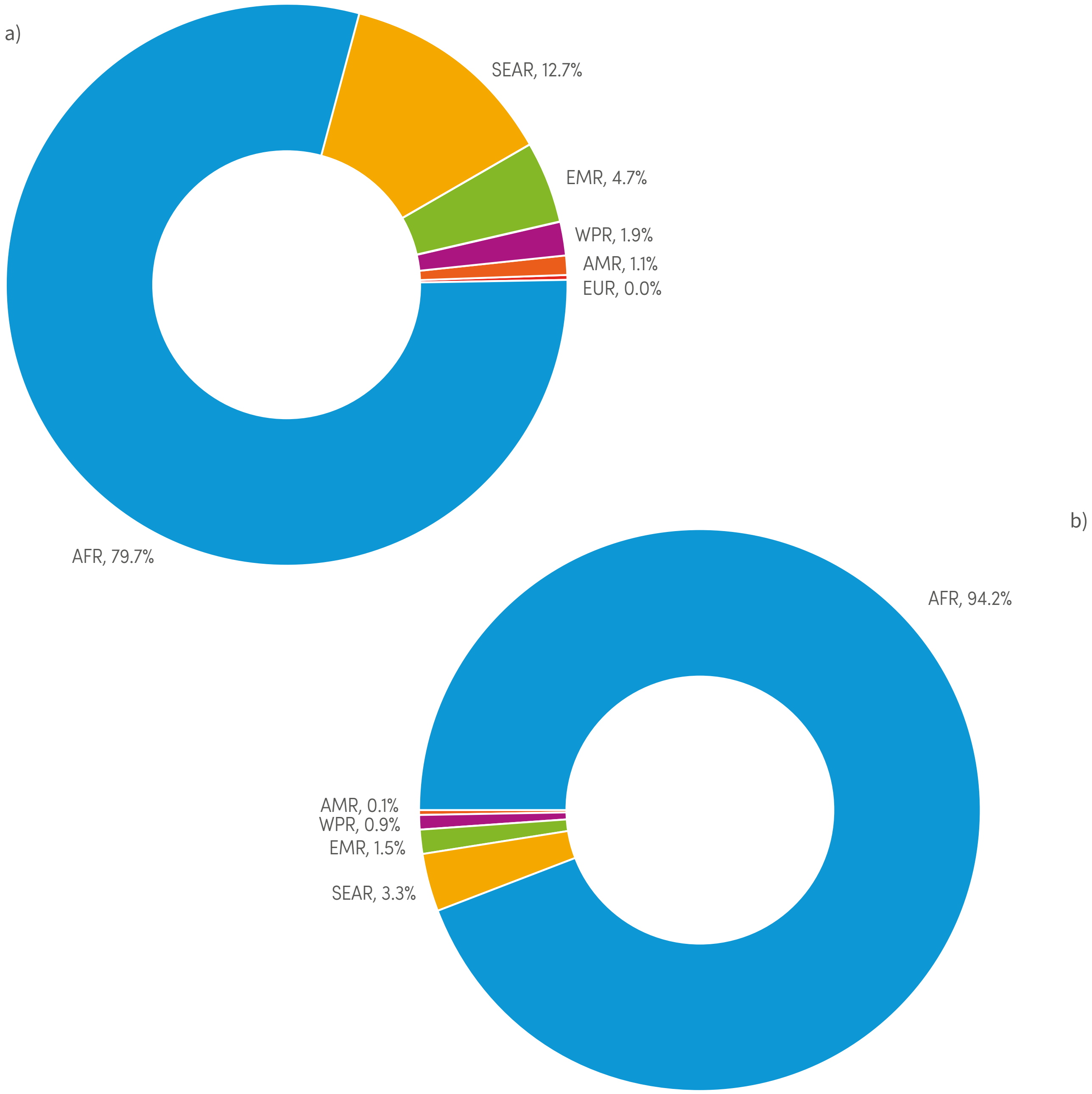
Fig. 2.10. Cumulative number of a) malaria cases and b) malaria deaths averted, globally and by WHO region, 2000–2023 *Source: WHO estimates.*



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

cases and 12.7 million malaria deaths were averted globally in the period 2000–2023. Most of the cases (79.7%) and deaths (94.2%) averted were in the WHO African Region, followed by the South-East Asia Region (12.7% of cases and 3.3% of deaths averted) (**Fig. 2.10**, **Fig. 2.11**). In addition to malaria interventions, cases and deaths could also have been averted by other factors that modify malaria transmission or disease, such as changes in population age structure or improvements in socioeconomic status, malnutrition, infrastructure, housing and urbanization.

Fig. 2.11. Percentage of a) malaria cases and b) malaria deaths averted, by WHO region, 2000–2023 *Source: WHO estimates.*



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

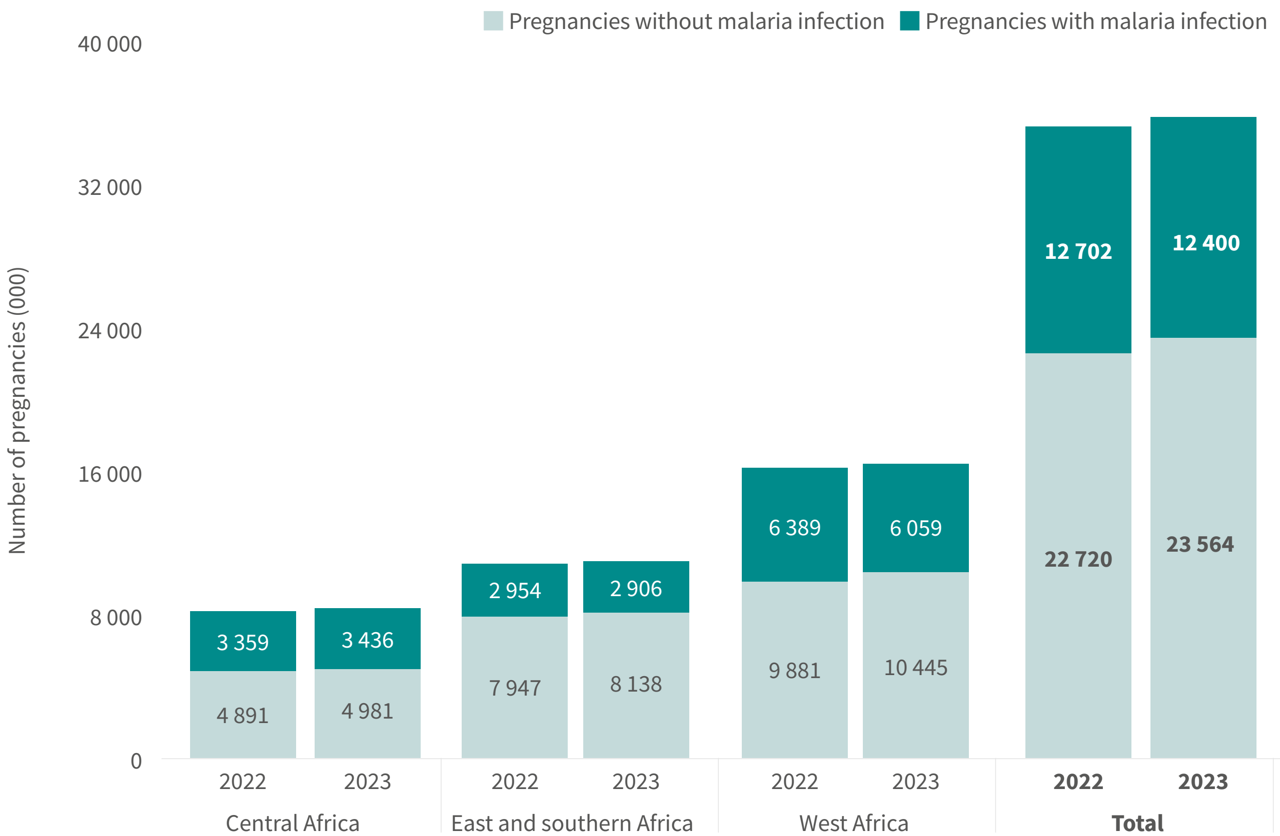
2.10 Burden of malaria in pregnancy

Malaria infection during pregnancy has substantial risks for pregnant women and girls, the fetus and the newborn child. For pregnant women and girls, malaria infection can lead to severe disease and death, and placental sequestration of the parasite, which can lead to maternal anaemia; it also puts the mother at increased risk of death before and after childbirth and is an important contributor to stillbirth and preterm birth. Placental infection can also lead to poor fetal growth and low birthweight, which in turn can lead to retardation of child growth and poor cognitive outcomes; it can also be a major risk factor for perinatal, neonatal and infant mortality (*31–33*). To avert the consequences of malaria infection for pregnant women and girls and their children, WHO recommends – in combination with other interventions – the use of IPTp-SP as part of ANC (see **Section 7.4**) in malaria endemic areas; however, access to preventive treatment throughout pregnancy remains low.

Some barriers related to access include long distances to ANC clinics and associated transport costs. Additionally, those who reach health care facilities may face challenges in accessing IPTp-SP due to stock-outs of medication or insufficient information provided by health workers (*34*).

The analysis in this section is restricted to moderate to high transmission countries in the WHO African Region, where the burden of malaria in pregnancy is most pronounced. This region includes some of the low-income countries, where marginalized and hard-to-reach communities often suffer disproportionately. Inequities in health care in these countries, such as limited access to information, critical health care services and essential commodities, significantly affect the quality of care and health outcomes. These inequities particularly affect children, adolescents and women, and especially pregnant women and girls.

Fig. 2.12. Estimated prevalence of exposure to malaria infection during pregnancy, overall and by subregion in 2023, in moderate to high transmission countries in the WHO African Region *Sources: Imperial College and WHO estimates.*



WHO: World Health Organization.

2.10.1 Prevalence of exposure to malaria infection during pregnancy

In 2023, in 33 moderate to high transmission countries[1] in the WHO African Region, there were an estimated 36 million pregnancies (see **Section 7.4**) of which 12.4 million (34%) were infected with malaria (**Fig. 2.12**). Exposure to malaria in pregnancy remained stable between 2022 and 2023.

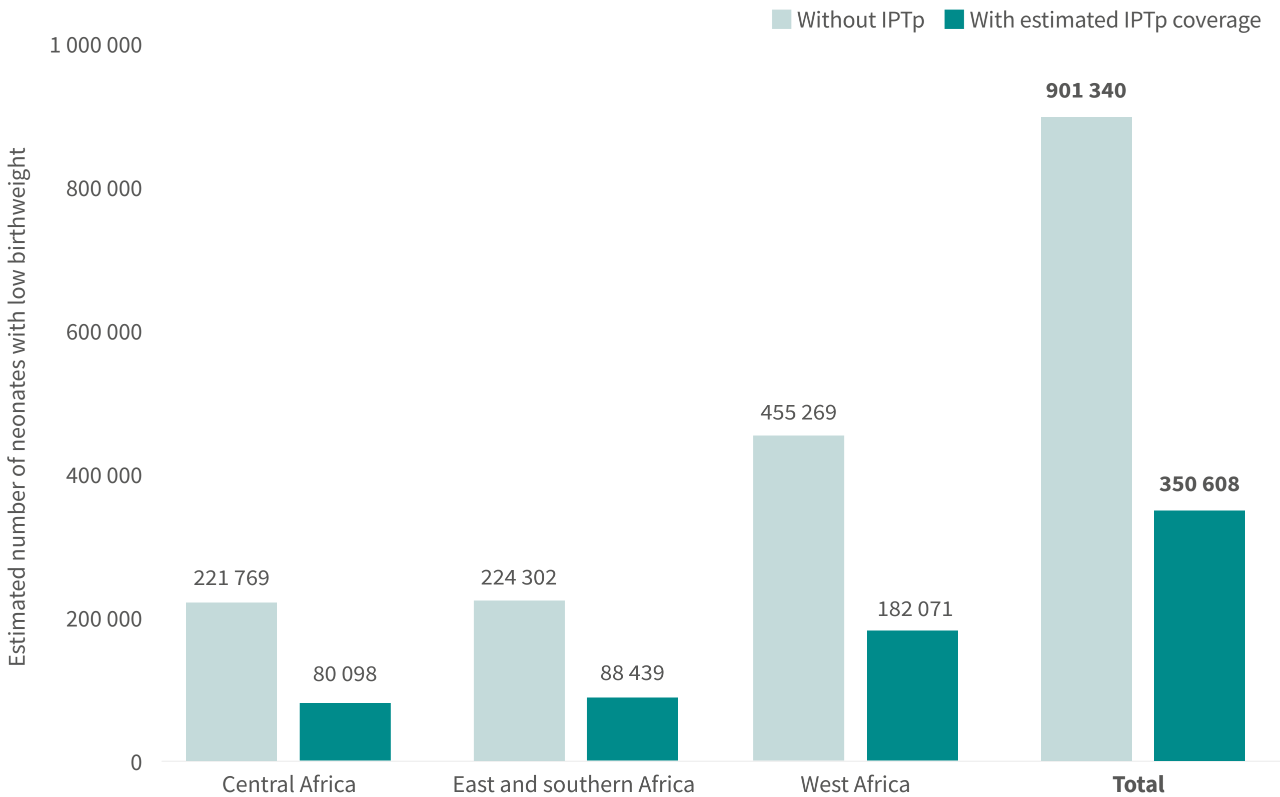
By WHO subregion, prevalence of exposure to malaria during pregnancy in 2023 was highest in west Africa, where about 6 million (36.4%) of an estimated 16.5 million pregnant women and girls had malaria infections, and in central Africa, where about 3.4 million (40.5%) of an estimated 8.4 million pregnant women and girls were infected with malaria. The prevalence of malaria infection in pregnant women and girls was lower in the subregions of east and southern Africa (26.3%) than in other subregions in 2023.

2.10.2 Prevalence of low birthweight in neonates due to malaria infection during pregnancy

From 2022 to 2023, exposure to malaria in pregnancy in the WHO African Region remained stable, as stated in **Section 2.10.1**. Low birthweight is a strong risk factor for neonatal and childhood mortality, and averting low birthweight in a substantial number of neonates will have a considerable impact on all-cause mortality in children. If there had been no pregnancy-specific malaria chemoprevention, it is estimated that exposure to malaria infection would have resulted in 901 000 neonates with low birthweight in 2023, compared with about 351 000 neonates with low birthweight estimated at the current IPTp coverage levels in the three subregions. Accounting for the current impact of IPTp, it is estimated that low birthweight was averted in about 551 000 neonates. The subregion of west Africa carries about half (50.5%) of the burden of neonates with low birthweight due to malaria infection during pregnancy (**Fig. 2.13**).

[1] Angola, Benin, Burkina Faso, Burundi, Cameroon, the Central African Republic, Chad, the Congo, Côte d'Ivoire, the Democratic Republic of the Congo, Equatorial Guinea, Gabon, the Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, the Niger, Nigeria, Senegal, Sierra Leone, South Sudan, Togo, Uganda, the United Republic of Tanzania, Zambia and Zimbabwe.

Fig. 2.13. Estimated number of neonates with low birthweight due to exposure to malaria infection during pregnancy (without IPTp versus at estimated levels of IPTp coverage), overall and by subregion in 2023, in moderate to high transmission countries in sub-Saharan Africa *Sources: Imperial College and WHO estimates.*

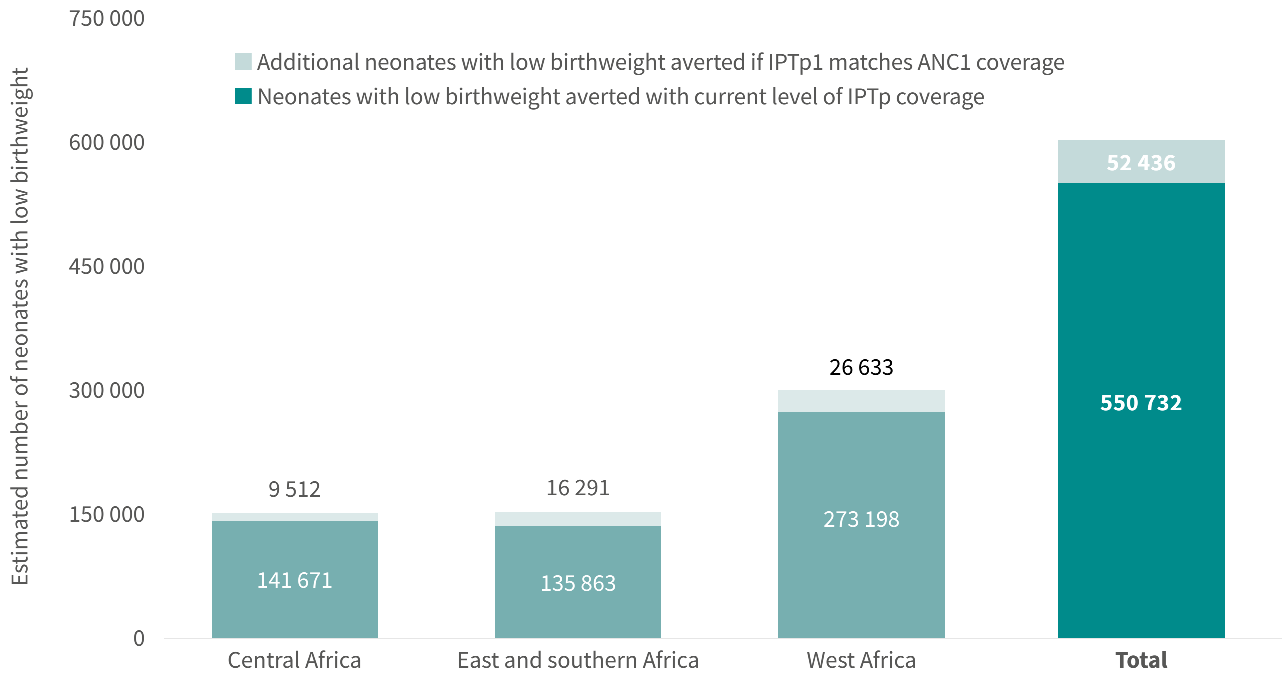


IPTp: intermittent preventive treatment of malaria in pregnancy; WHO: World Health Organization.

From the baseline of about 351 000 neonates with low birthweight estimated at the current IPTp coverage levels, three different scenarios for ANC and IPTp coverage were explored:

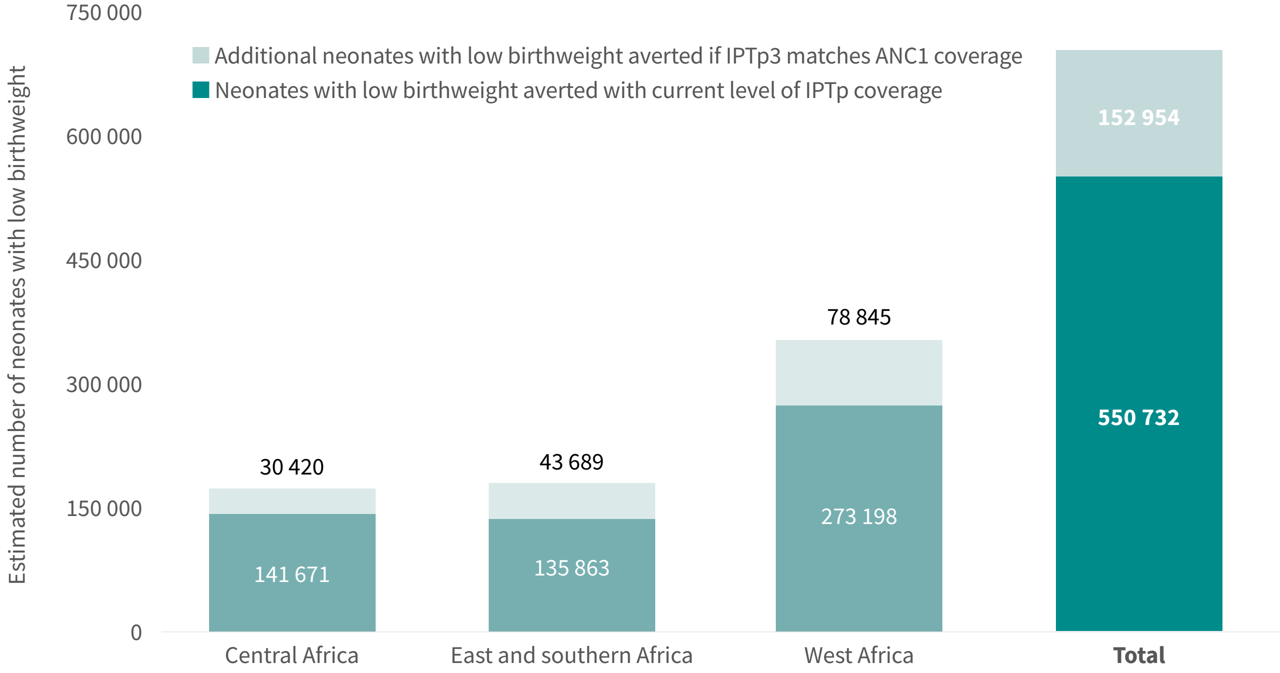
- If all pregnant women and girls visiting ANC clinics at least once during pregnancy received a single dose of IPTp – assuming that they were all eligible, and that the levels of second and third doses of IPTp (i.e. IPTp2 and IPTp3) coverage remained the same – low birthweight would be averted in an additional 52 000 neonates (**Fig. 2.14**), reducing the remaining residual number of neonates with low birthweight due to malaria infection in pregnancy to about 299 000.
- If IPTp3 coverage matched the levels of first ANC visit (ANC1) coverage, assuming that subsequent ANC visits were just as high, then low birthweight would be averted in an additional 153 000 neonates (**Fig. 2.15**), reducing the remaining residual number of neonates with low birthweight due to malaria infection in pregnancy to 198 000.
- If IPTp3 coverage increased to 90%, then low birthweight would be averted in an additional 175 000 neonates (**Fig. 2.15**), reducing the remaining residual number of neonates with low birthweight due to malaria infection in pregnancy to 176 000 (**Fig. 2.16**)

Fig. 2.14. Estimated number of neonates with low birthweight averted if current levels of IPTp coverage are maintained, and additional number averted if coverage of IPTp1 were optimized to match levels of coverage of ANC1 in 2023 while maintaining IPTp2 and IPTp3 at current levels, in moderate to high transmission countries in the WHO African Region *Sources: Imperial College and WHO estimates.*



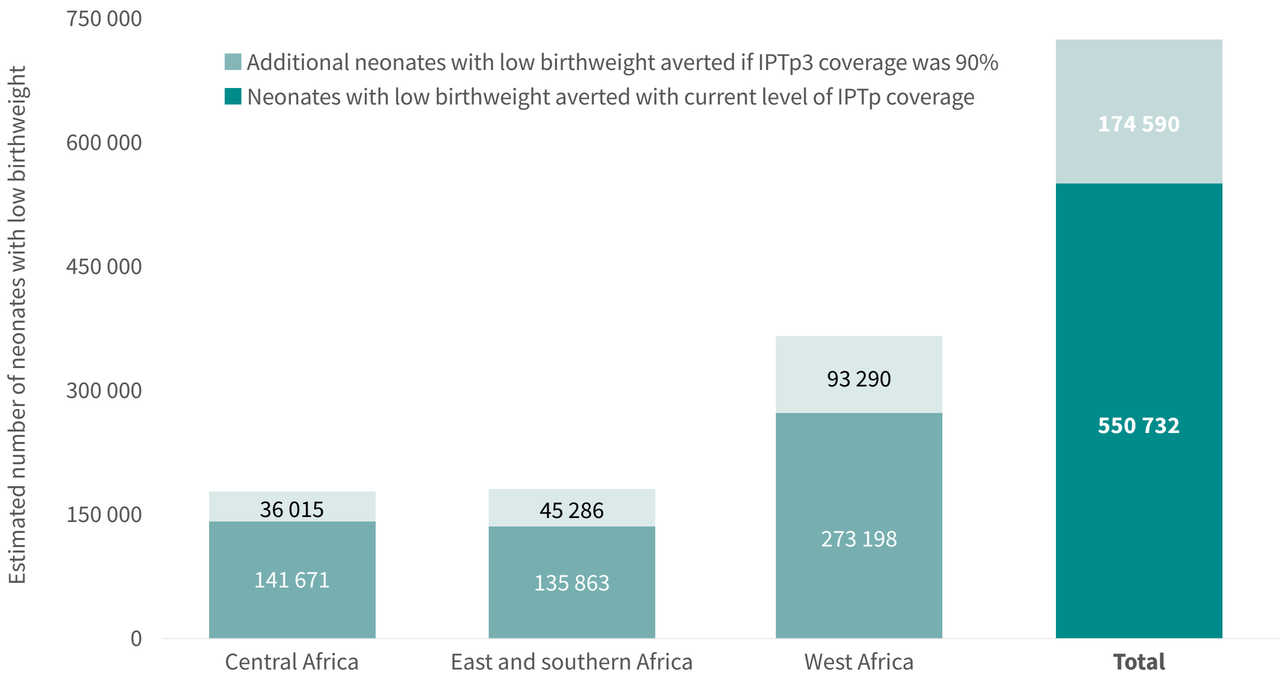
ANC: antenatal care; ANC1: first ANC visit; IPTp: intermittent preventive treatment of malaria in pregnancy; IPTp1: first dose of IPTp; IPTp2: second dose of IPTp; IPTp3: third dose of IPTp; WHO: World Health Organization.

Fig. 2.15. Estimated number of neonates with low birthweight averted if levels of IPTp3 coverage were optimized to match levels of coverage of ANC1 in 2023, in moderate to high transmission countries in the WHO African Region *Sources: Imperial College and WHO estimates.*



ANC: antenatal care; ANC1: first ANC visit; IPTp: intermittent preventive treatment of malaria in pregnancy; IPTp3: third dose of IPTp; WHO: World Health Organization.

Fig. 2.16. Estimated number of neonates with low birthweight averted if levels of IPTp3 were optimized to achieve 90% coverage in 2023, in moderate to high transmission countries in the WHO African Region *Sources: Imperial College and WHO estimates.*



IPTp: intermittent preventive treatment of malaria in pregnancy; IPTp3: third dose of IPTp; WHO: World Health Organization.

3 Global progress towards the GTS milestones

The GTS calls for a reduction in malaria case incidence and mortality rate (compared with a 2015 baseline) of at least 40% by 2020, 75% by 2025 and 90% by 2030 (*35*). Trends in estimated malaria cases and deaths (see **Chapter 2**) were used to make annual projections from 2023 to 2030 (informed by the same year-on-year trend between 2013 and 2023, see **Annex 1**) and to track progress towards future GTS milestones, as mandated to WHO by the World Health Assembly (*35*).

3.1 Global progress

Since 2000, 2.2 billion malaria cases and 12.7 million malaria deaths were averted. Between 2015 and 2023, malaria incidence increased by 4.1% and mortality rate decreased by 8.1%. Despite the considerable progress since 2000, the ambitious GTS 2020 targets for morbidity and mortality, based on the 2015 baseline, were not achieved globally in 2023 (**Fig. 3.1**). The GTS and Sustainable Development Goal (SDG) 2025 and 2030 targets for malaria morbidity and mortality are also unlikely to be met (**Fig. 3.1**). The 2023 malaria incidence of 60 cases per 1000 population at risk is nearly three times higher than the 21.3 cases per 1000 population at risk needed to reach the target (**Fig. 3.1a**). Malaria deaths per 100 000 population at risk decreased from 14.9 in 2015 to 13.7 in 2023 (more than twice the target of 5.5 deaths per 100 000 in 2023); if this trajectory continues, by 2030 it will be more than eight times the target of 1.5 per 100 000 (**Fig. 3.1b**).

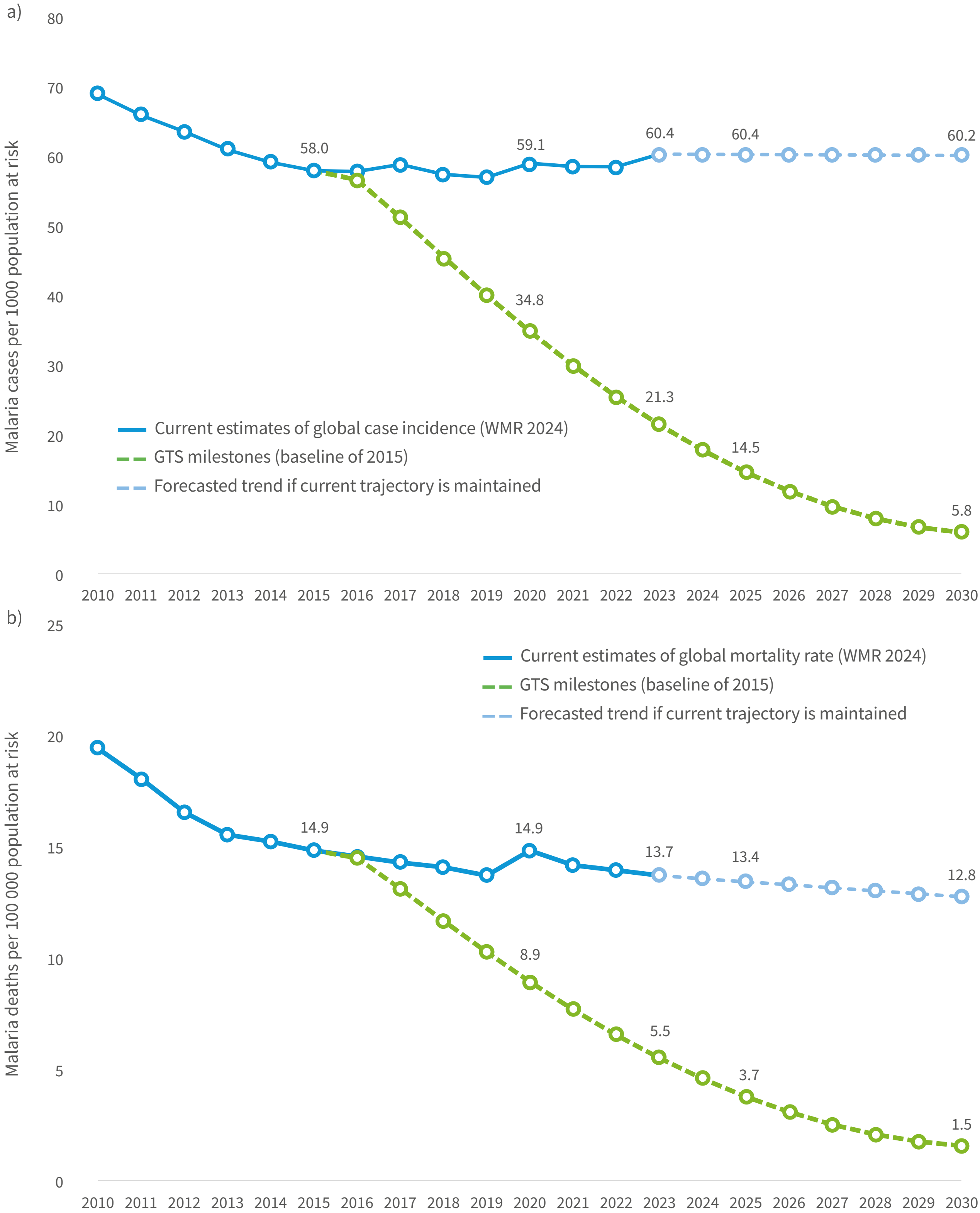
Fig. 3.2 and **Fig. 3.3** present progress in all countries considered to be malaria endemic in 2015. Countries were ranked into eight categories to assess progress towards estimated malaria case incidence and mortality rate milestone in 2025 from the 2015 baseline:

- on track (zero malaria cases);
- on track (decrease by 63% or more), where 63% represents the estimated expected reduction for 2023 between the GTS targets of 2020 (40%) and 2025 (75%);
- decrease by between 25% and less than 63%;
- decrease by less than 25%;
- no increase or decrease since 2015 (less than 5% increase or decrease in case incidence or mortality rate);
- increase by less than 25%;
- increase by between 25% and less than 63%; and
- increase by 63% or more.

Of the 93 countries that were malaria endemic (including the territory of French Guiana) in 2015, eight countries have been certified malaria free since 2015: Algeria, Azerbaijan, Belize, Cabo Verde, China, El Salvador, Sri Lanka and Tajikistan. A total of 24 countries (26%), including those that are certified malaria free, met the GTS morbidity milestone for 2023, having achieved a reduction of 63% or more in case incidence or reported zero malaria cases, where 63% represents the estimated expected reduction for 2023 between the GTS targets of 2020 (40%) and 2025 (75%). A further 32 countries (34%) made progress in reducing malaria case incidence but by less than the expected target. Twenty-four countries (26%) experienced an increase in case incidence, with 15 countries (16%) experiencing an increase of 63% or more in 2023 compared with 2015. In 14 countries (15%), malaria case incidence in 2023 was similar to that of 2015.

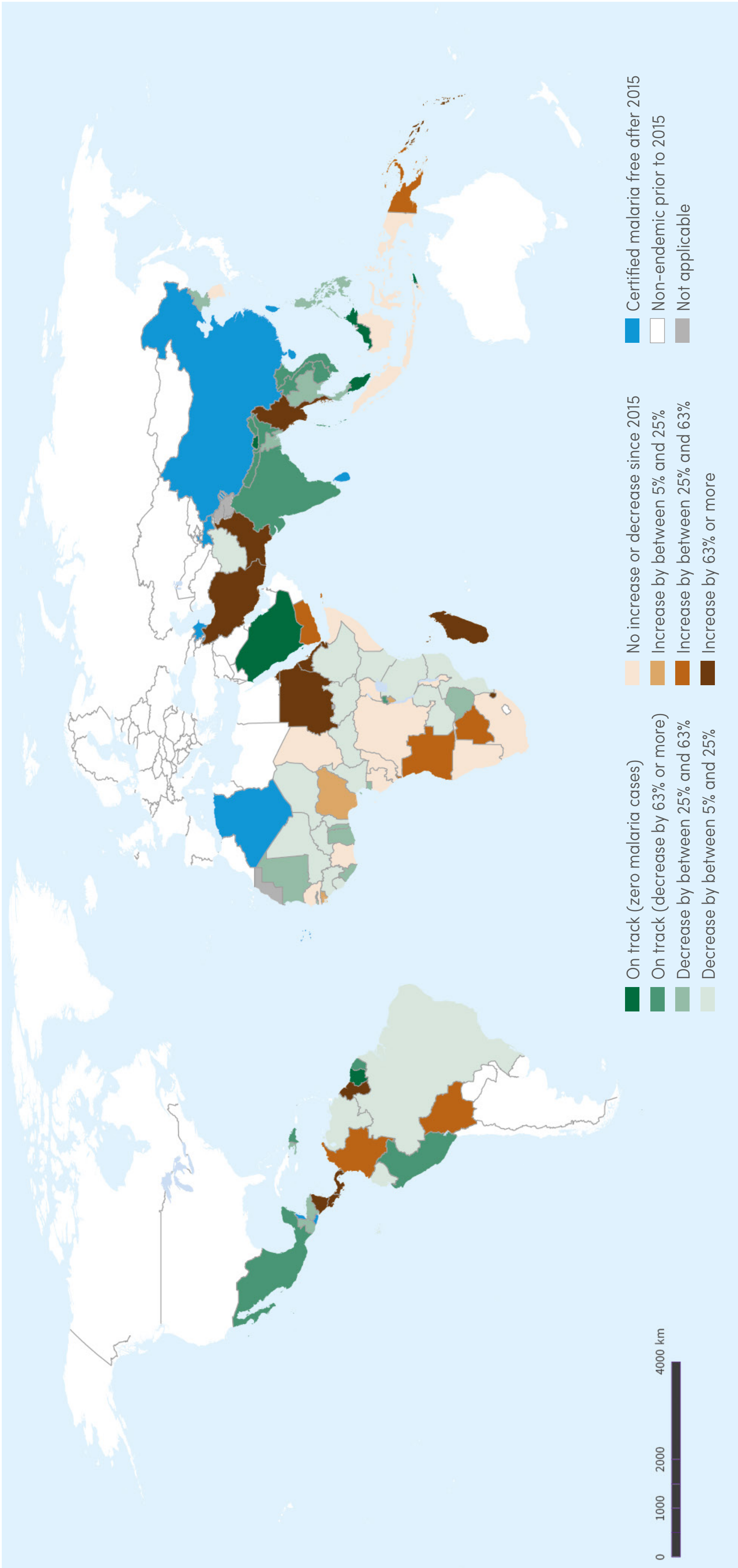
Thirty-six countries (38%) that were malaria endemic in 2015 met the GTS mortality milestone for 2023, with 30 of them reporting zero malaria deaths (including those that were certified malaria free). An additional 38 countries (40%) achieved reductions in mortality rate, but progress was below the 63% target. In four countries, malaria mortality rates remained at the same level in 2023 as in 2015 (4%), whereas rates increased in 16 countries (17%), among which nine countries had an increase of 63% or more.

Fig. 3.1. Comparison of global progress in malaria a) case incidence and b) mortality rate, considering two scenarios: current trajectory maintained (blue) and GTS targets achieved (green) *Source: WHO estimates.*



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

Fig. 3.2. Map of malaria endemic countries (including the territory of French Guiana) showing progress towards the GTS 2025 malaria case incidence milestone of at least 63% reduction from a 2015 baseline[a,b]
Source: WHO estimates.

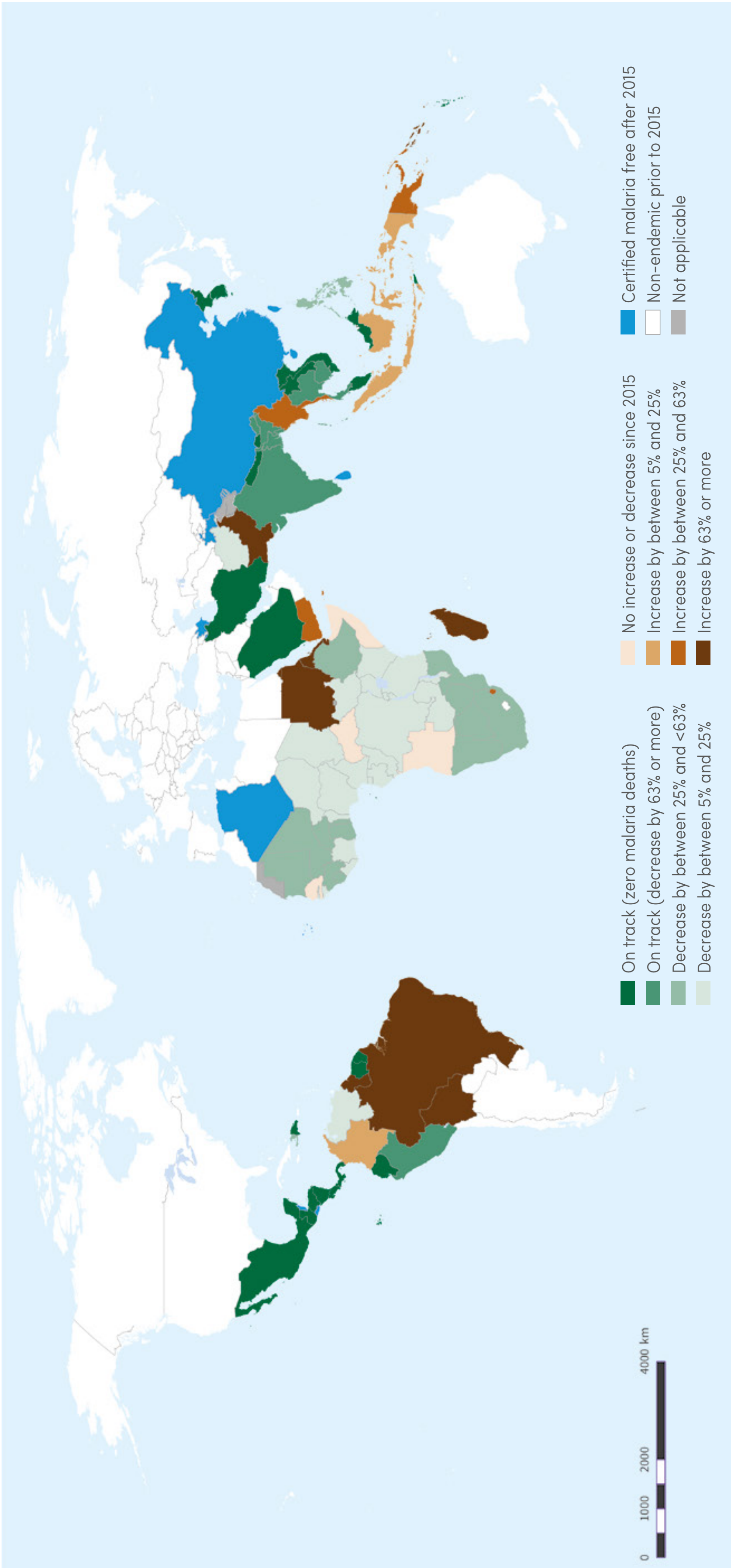


GTS: *Global technical strategy for malaria 2016–2030*; WHO: World Health Organization.

[a] Countries that have experienced reductions of 63% or more in 2023 are considered to be on track to meet the GTS 2025 targets because 63% represents the estimated expected reduction for 2023 between the GTS targets of 2020 (40%) and 2025 (75%).

[b] Egypt has since been certified malaria free in 2024.

Fig. 3.3. Map of malaria endemic countries (including the territory of French Guiana) showing progress towards the GTS 2025 malaria mortality rate milestone of at least 63% reduction from a 2015 baseline[a,b]
Source: WHO estimates.



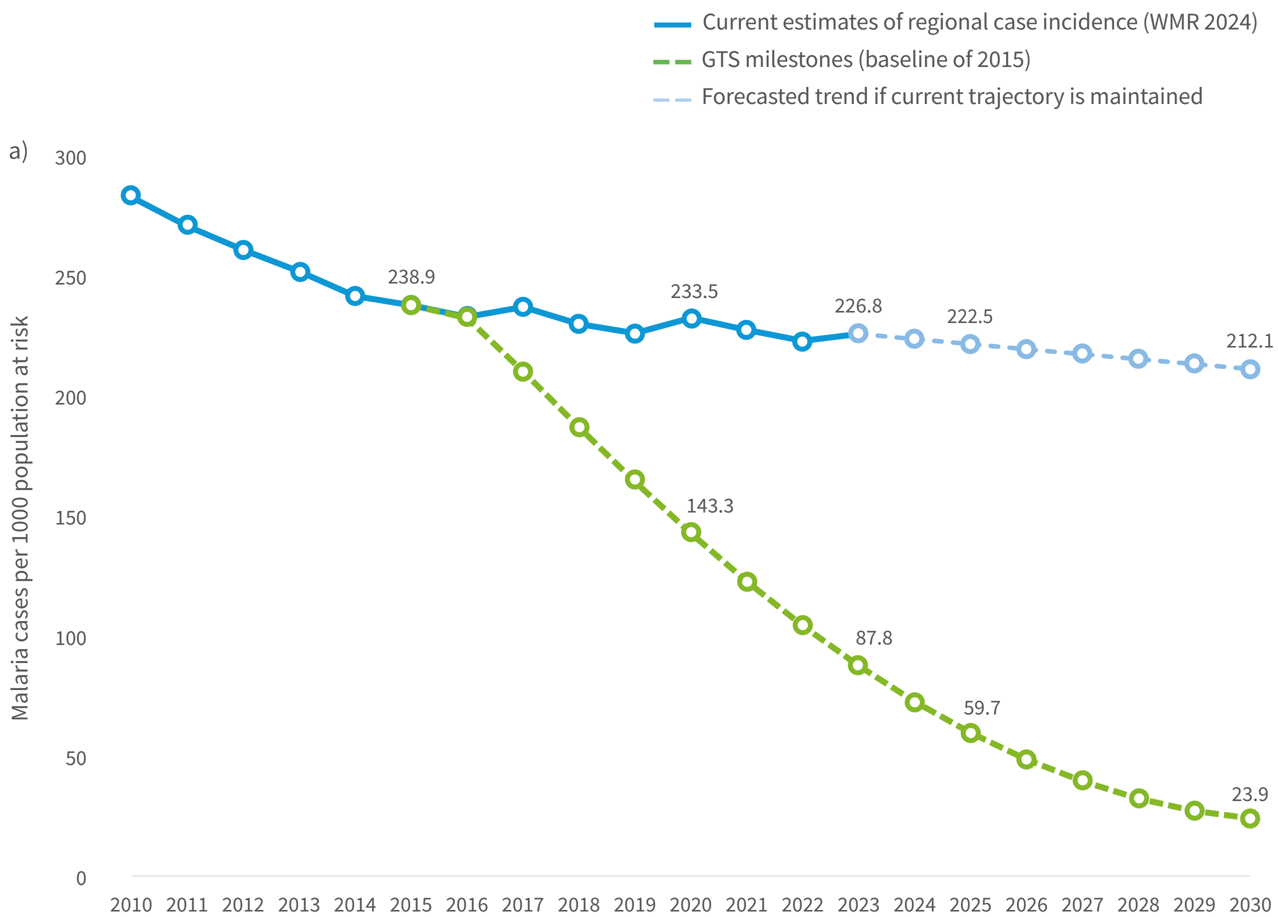
GTS: *Global technical strategy for malaria 2016–2030*; WHO: World Health Organization.
[a] Countries that have experienced reductions of 63% or more in 2023 are considered to be on track to meet the GTS 2025 targets because 63% represents the estimated expected reduction for 2023 between the GTS targets of 2020 (40%) and 2025 (75%).
[b] Egypt has since been certified malaria free in 2024.

3.2 WHO African Region

Since 2000, more than 1.7 billion cases and 12 million deaths have been averted in the region. Since 2015, estimated case incidence and mortality rate decreased by 5% and 16%, respectively. However, analysis of the trends shows that, in 2023, the WHO African Region was off track for both malaria morbidity and mortality, with more than twice the respective estimated incidence and mortality GTS 2023 targets (**Fig. 3.4**). In 2020, Cabo Verde, Ethiopia, the Gambia and Ghana met the GTS 2020 target. In 2023, the countries on track to meet the GTS 2025 target with at least a 75% reduction in malaria case incidence were Cabo Verde, which is now certified malaria free, and Rwanda. Algeria has already been certified malaria free.

Although not on track, 21 countries (Benin, Burkina Faso, Cameroon, the Central African Republic, Equatorial Guinea, Ethiopia, the Gambia, Ghana, Guinea, Kenya, Liberia, Mali, Mauritania, Mozambique, the Niger, Sierra Leone, South Sudan, Togo, the United Republic of Tanzania, Zambia and Zimbabwe) achieved reductions in malaria case incidence by 2023 compared with 2015 (**Fig. 3.2**). There was no difference (<5% increase or decrease) in case incidence in

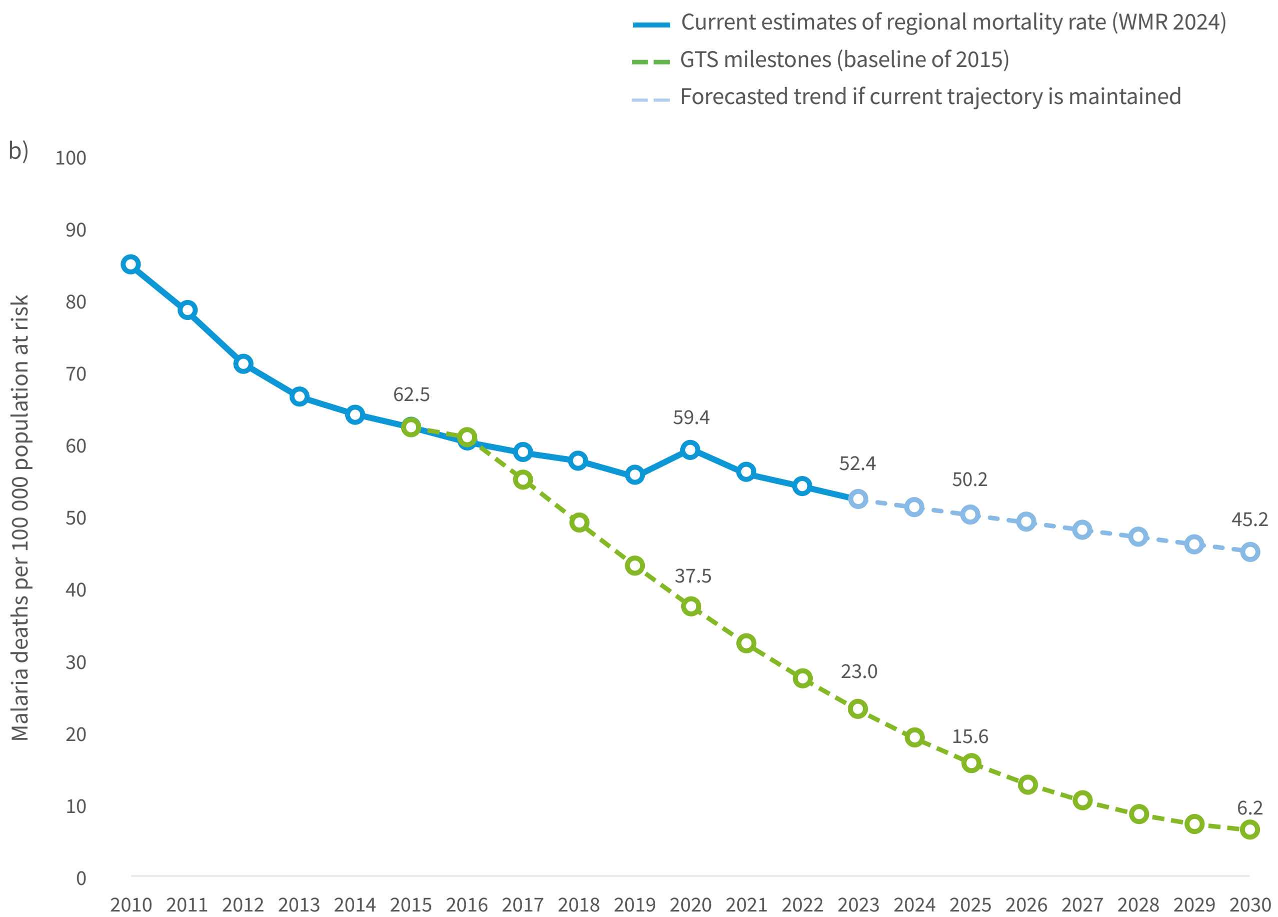
Fig. 3.4. Comparison of progress in malaria a) case incidence and b) mortality rate in the WHO African Region considering two scenarios: current trajectory maintained (blue) and GTS targets achieved (green) *Source: WHO estimates.*



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

2023 compared with 2015 in 11 countries (Chad, the Congo, Côte d'Ivoire, the Democratic Republic of the Congo, Gabon, Malawi, Namibia, Sao Tome and Principe, Senegal, South Africa and Uganda). Estimated case incidence was higher in 2023 than in 2015 by less than 25% in Burundi, Guinea-Bissau and Nigeria; increased by between 25% and 63% in Angola and Botswana; and increased by 63% or more in the Comoros, Eritrea, Eswatini and Madagascar.

Sao Tome and Principe was the only country to meet the GTS target, with zero estimated malaria deaths in 2023 (**Fig. 3.3**), although the following 34 countries did achieve mortality rate reductions of less than 63%: Benin, Botswana, Burkina Faso, Burundi, Cameroon, Chad, the Congo, Côte d'Ivoire, the Democratic Republic of the Congo, Equatorial Guinea, Ethiopia, Gabon, the Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Malawi, Mali, Mauritania, Mozambique, Namibia, the Niger, Nigeria, Rwanda, Sierra Leone, South Africa, South Sudan, Togo, Uganda, the United Republic of Tanzania, Zambia and Zimbabwe. Three countries (Angola, the Central African Republic and Senegal) showed no change (<5% decrease or increase) in mortality rate in 2023 compared with 2015. An increase in mortality rate of between 25% and 63% was seen in Eswatini, and increases of 63% or more were reported in the Comoros, Eritrea and Madagascar.

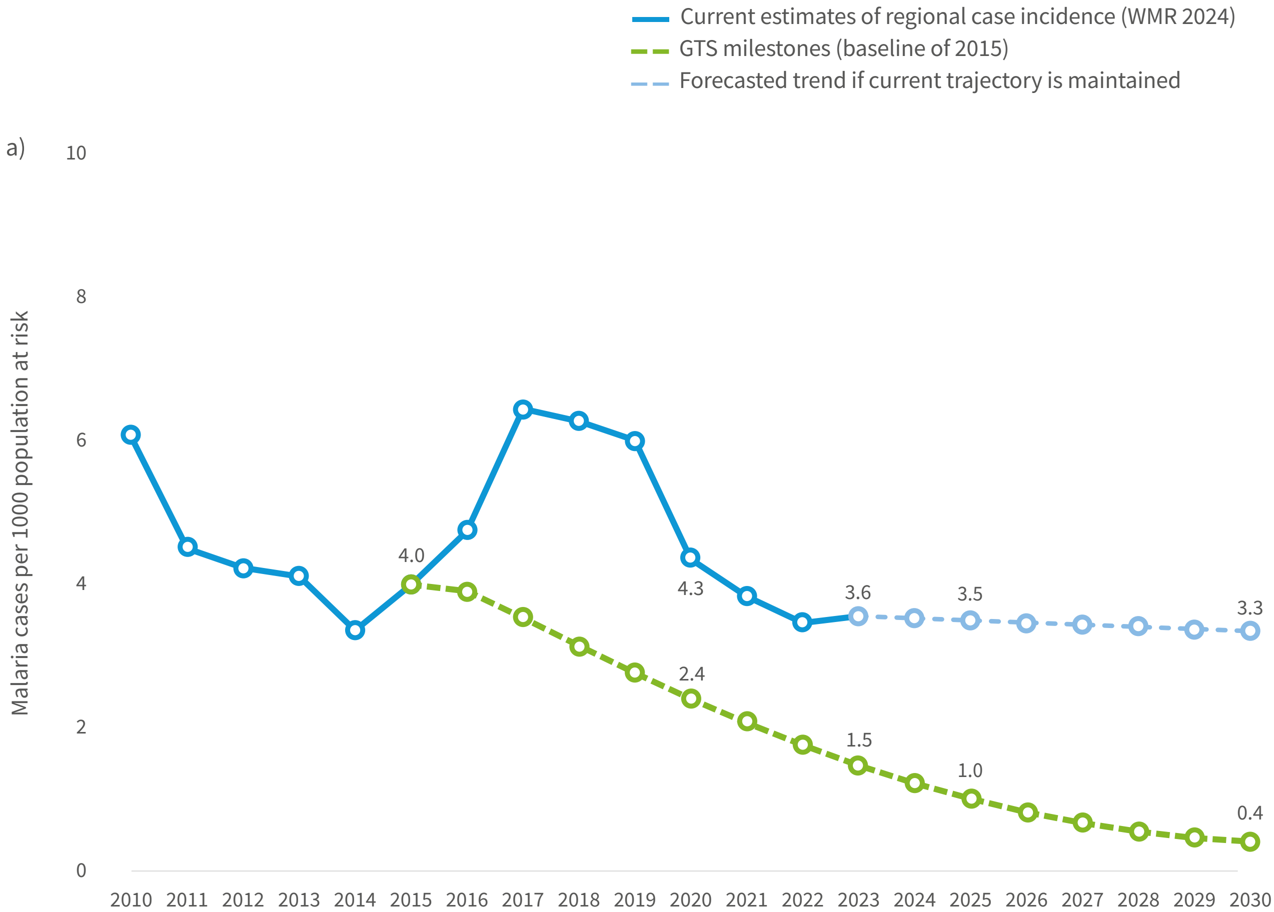


GTS: *Global technical strategy for malaria 2016–2030*; WHO: World Health Organization; WMR: *World malaria report.*

3.3 WHO Region of the Americas

Since 2000, more than 23 million cases and nearly 12 000 deaths have been averted in the region. Since 2015, estimated case incidence and mortality rate decreased by 10% and 33%, respectively. El Salvador and Belize were certified malaria free in 2021 and 2023, respectively. The Dominican Republic, French Guiana, Mexico, Peru and Suriname all had a reduction of more than 63% in case incidence in 2023 compared with 2015 (**Fig. 3.2**), with Suriname reporting zero indigenous cases for the second consecutive year. Over the same period, Guatemala, Honduras and Haiti reduced their malaria incidence by between 25% and 63%, and Brazil, Ecuador and the Bolivarian Republic of Venezuela by less than 25%. In Colombia and the Plurinational State of Bolivia, the

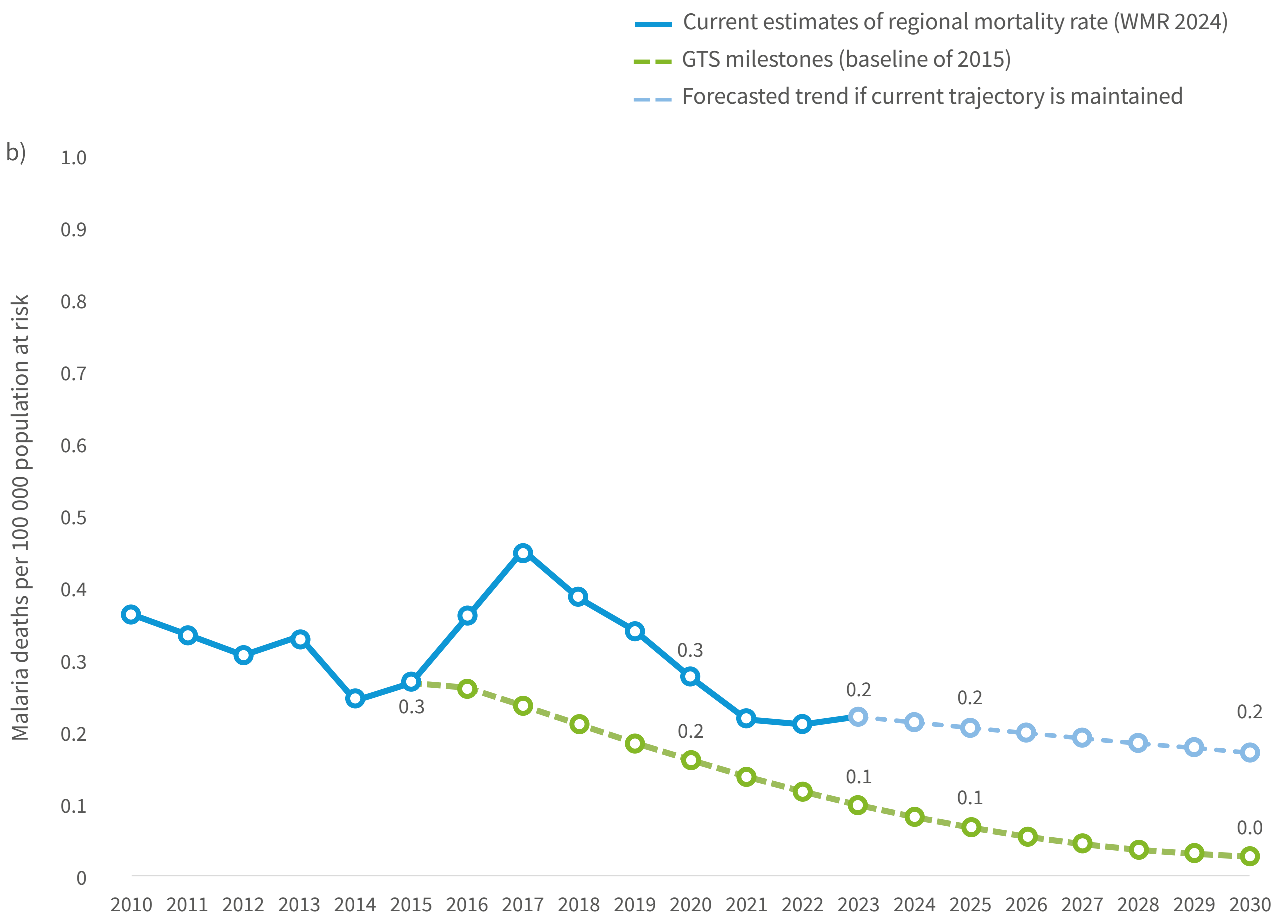
Fig. 3.5. Comparison of progress in malaria a) case incidence and b) mortality rate in the WHO Region of the Americas considering two scenarios: current trajectory maintained (blue) and GTS targets achieved (green)
Source: WHO estimates.



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

estimated increase in case incidence was between 25% and 63%. In Costa Rica, Guyana, Nicaragua and Panama, case incidence increased by 63% or more in 2023 compared with 2015. Analysis of progress towards the GTS malaria case incidence milestones in the WHO Region of the Americas shows that the region's estimated incidence was more than twice the 2023 target (**Fig. 3.5a**).

There were few malaria deaths in the WHO Region of the Americas (**Fig. 3.5b**), and changes in 2023 relative to the GTS 2015 baseline should be interpreted with caution. For example, although the mortality rate in the Plurinational State of Bolivia, Brazil and Guyana has increased by 63% or more (**Fig. 3.3**), it is estimated that the actual number of deaths would be seven, 73 and 42, respectively. An estimated additional 22 deaths were from Colombia, where there was an increase of <25% in the mortality rate. The region is currently off track for achieving all current and future GTS mortality rate milestones, with no expected change in trend projected between 2023 and 2030.



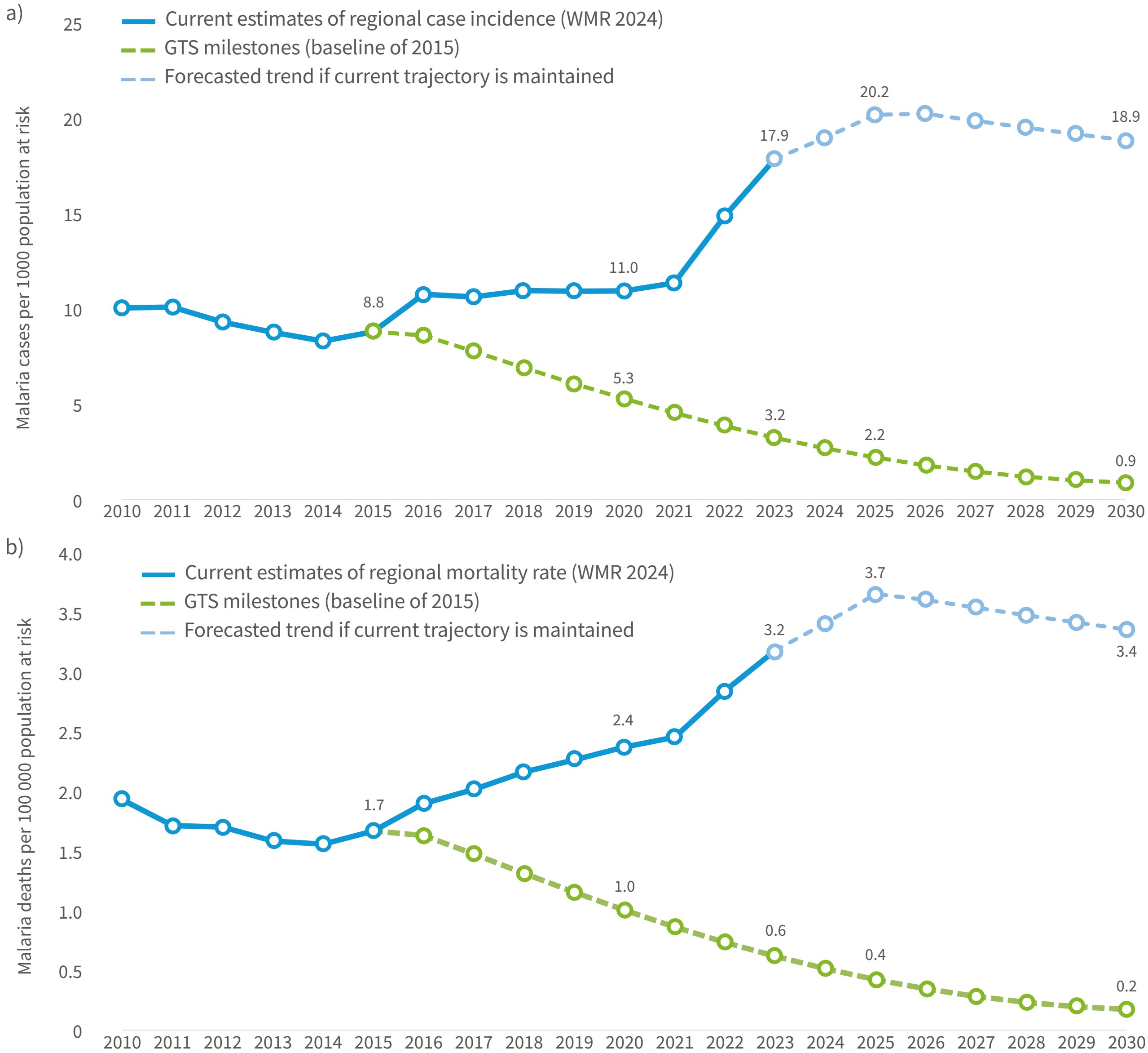
GTS: *Global technical strategy for malaria 2016–2030*; WHO: World Health Organization; WMR: *World malaria report.*

3.4 WHO Eastern Mediterranean Region

Since 2000, more than 100 million cases and nearly 200 000 deaths have been averted in the region. However, since 2015, there has been an increase in case incidence and mortality rate in the WHO Eastern Mediterranean Region (**Fig. 3.6**). Saudi Arabia reported zero indigenous malaria cases for the third consecutive year in 2023, ending the malaria epidemic. All other countries in the region were off track, with increases in case incidence and mortality rate of more than 63% in Djibouti, the Islamic Republic of Iran, Pakistan and the Sudan, and an increase between 25% and 63% in Yemen. Afghanistan reduced estimated case incidence and mortality rate by less than 25% in 2023 compared with 2015 (**Fig. 3.2**), although these estimates need to be verified through ongoing subnational analysis. It is estimated that there was no change in incidence or mortality rate in Somalia.

Zero malaria deaths have been reported in Saudi Arabia since 2000, and zero indigenous malaria deaths have been reported in the Islamic Republic of Iran since 2009. In 2023, Afghanistan also reported zero malaria deaths.

Fig. 3.6. Comparison of progress in malaria a) case incidence and b) mortality rate in the WHO Eastern Mediterranean Region considering two scenarios: current trajectory maintained (blue) and GTS targets achieved (green) *Source: WHO estimates.*



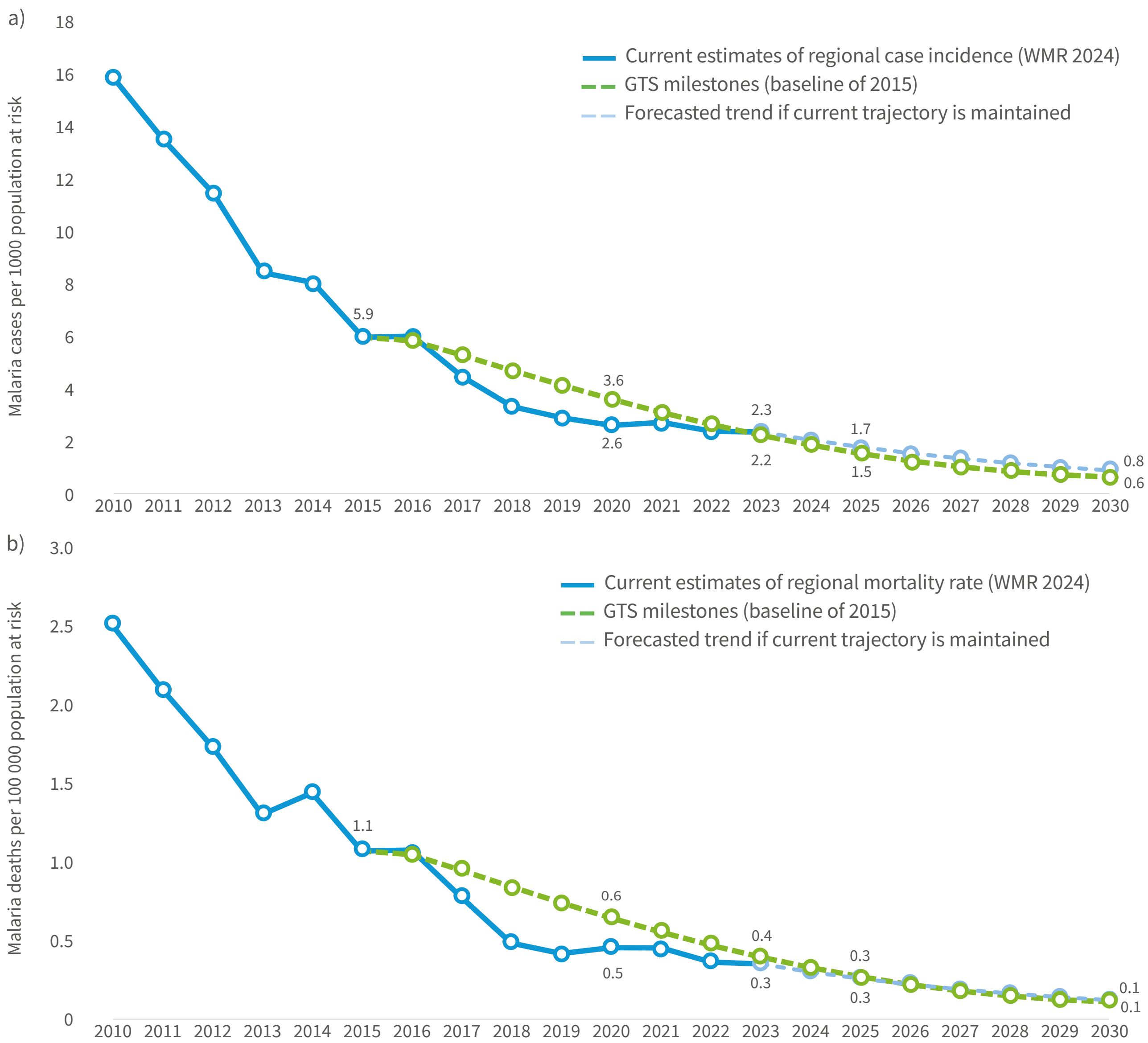
GTS: *Global technical strategy for malaria 2016–2030*; WHO: World Health Organization; WMR: *World malaria report*.

3.5 WHO South-East Asia Region

Since 2000, more than 270 million cases and 420 000 deaths have been averted in the region. Since 2015, estimated case incidence and mortality rate decreased by 61% and 73%, respectively. The WHO South-East Asia Region met the GTS 2020 milestones for both mortality and morbidity (**Fig. 3.7**) and remains on track to meet the GTS 2025 and 2030 targets. Sri Lanka was certified malaria free in 2016 and remains malaria free. Four of the nine endemic countries in the region – Bhutan, India, Nepal and Timor-Leste – reduced malaria case incidence by more than 63% in 2023 compared with 2015, with Timor-Leste reporting zero malaria cases since 2021, ending the malaria epidemic, and Bhutan reporting zero cases for the second consecutive year in 2023. Bangladesh, the Democratic People's Republic of Korea and Thailand had a decrease of between 25% and 63%. There was no difference in case incidence in Indonesia in 2023 compared with 2015. In Myanmar, incidence increased by more than 63% over the same period (**Fig. 3.2**).

Zero malaria deaths were reported in Bhutan, the Democratic People's Republic of Korea, Nepal and Timor-Leste. Bangladesh, India and Thailand had reductions in mortality rate of 63% or more, and Myanmar had an increase of between 25% and 63%. Indonesia was the only country in the region that had an increase in mortality rate of less than 25% (**Fig. 3.3**).

Fig. 3.7. Comparison of progress in malaria a) case incidence and b) mortality rate in the WHO South-East Asia Region considering two scenarios: current trajectory maintained (blue) and GTS targets achieved (green)
Source: WHO estimates.



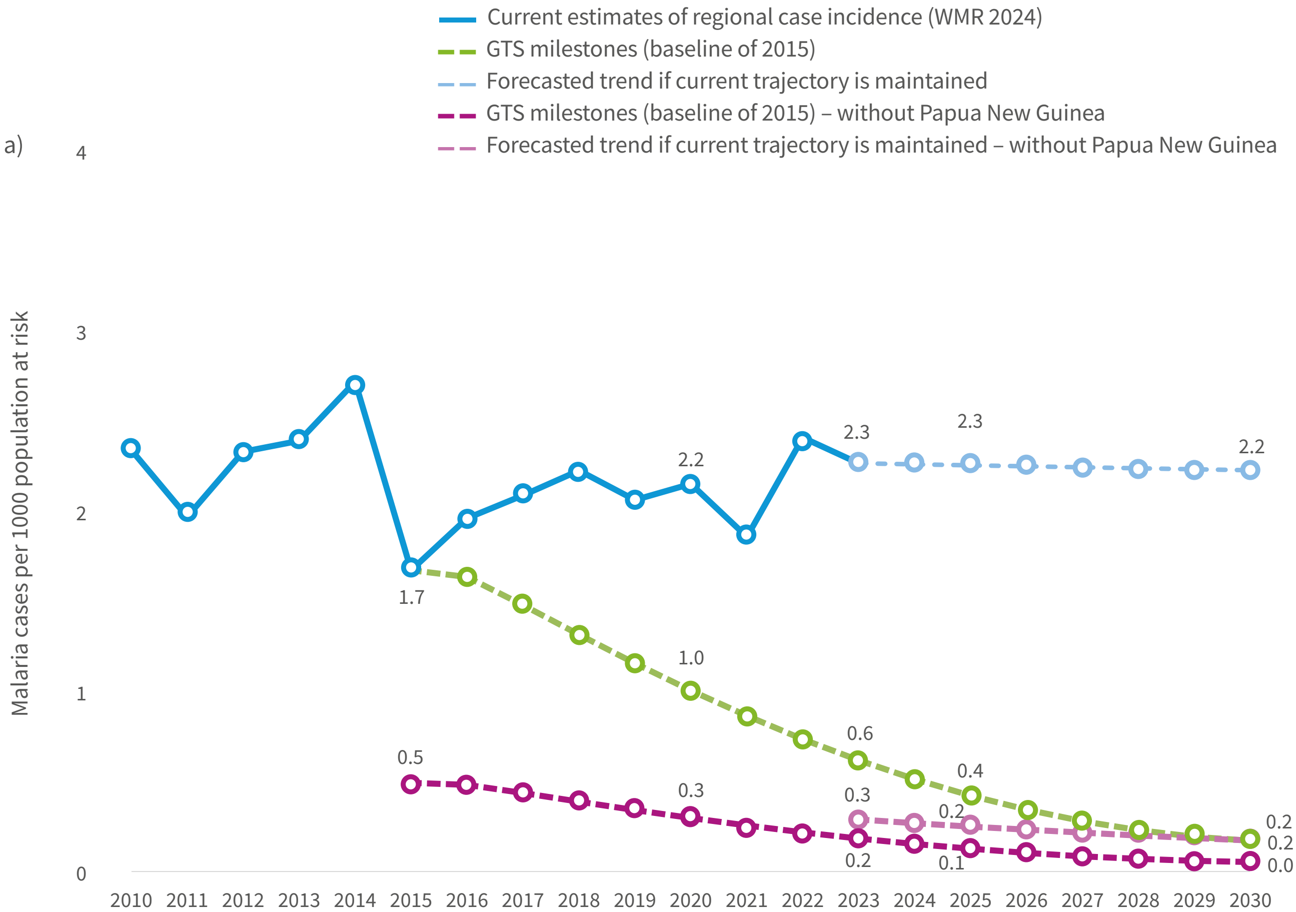
GTS: *Global technical strategy for malaria 2016–2030*; WHO: World Health Organization; WMR: *World malaria report.*

3.6 WHO Western Pacific Region

Since 2000, nearly 41 million cases and 100 000 deaths have been averted in the region. Since 2015, estimated case incidence and mortality rate increased by 35% and 33%, respectively. The WHO Western Pacific Region did not achieve the GTS 2020 milestones for malaria morbidity or mortality, and in 2023, estimated case incidence and mortality rate were about four times the GTS targets (**Fig. 3.8**).

The lack of reduction in malaria case incidence and mortality rate is mainly due to an increase of between 25% and 63% in estimated cases and deaths in Papua New Guinea, which accounts for about 88% of the burden of malaria in the region. Increases of 63% or more in case incidence were seen in Solomon Islands, which also accounts for a large proportion of cases in the region, and Vanuatu, for which trends should be interpreted with

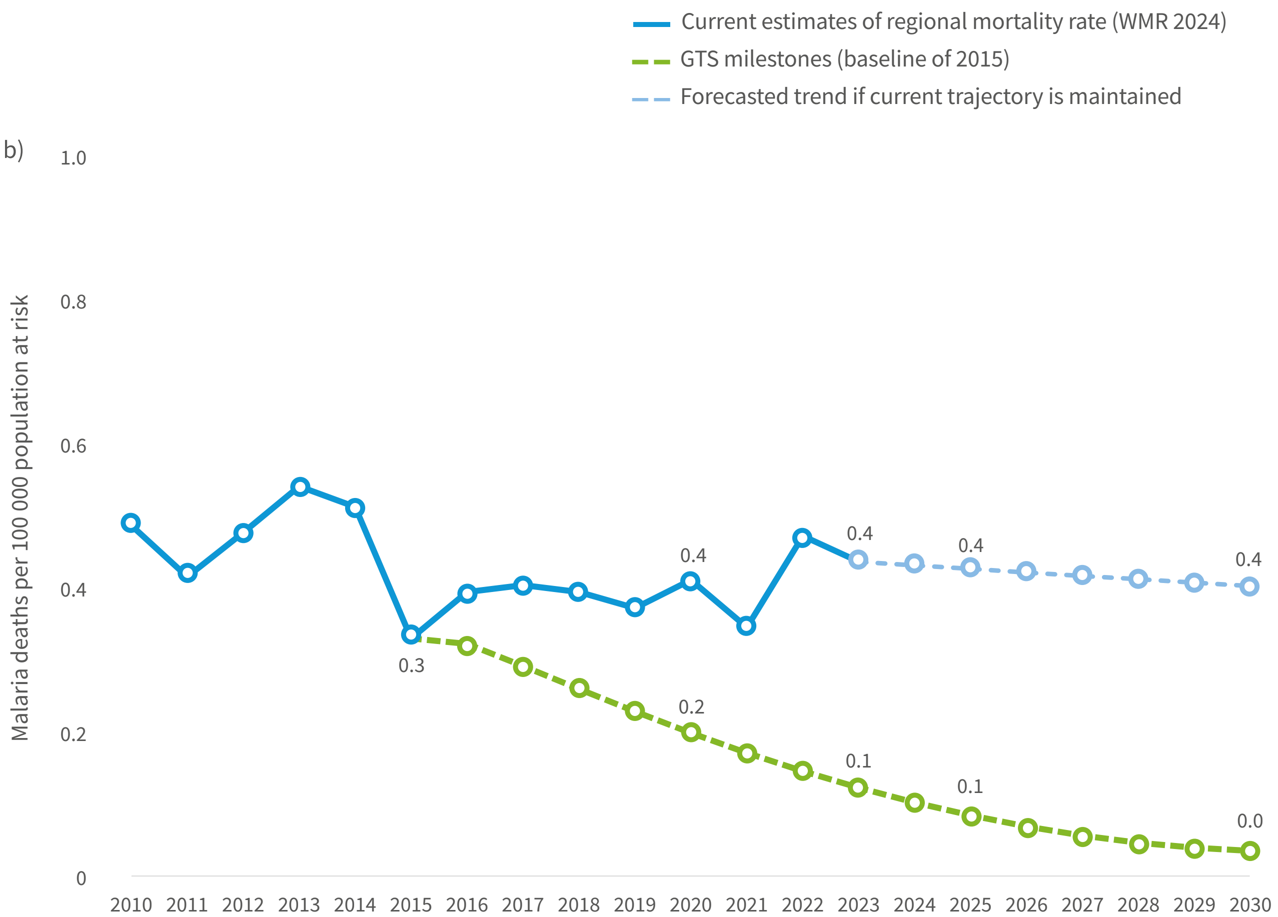
Fig. 3.8. Comparison of progress in malaria a) case incidence and b) mortality rate in the WHO Western Pacific Region considering four scenarios with and without the inclusion of Papua New Guinea: current trajectory maintained (blue; light purple) and GTS targets achieved (green; dark purple) *Source: WHO estimates.*



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

caution due to the low number of cases. In 2015, Vanuatu was affected by a major cyclone that severely disrupted malaria diagnostic services and care seeking. As a result, it is likely that malaria cases in 2015 were underestimated. This confounds assessment of progress towards the GTS targets relative to a 2015 baseline for Vanuatu.

China was certified malaria free in 2021, and Malaysia reported zero malaria cases caused by human *Plasmodium* species for the sixth consecutive year in 2023. Decreases in case incidence of 63% or more occurred in Cambodia, the Lao People's Democratic Republic and Viet Nam, while the Philippines was off target with a decrease of between 25% and 63% (**Fig. 3.2**). There was no difference in incidence between 2015 and 2023 for the Republic of Korea. The Lao People's Democratic Republic, the Republic of Korea, Vanuatu and Viet Nam all reported zero malaria deaths. There were also zero indigenous deaths from malaria caused by human *Plasmodium* species in Malaysia, but 14 deaths occurred due to zoonotic *P. knowlesi* infection. All other countries in the region, apart from Papua New Guinea, reported fewer than 20 deaths.



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

4 Elimination

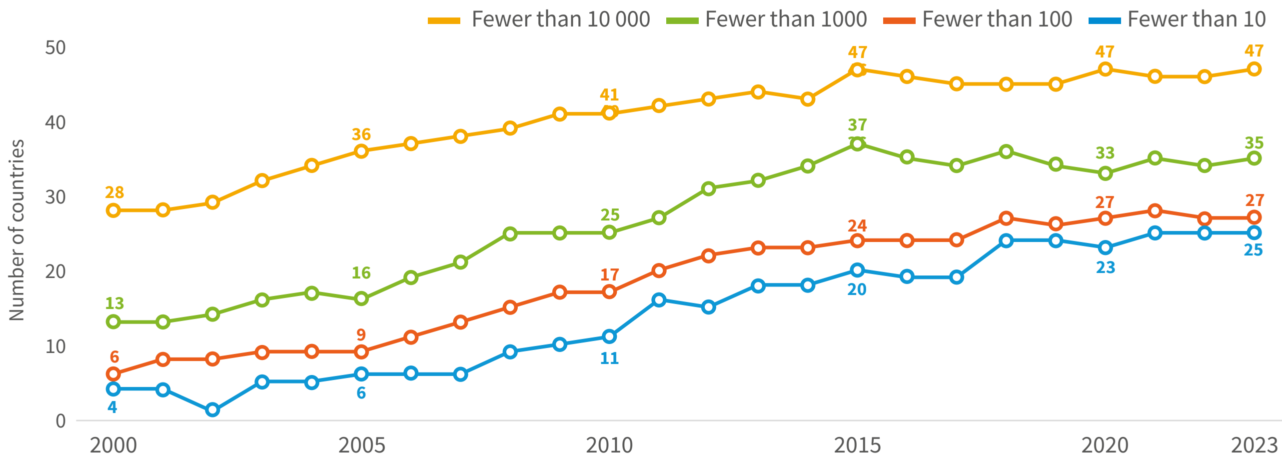
4.1 Nearing elimination

In 2023, efforts to eliminate malaria made significant progress, with more countries achieving zero indigenous cases. A total of 83 countries (including the territory of French Guiana) were malaria endemic in 2023, a decrease from 85 in 2022, following Timor-Leste and Saudi Arabia reporting zero indigenous cases for 3 consecutive years. The number of countries reporting fewer than 10 000 cases increased by 68%, from 28 countries in 2000 to 47 in 2023 (**Fig. 4.1**).

4.2 Malaria elimination certification

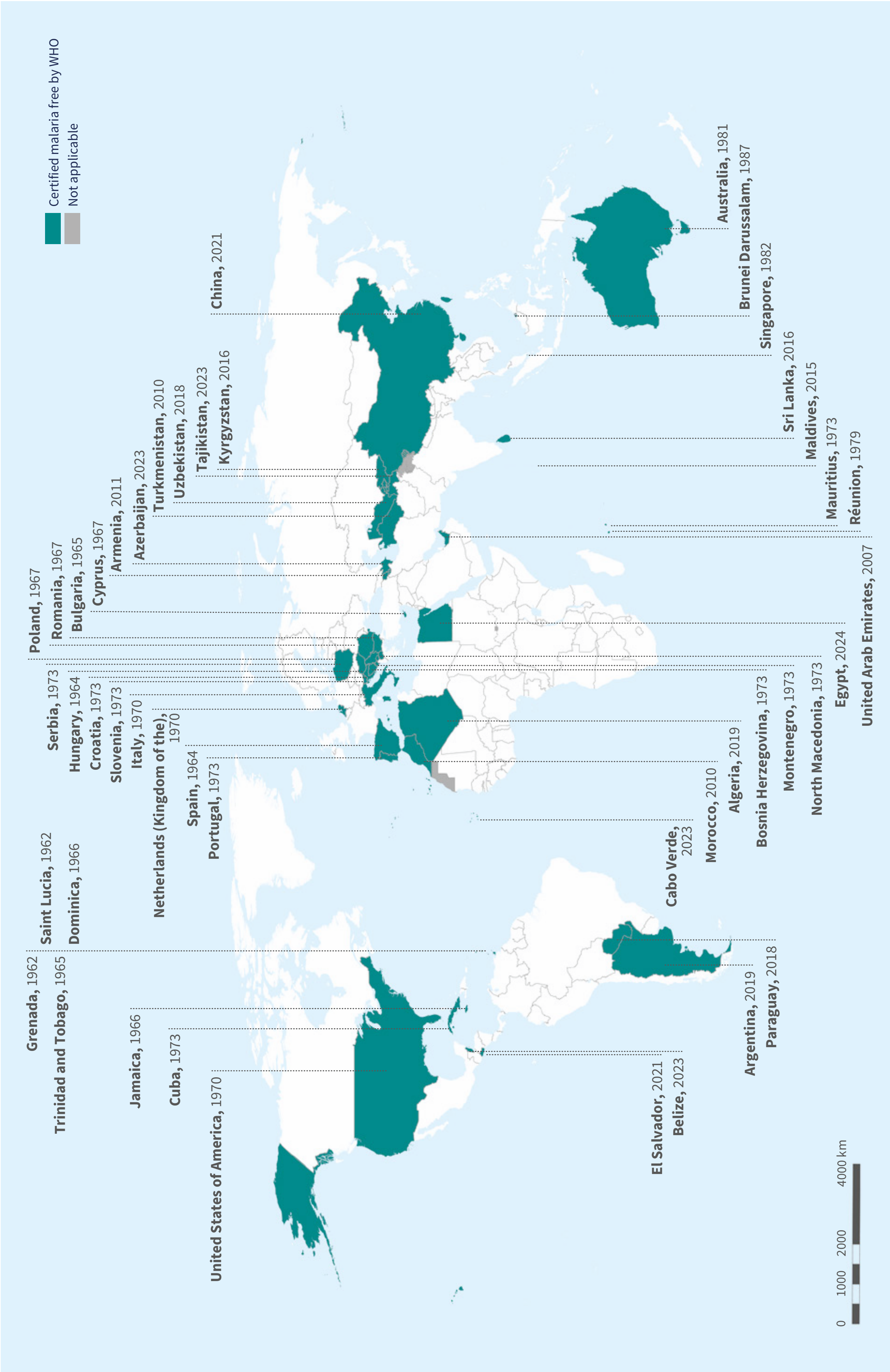
From 2000 to 2024, a total of 26 countries that were malaria endemic in 2000 successfully reported 3 consecutive years of zero indigenous malaria cases; 18 of these countries were certified malaria free by WHO. Certification of malaria elimination requires the elimination of the four main human parasite species: *P. falciparum*, *P. vivax*, *P. ovale* and *P. malariae*. Certification is awarded when a country or territory can prove beyond a reasonable doubt that the mosquito-borne transmission chain has been interrupted nationwide, resulting in zero indigenous malaria cases for at least 3 consecutive years. Additionally, certification might be granted to countries where cases of other *Plasmodium* species are reported if the risk to humans is assessed as negligible. The country is also required to have a programme in place for preventing the re-establishment of transmission (*36*). In 2022, no countries were certified malaria free. However, 2023 marked immense progress as four countries – Azerbaijan, Belize, Cabo Verde and Tajikistan – were granted malaria free certification (*37*). In 2024, Egypt was certified malaria free, the most recent country to achieve malaria free status and the third country in the WHO Eastern Mediterranean Region to do so (*38*) (**Fig. 4.2**). To date, Georgia and Türkiye have submitted their request for malaria free certification, and an increasing number of countries continue to express interest in being certified malaria free.

Fig. 4.1. Number of countries that were malaria endemic in 2000 and had fewer than 10, 100, 1000 and 10 000 indigenous malaria cases, 2000–2023 *Sources: NMP reports and WHO estimates.*



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

Fig. 4.2. Countries and areas that have been certified malaria free since 1960[a,b] *Sources: Country reports and WHO.*



WHO: World Health Organization.

[a] Green represents countries and areas that have been certified as malaria free, with the year of certification.

[b] Until 1987, the register was known as the "WHO official register of areas where malaria eradication has been achieved".

4.2.1 Cabo Verde

In December 2023, WHO certified its third country in the WHO African Region – Cabo Verde – as malaria free, following Mauritius in 1973 and Algeria in 2019. This certification marks a significant milestone in Cabo Verde's prolonged fight against malaria, a disease that was once endemic across all its islands and the leading cause of death in the 1950s. Cabo Verde has now reported no indigenous cases of malaria since 2018 (*39*).

Initial elimination efforts began in 1953, focusing on IRS with dichlorodiphenyltrichloroethane (DDT), which effectively interrupted malaria transmission by 1967. However, transmission resumed in 1973 on Santiago Island after IRS implementation stopped. Renewed IRS efforts in the late 1970s and early 1980s once again interrupted transmission, maintaining elimination for 3 consecutive years (1983–1985). Despite these achievements, new epidemics emerged between 1987 and 1989, primarily on Santiago Island (*39*). Cabo Verde's path to this certification was characterized by challenges, especially of recurring epidemics even after reporting zero indigenous cases and when elimination was attained.

As transmission became more focal and fewer cases were detected, the country moved from a "malaria control brigade" to an NMP in 1989. From 1995 to 2001, sporadic outbreaks were quickly managed and contained through enhanced IRS and improved surveillance. The most recent outbreak, in 2017 on Santiago Island, was effectively controlled through expanded diagnostic services, early treatment, and the timely notification and investigation of all cases, leading to the last reported indigenous case in 2018.

Cabo Verde's experience with achieving malaria elimination twice (in 1967 and 1983), and dealing with setbacks due to malaria outbreaks, informed the development of a comprehensive national strategic plan to prevent malaria re-establishment. This plan adopts a multisectoral approach, involving collaboration across the ministries of tourism, agriculture and transport, and improved surveillance to ensure transmission has been interrupted. The successful elimination of malaria in Cabo Verde was driven by a collaborative effort between the Ministry of Health and multiple government departments, including those responsible for the environment, agriculture, transportation and tourism. The interministerial commission for vector control, led by the Prime Minister, played a key role in this achievement. This unified approach, reinforced by the involvement of community-based organizations and nongovernmental organizations (NGOs), underscores the critical role of a comprehensive, cross-sectoral strategy in public health (*37*). The use of systems and structures built for malaria elimination can sustainably strengthen the health system, and can also be used for reporting of other vector-borne diseases, such as dengue (*37*).

Cabo Verde's journey to malaria elimination highlights the challenges involved, but also demonstrates the potential for success through sustained efforts.

4.2.2 Egypt

In October 2024, after a century of concerted efforts, Egypt, the most populous country in North Africa, was officially certified malaria free. This milestone makes Egypt the third country in the WHO Eastern Mediterranean Region to achieve this status, following the United Arab Emirates and Morocco. To date, 44 countries and one territory have reached this milestone (*38*).

Malaria has been detected in Egypt from as early as 4000 B.C.E., with genetic markers of the disease identified in the mummies of notable figures, such as Tutankhamun. Historically, the areas along the Nile River were reported to have cases of malaria, as they provided ideal conditions for the breeding *Anopheles* mosquitoes responsible for transmission (*40*). Efforts to minimize human–mosquito contact began in the 1920s with a ban on cultivating rice and other crops near residential areas, given the high malaria rates among the population residing along the Nile (*38*).

By 1930, when malaria became a notifiable disease, Egypt established its first malaria control station for diagnosis, treatment and surveillance (*38*). The situation worsened by 1942 during the Second World War, with malaria cases surpassing 3 million among civilians and military personnel due to population displacements, and shortages in medical supplies and larvicides, which led to the invasion of *Anopheles arabiensis*, a highly effective malaria vector (*40*).

In the 1950s and 1960s, vector surveillance and larval control, alongside environmental management and economic development of rural areas, significantly reduced malaria transmission. While the completion of the Aswan Dam in 1969 introduced new risks, with standing water serving as breeding grounds for mosquitoes, Egypt collaborated with the Sudan on vector control and public health surveillance projects to quickly detect and respond to outbreaks (*40*).

By 2001, Egypt had curbed malaria transmission and focused on eliminating locally transmitted cases. In 2014, the Aswan Governorate managed a swift response to an outbreak through early case detection, treatment, vector control and community education.

Egypt's achievement of reaching certification stems from sustained investment in robust surveillance and a strong, integrated health system bolstered by community engagement and partnerships (*40*). Cross-border collaboration, particularly with the Sudan, has been crucial in preventing malaria re-establishment. Following the April 2023 armed conflict in the Sudan, which displaced thousands of people to Egypt, the Egyptian government ensured that migrants had free access to essential health services, irrespective of their legal status, to mitigate the risk of malaria reintroduction (*40*).

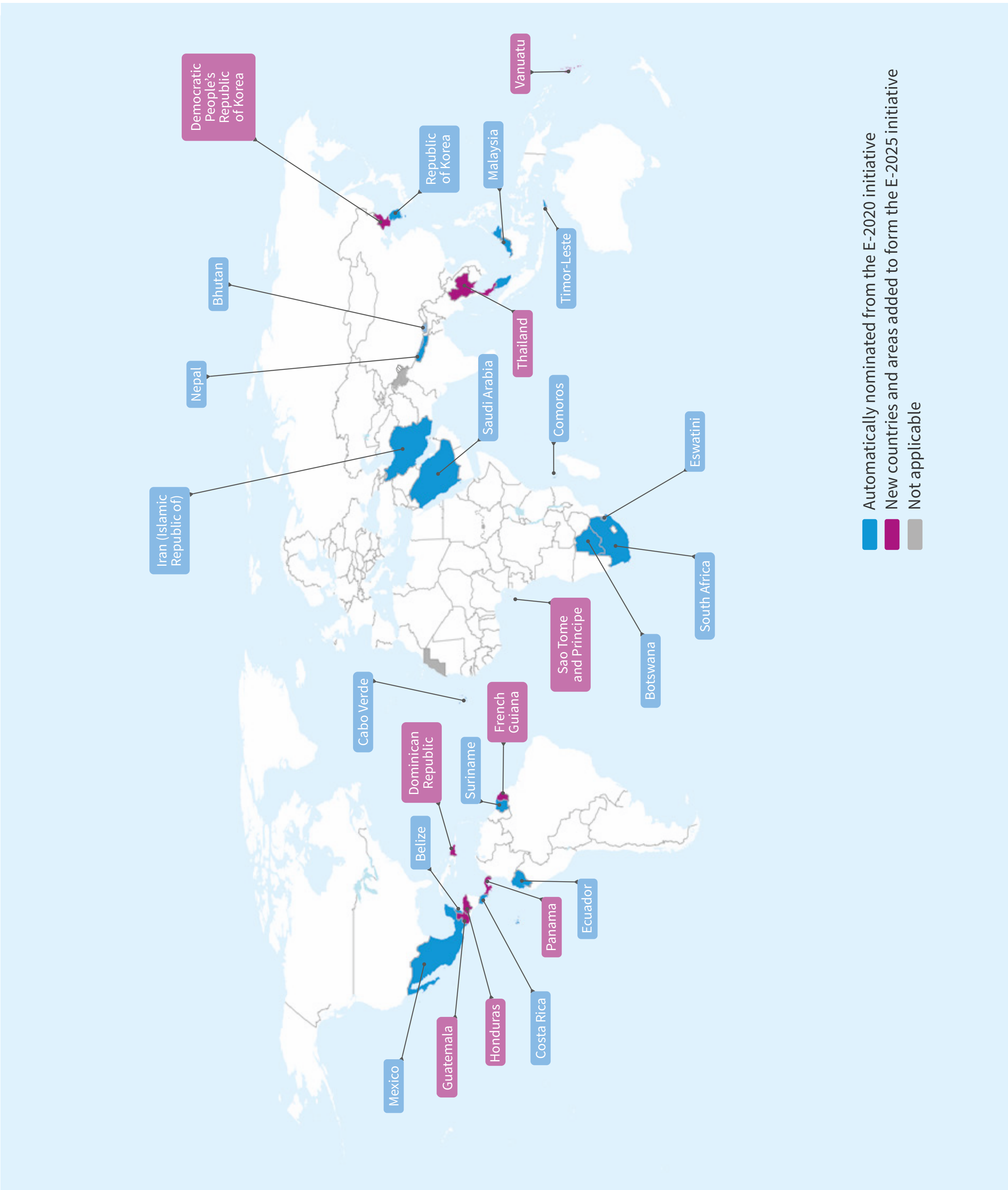
4.3 Elimination initiatives

4.3.1 E-2025 initiative

The malaria eliminating countries for 2025 (E-2025) initiative, launched in 2021, succeeded the E-2020 initiative, which had a total of 21 selected countries identified by WHO in 2016 as having the potential to eliminate malaria by 2020. In 2021, the initiative evolved and now includes 25 countries and one territory (**Fig. 4.3**).

From 2010 to 2023, the total number of indigenous malaria cases in E-2025 countries showed a decrease of 66.5%. Notably, a significant reduction occurred by 2016, with only 42 707 cases reported, marking the inception of the E-2020 initiative. Despite these overall gains, the subsequent years were characterized by fluctuations. There were increases in cases from 2017 to 2018, followed by progress from 2019 to 2020, during which there was a decline in cases.

Fig. 4.3. Countries and areas that form the E-2025 initiative *Source: WHO.*



E-2020: malaria eliminating countries for 2020; E-2025: malaria eliminating countries for 2025; WHO: World Health Organization.

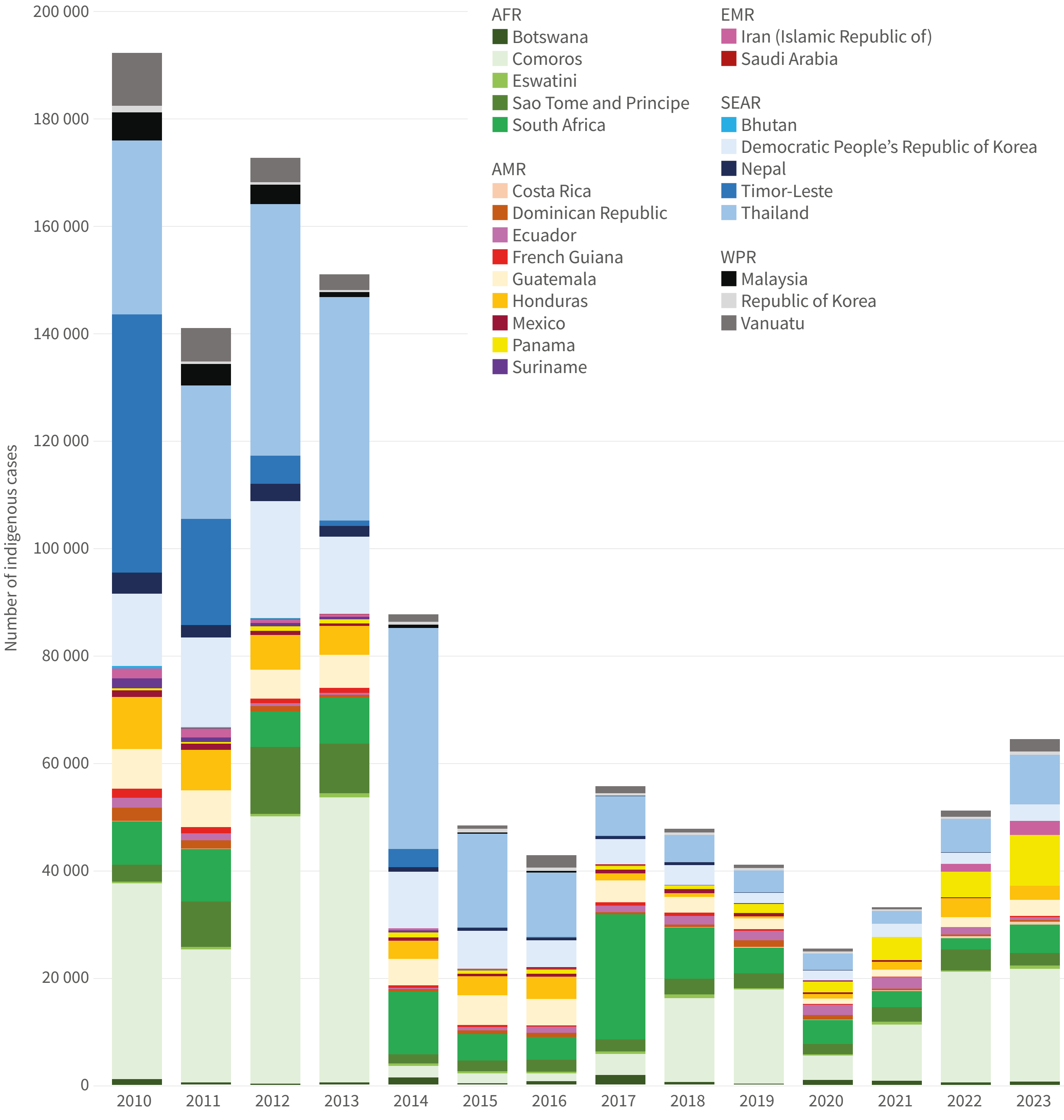
However, recent years have seen a stalling of progress, with increases observed in 2021, 2022 and 2023, indicating challenges in sustaining the momentum of malaria control efforts (**Fig 4.4**).

Between 2022 and 2023, 12 countries and one territory reported a 40.5% increase in malaria cases. For the past 3 consecutive years, the Comoros remains the main contributor of malaria cases among E-2025 countries, with around a third of all cases. Costa Rica, Guatemala and Panama have observed continued increases in indigenous cases from 2021 to 2023, while French Guiana reported an increase in cases, from 21 in 2022 to 189 in 2023. A sharp increase in Costa Rica was observed mostly in the provinces of Limón, Alajuela and Puntarenas. In Panama, transmission has risen along migration routes in the Darien region, an area receptive to malaria where populations have limited access to timely diagnosis and treatment (**Table 4.1**).

Thailand, the Republic of Korea and Vanuatu also experienced increases in indigenous cases for 2 consecutive years.

The increase in malaria cases in the three southern African countries – Botswana, Eswatini and South Africa – is likely

Fig. 4.4. Total number of indigenous malaria cases in E-2025, by country and area, 2010–2023 *Source: NMP reports.*



AFR: WHO African Region; AMR: WHO Region of the Americas; E-2025: malaria eliminating countries for 2025; EMR: WHO Eastern Mediterranean Region; NMP: national malaria programme; SEAR: WHO South-East Asia Region; WHO: World Health Organization; WPR: WHO Western Pacific Region.

due to multiple factors. These may include challenges in achieving high coverage of vector control interventions, increased movement of people for economic reasons (particularly between Mozambique and South Africa or Eswatini), and issues with surveillance systems that may have led to underreporting and delays in case notification, investigation and response, especially in Botswana in 2022.

Despite these notable increases, several countries reported decreases in indigenous malaria transmissions. Both Sao Tome and Principe and the Dominican Republic reported a 20.9% decline in cases, while Honduras reported a 27.9% decline when compared with 2022. Nepal showed a notable reduction from 36 cases in 2022 to 15 in 2023. In the Dominican Republic, reduction occurred in a context of expansion of testing and treatment at community level.

Notably, Timor-Leste and Saudi Arabia have reported zero indigenous cases for 3 consecutive years as they prepare for malaria free certification. Both Bhutan and Suriname reported zero indigenous cases for the second consecutive year, illustrating their continued efforts to eliminate malaria and progress towards malaria free certification.

Table 4.1. Number of indigenous malaria cases in E-2025 countries and areas, 2010–2023[a,b] *Source: NMP reports.*

WHO region	Country/area	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
African	Botswana	1 046	432	193	456	1 346	284	659	1 847	534	169	884	703	397	560
	Comoros	36 538	24 856	49 840	53 156	2 203	1 884	1 467	3 896	15 613	17 599	4 546	10 537	20 675	21 049
	Eswatini	268	379	409	728	389	318	250	440	686	235	233	505	214	597
	Sao Tome and Principe	3 146	8 442	12 550	9 243	1 754	2 056	2 238	2 239	2 937	2 732	1 933	2 719	3 970	2 348
	South Africa	8 060	9 866	6 621	8 645	11 705	4 959	4 323	23 381	9 562	4 821	4 463	2 972	2 043	5 291
Americas	Costa Rica	110	10	6	0	0	0	4	12	70	95	90	189	406	543
	Dominican Republic	2 482	1 616	952	473	459	631	690	341	433	1 291	826	284	320	253
	Ecuador	1 888	1 219	544	368	242	627	1 191	1 275	1 653	1 803	1 934	2 175	1 348	604
	French Guiana	1 632	1 209	900	875	448	374	217	554	546	212	140	74	21	189
	Guatemala	7 384	6 817	5 346	6 214	4 929	5 538	5 000	4 121	3 018	2 069	1 058	1 273	1 856	3 046
	Honduras	9 745	7 618	6 439	5 364	3 378	3 555	4 094	1 273	632	330	810	1 542	3 534	2 593
	Mexico	1 226	1 124	833	495	656	517	551	736	803	618	356	242	163	42
	Panama	418	354	844	696	864	546	769	649	684	1 757	1 948	4 354	4 746	9 485
	Suriname	1 771	795	569	525	401	81	78	137	37	104	147	22	0	0
Eastern Mediterranean	Iran (Islamic Republic of)	1 847	1 632	756	480	358	167	81	57	0	0	0	0	1 439	2 528
	Saudi Arabia	29	69	82	34	30	83	272	177	61	38	83	0	0	0
South-East Asia	Bhutan	436	194	82	15	19	34	15	11	6	2	22	9	0	0
	Democratic People's Republic of Korea	13 520	16 760	21 850	14 407	10 535	7 022	5 033	4 603	3 698	1 869	1 819	2 357	2 136	3 160
	Nepal	3 894	2 335	3 230	1 974	832	591	507	623	493	131	73	32	36	15
	Thailand	32 480	24 897	46 895	41 602	41 218	17 495	12 076	7 416	5 110	4 065	3 123	2 426	6 263	9 169
	Timor-Leste	48 137	19 739	5 208	1 025	3 424	80	81	16	0	0	3	0	0	0
Western Pacific	Malaysia	5 194	3 954	3 662	1 028	596	242	266	85	0	0	0	0	0	0
	Republic of Korea	1 267	505	394	383	557	627	602	436	501	485	356	274	382	662
	Vanuatu	9 817	6 179	4 532	2 883	1 314	571	2 243	1 227	632	567	493	312	1 102	2 261
Total		**192 335**	**141 001**	**172 737**	**151 069**	**87 657**	**48 282**	**42 707**	**55 552**	**47 709**	**40 992**	**25 340**	**33 001**	**51 051**	**64 395**
Certified malaria free	Algeria (2019), Belize (2023), Cabo Verde (2023), China (2021), El Salvador (2021) and Paraguay (2018).														

E-2025: malaria eliminating countries for 2025; NMP: national malaria programme; WHO: World Health Organization.

[a] Entries in red from 2021 to 2023 indicate cases in E-2025 countries that were higher than in the previous year.

[b] In 2022 and 2023, the Islamic Republic of Iran reported locally acquired cases, which included indigenous and introduced cases.

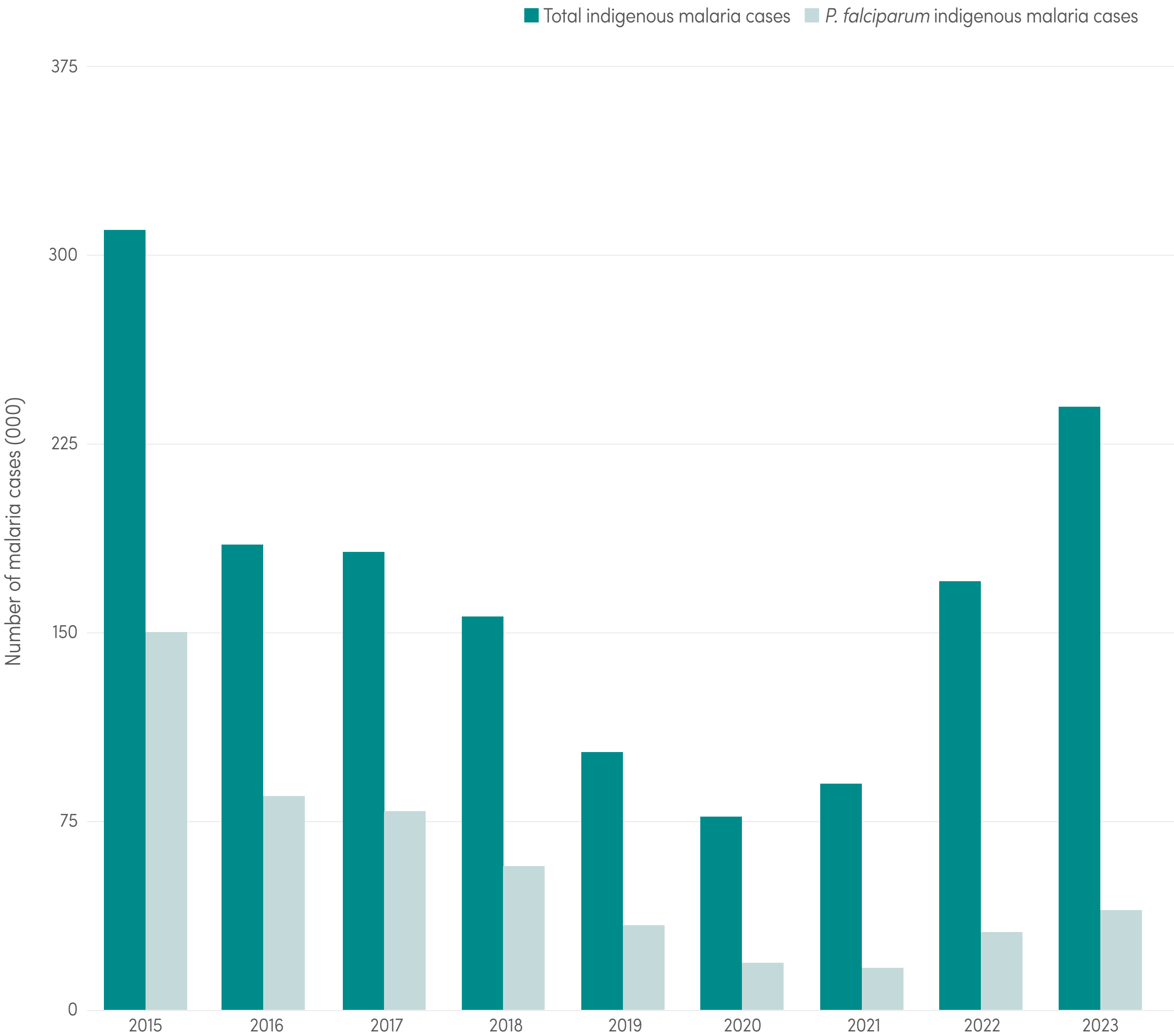
4.3.2 Mekong malaria elimination

The WHO Mekong Malaria Elimination (MME) programme, which constitutes six countries of the Greater Mekong subregion (GMS) – Cambodia, China (Yunnan Province), the Lao People's Democratic Republic, Myanmar, Thailand and Viet Nam – continues to make significant progress as the countries aim to reach the goal of eliminating malaria by 2030 and eradicating *P. falciparum* by 2025, due to the urgency posed by multidrug resistance of *P. falciparum*.

Between 2015 and 2023, the GMS countries saw a 26.6% reduction in indigenous malaria cases and a 73.7% reduction in indigenous *P. falciparum* cases. However, most of the reduction was observed between 2015 and 2020, and since then, indigenous malaria cases have increased (**Fig. 4.5**). This increase is mostly driven by Myanmar which, between 2020 and 2023, experienced a resurgence of indigenous malaria cases and indigenous *P. falciparum* cases, accounting for 95% of all indigenous malaria cases and 99% of all indigenous *P. falciparum* cases.

Notably, China was certified malaria free in 2021, one year shy of the 2020 goal set under the MME; to date, China continues to maintain malaria free status. Cambodia reported 1073 indigenous *P. falciparum* cases in 2020; significant progress has been made, with only 34 cases reported in 2023 (**Fig. 4.6**). Cambodia's success in significantly reducing cases has been through strengthening surveillance, case management and vector control interventions. Over the past 2 years, the rollout of

Fig. 4.5. Total indigenous malaria and *P. falciparum* cases in the GMS, 2015–2023 *Source: WHO database.*

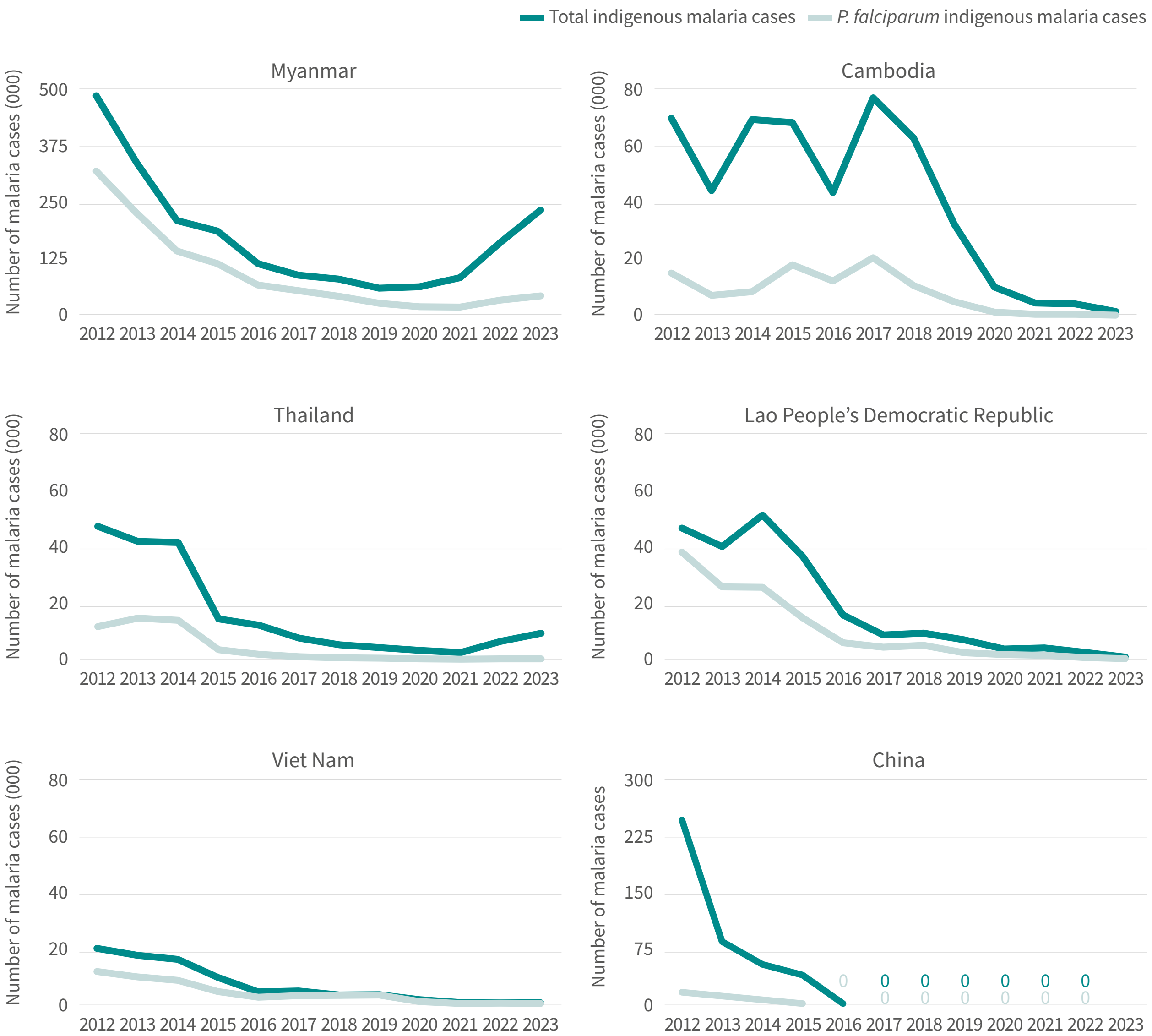


GMS: Greater Mekong subregion; *P. falciparum*: *Plasmodium falciparum*; WHO: World Health Organization.

elimination acceleration strategies specifically targeted to the country's context and driven by community engagement has further accelerated efforts. Community engagement is key, as remaining malaria cases occur primarily in remote villages and communities where difficult terrain, and different ethnicities, languages and dialects remain as some of the barriers to eliminating malaria, and cases are managed by health workers at the local level (*41*). Community-led solutions can contribute to sustainable change. Empowering individuals and communities to take charge of their health and to participate in health decision-making is an important part of successfully responding to malaria (*42*). This approach not only brings health care closer to those in need but also ensures that even the most geographically and economically marginalized communities are not left behind in the fight against malaria.

Through the MME initiative, Cambodia and Thailand aim to achieve malaria elimination by 2025 (*43*). However, Thailand faces ongoing challenges, particularly with rising annual cases of indigenous *P. falciparum* malaria, concentrated along the Myanmar border. Myanmar remains a significant concern within the GMS, accounting for 95.2% of all indigenous malaria cases and 99.1% of *P. falciparum* cases. This poses a threat to neighbouring Thailand, as cross-border movement from Myanmar could potentially fuel local transmission. Thailand faces the challenge of individuals entering the country to seek medical care, creating a need for increased investment in diagnostics, treatment and LLINs

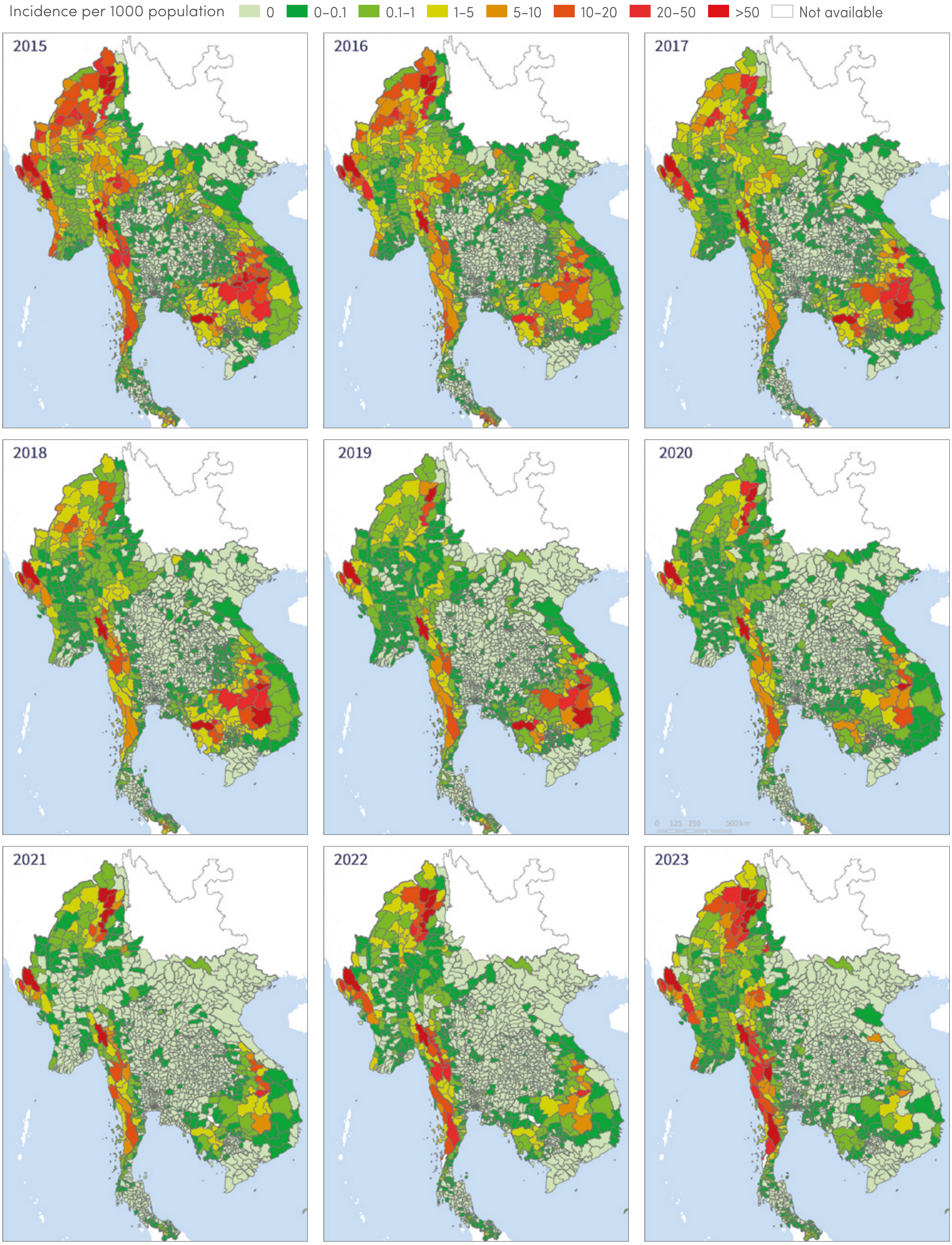
Fig. 4.6. Total indigenous malaria and *P. falciparum* cases in the GMS, by country, 2012–2023[a] *Source: WHO database.*



GMS: Greater Mekong subregion; *P. falciparum*: *Plasmodium falciparum*; WHO: World Health Organization.
[a] Countries are shown from the highest number of total indigenous malaria cases in 2012 (top left) to the lowest (bottom left). For 2023, China did not report any data.

to address the rising number of cases. There is a need to tackle cross-border transmission challenges; tailoring health interventions to these groups, considering their specific health needs and social determinants, is crucial for effective malaria control and preventing onward transmission (**Fig. 4.7**).

Fig. 4.7. Regional map of malaria incidence in the GMS, by area, 2015–2023 *Source: NMP reports to the GMS Malaria Elimination Database.*



GMS: Greater Mekong subregion; NMP: national malaria programme.

4.4 *P. knowlesi* disease burden and transmission

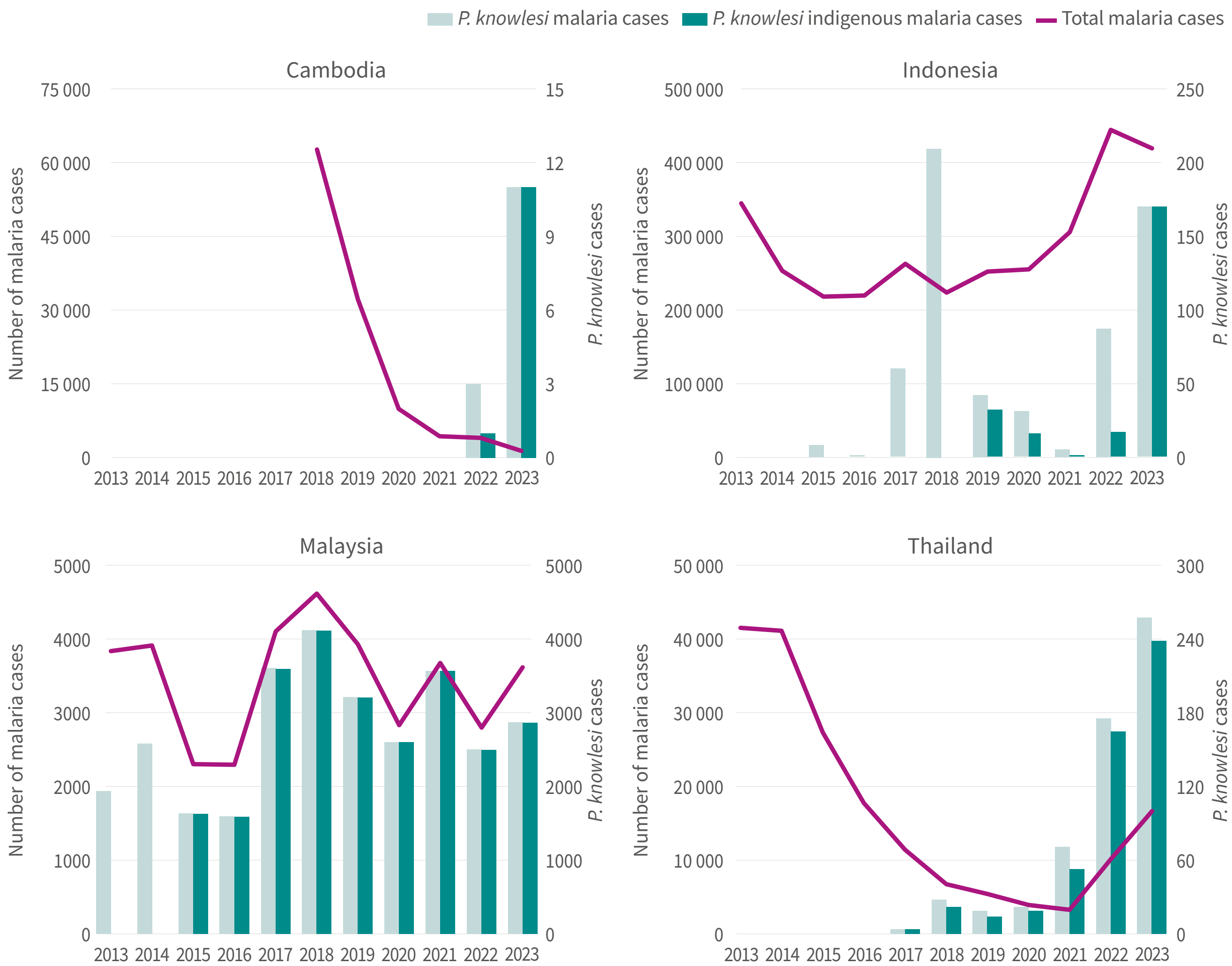
In recent years, *P. knowlesi* has emerged as a significant concern in malaria cases, particularly in South-East Asia, in the countries of Indonesia, Malaysia and Thailand, and more recently in Cambodia. Globally, there were 3290 reported cases of *P. knowlesi* infection in 2023, marking an increase of 18.9% from 2768 cases in 2022. Reported indigenous *P. knowlesi* cases also rose by 22%, from 2682 cases in 2022 to 3274 in 2023.

Malaysia continues to account for most *P. knowlesi* cases, contributing 87.4% of the global total cases in 2023, followed by Thailand (7.8%), Indonesia (4.4%) and Cambodia (0.3%). In 2023, all indigenous malaria deaths in Malaysia (14) were attributed to *P. knowlesi*.

In Malaysia, cases increased by 14.9%, from 2505 in 2022 to 2879 in 2023, with nearly all (99.4%) classified as indigenous. Similarly, Indonesia, Thailand and Cambodia saw significant increases in *P. knowlesi* cases between 2021 and 2023. Indonesia reported an increase from five cases in 2021 to 170 in 2023, Thailand saw an increase from 71 in 2021 to 258 cases in 2023, and Cambodia, with its first reported cases in 2022, recorded 11 cases in 2023 (**Fig. 4.8**). In 2023, the only country to report deaths from *P. knowlesi* was Malaysia, with all of its 14 deaths attributed to *P. knowlesi*.

The rising burden and transmission of *P. knowlesi* present unique challenges for malaria elimination efforts and have implications for malaria free certification. To date, certification has been awarded only to countries where the four human *Plasmodium* species are transmitted. Considering the emergence of *P. knowlesi* transmission in the context of certification of malaria elimination, WHO convened an advisory group, which concluded that countries that have eliminated transmission of the four main human malaria parasite species but continue reporting indigenous transmission of other *Plasmodium* species might be granted certification if the risk of infection to humans is assessed as negligible. WHO continues to work on assessing the situation with *P. knowlesi* and other zoonotic malaria and to provide further guidance.

Fig. 4.8. Number of total *P. knowlesi*, indigenous *P. knowlesi* and total malaria cases in Cambodia, Indonesia, Malaysia and Thailand, 2013–2023 *Source: NMP data.*



NMP: national malaria programme; *P. knowlesi*: *Plasmodium knowlesi*.

4.5 Prevention of re-establishment

Once malaria has been eliminated in a country, and as part of the certification process, countries should reorient their programmes to ensure activities are in place to prevent re-establishment of malaria (*36*). During this time, countries should ensure that malaria services, particularly curative, preventive and epidemiological services, remain operational during and after integration to prevent resurgence. The minimum indication of re-establishment is defined as at least three indigenous malaria cases of the same species in the same focus for 3 consecutive years; such re-establishment in a malaria free certified country may trigger a de-certification process.

Countries that have interrupted indigenous transmission should remain vigilant to prevent its reintroduction. There are several key aspects to consider for maintaining an effective prevention programme (*36*):

- National governance: a structure to oversee and coordinate effective implementation of re-establishment prevention activities.
- Surveillance and response: a robust surveillance system that ensures all suspected malaria cases are quickly tested, treated, reported, investigated and responded to. This system should also be capable of early detection and containment of malaria outbreaks.
- Malaria diagnosis network: a network of laboratories capable of providing quality-assured confirmation of malaria infections and verifying infection clearance. Periodic assessment of laboratory staff competence should be in place.
- Case management: good-quality malaria diagnosis and treatment services available throughout the country and to everyone, irrespective of nationality. General health services must maintain vigilance for prompt detection and treatment of any malaria cases that might occur.
- Vector control and entomological surveillance: continued entomological surveillance and vector control measures in areas with high malariogenic potential to minimize the risk of transmission from imported parasites. Maintain capacity for vector control during local transmission interruptions.
- Multisectoral collaboration: coordination and collaboration with non-health sectors to optimize the coverage and effectiveness of interventions, particularly in high-risk populations.
- Intercountry information sharing and border collaboration: strengthened coordination and communication with neighbouring countries to mitigate reintroduction risks, especially in border areas with high malariogenic potential and ongoing transmission.
- Raising awareness and providing preventive strategies for travellers: early detection of malaria cases can be improved by raising the awareness of health practitioners and travellers to and from malaria endemic countries. Countries should provide advice to travellers to endemic countries on malaria risk, avoiding mosquito bites and the availability and use of chemoprophylaxis, which can significantly reduce the risk of infection and severe disease.

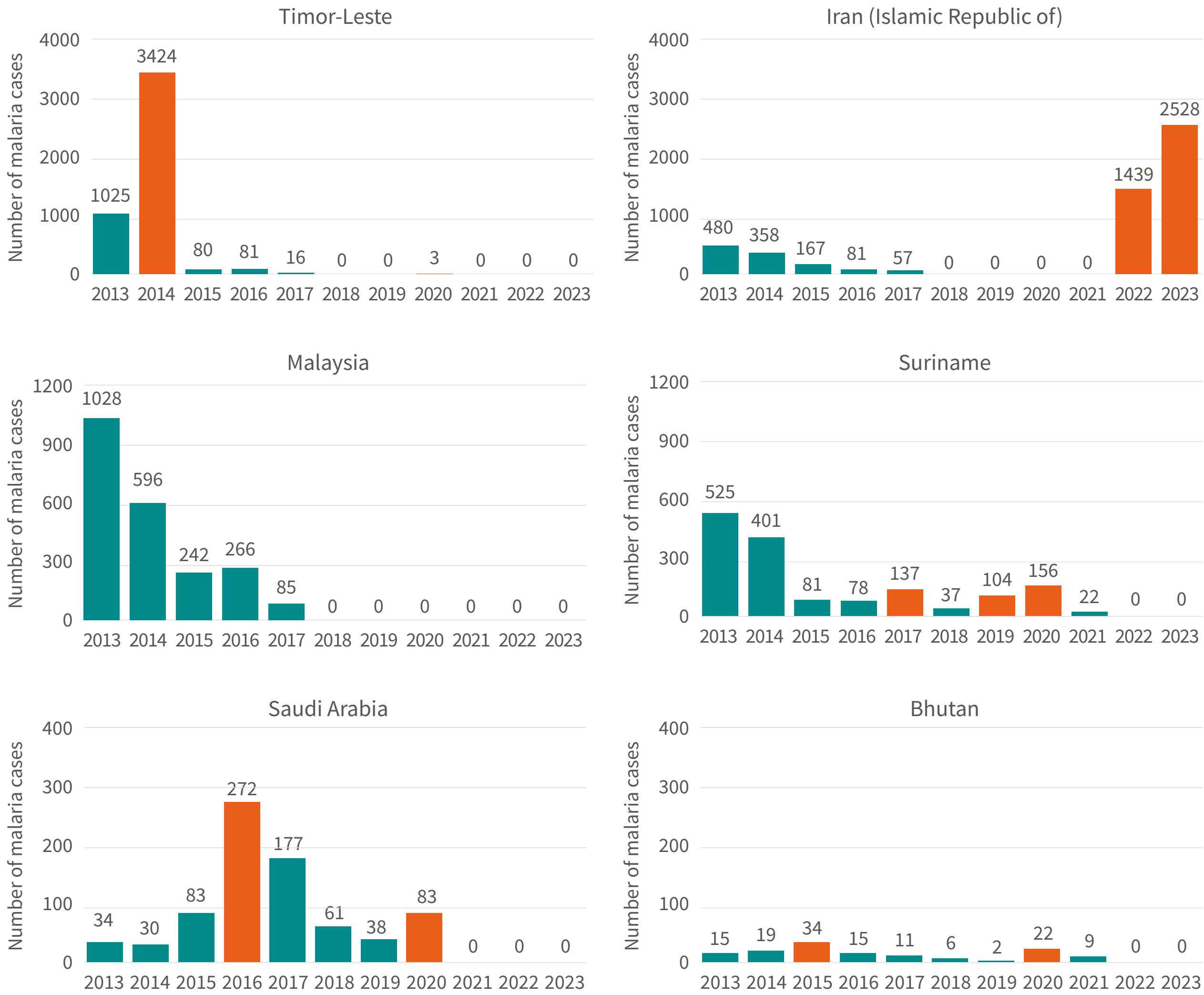
Between 2000 and 2023, no country that was certified malaria free was found to have malaria transmission re-established. However, several E-2025 countries that have recently achieved zero indigenous cases face challenges in maintaining that achievement and preventing re-establishment. Some of the challenges may be related to the movement of people from countries with higher malaria burdens, particularly along border areas. Additionally, these challenges may be linked to reductions in financial resources and gaps in diagnostic and preventive interventions. Decreased funding for malaria poses a threat to countries that report zero or low numbers of indigenous cases. There is a need to advocate and ensure that malaria programmes remain adequately funded to sustain progress by responding to cases in a timely way and prevent re-establishment of transmission.

Following 4 consecutive years of zero indigenous cases, for the past 2 years (since 2022), the Islamic Republic of Iran has seen a resurgence of cases (locally acquired, including indigenous and introduced cases) (**Fig. 4.9**) (see **Section 2.4**). This highlights the constant threat of reintroduction and further re-establishment of malaria transmission. Therefore, to maintain zero indigenous cases, political commitment to and continuous investment in prevention; rigorous deployment of interventions; a robust surveillance system that can detect cases and respond in a timely way to prevent onward transmission; and cross-border collaboration along high transmission areas remain key priorities in safeguarding progress and maintaining malaria free status.

Additionally, community engagement and participation are crucial in preventing the re-establishment of malaria. Building community commitment during elimination efforts and raising community awareness about potential outbreaks and resurgences enhances understanding of malaria and the rationale for re-establishment prevention efforts (*44*).

WHO is currently in the process of finalizing the guidance for the prevention of re-establishment, which will include a section on guidance around border malaria to address policy gaps, as more countries that were once endemic to malaria become certified malaria free.

Fig. 4.9. Number of annual indigenous malaria cases between 2013 and 2023 in E-2025 countries that recently reported zero cases[a] *Source: NMP reports.*



E-2025: malaria eliminating countries for 2025; NMP: national malaria programme.

[a] Countries are shown from the highest number of indigenous malaria cases in any year between 2013 and 2023 to the lowest (left to right and top to bottom). These are countries that have reported zero indigenous cases at any time in this period and have not been certified malaria free. Orange bars represent substantial increases in cases or outbreaks in comparison with the previous year of the time series. The data on the Islamic Republic of Iran reflect locally acquired cases, which include indigenous and introduced cases.

Impact of humanitarian emergencies worldwide on malaria control

5.1 Malaria and humanitarian emergencies (conflict and violence and natural disaster)

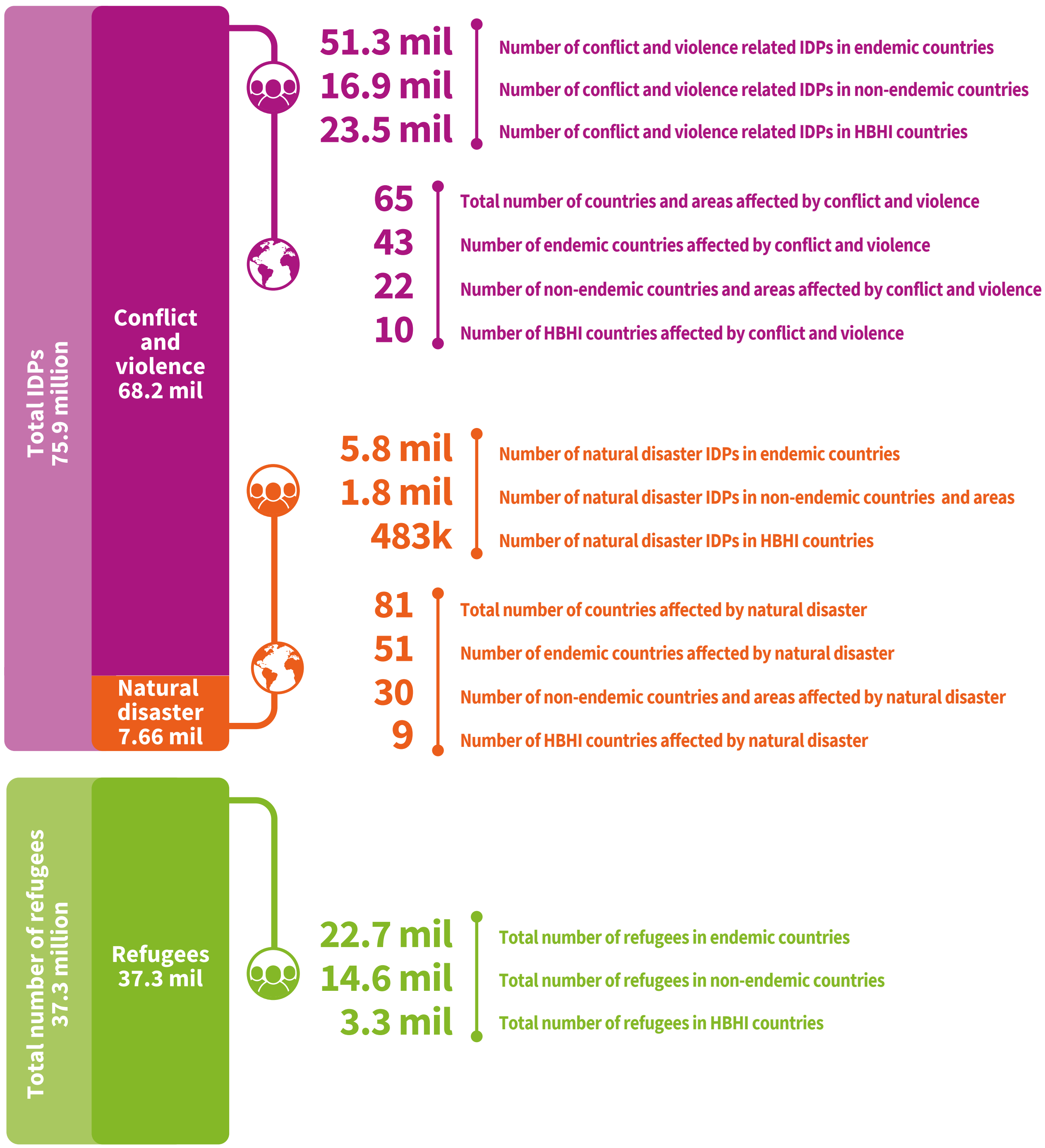
The intersection of conflict and violence, natural disasters, malnutrition and malaria transmission creates a compounded public health challenge in malaria endemic regions. Environmental and political changes can play a role in the resurgence of malaria in areas where it was previously well controlled, eliminated or non-existent. This was observed in 1993 with the return of displaced Tajiks to Tajikistan from high-burden areas of Afghanistan and Pakistan, due to armed conflict, which subsequently led to a resurgence of *P. falciparum* malaria (*45*, *46*). Changes in climate may also be altering the distribution of malaria vectors, influencing the patterns of malaria transmission and the overall global burden of the disease. Increases in rainfall and more frequent extreme weather events can create more breeding grounds for mosquitoes, thereby increasing the risk of malaria transmission (*27*, *45*).

Several factors arising from humanitarian emergencies may contribute to the increase in burden of malaria. These include poor or absent housing structures and environmental deterioration, resulting in increased breeding sites and exposure to mosquitoes; the breakdown of health services, preventing access to effective prevention measures and treatment; and malnutrition, leading to weakened immunity and the increased likelihood of multiple infections (*45*). In malaria endemic settings, IDPs and refugees may be disproportionately affected by malaria due to limited access to prevention and treatment, which can intensify transmission risks and place additional demands on already strained health systems. The convergence of displacement, weakened health systems and environmental changes poses significant challenges. Women, girls and young children often make up the largest proportion of the population that suffers the most during humanitarian emergencies, due to malnutrition and violence leaving them more vulnerable to disease (*47*). Additionally, certain groups face heightened vulnerability during the acute phase of emergencies, due to factors such as lower prioritization in resource distribution, social or political marginalization, and challenges in accessing treatment and care. These groups typically include infants and lone children, pregnant women and girls, older individuals, persons with disabilities, people of minority ethnicities, and those living in remote areas (*45*).

5.2 IDPs and refugees in malaria endemic countries

In 2023, there were a total of 113.3 million IDPs and refugees, of which 75.9 million people were internally displaced due to conflict and violence or natural disasters (*48*), and 37.3 million were reported as refugees under United Nations High Commissioner for Refugees (UNHCR) mandate, as illustrated in **Fig. 5.1**. The global population of IDPs and refugees has been steadily increasing because of escalating conflicts and violence and natural disasters.

Fig 5.1. Summary of IDPs and refugees due to humanitarian emergencies, 2023[a] *Sources: IDP data: IDMC; refugee data: UNHCR.*



HBHI: high burden to high impact; IDMC: Internal Displacement Monitoring Centre; IDP: internally displaced person; mil: million; UNHCR: United Nations High Commissioner for Refugees.

[a] Refugees reflected here are those recorded under UNHCR mandate and other people in need of protection.

This has disproportionately affected low- and middle-income countries (LMIC), particularly those endemic for malaria, and regions facing both political instability and environmental vulnerability (**Fig. 5.2**). Globally, in 2023, more than 75% of the population displaced by conflict and violence and natural disaster were within malaria endemic countries. Of all 65 countries affected by conflict, 66% were malaria endemic. Malaria endemic countries and areas also accounted for 63% of countries that have been affected by disaster (**Fig. 5.1**).

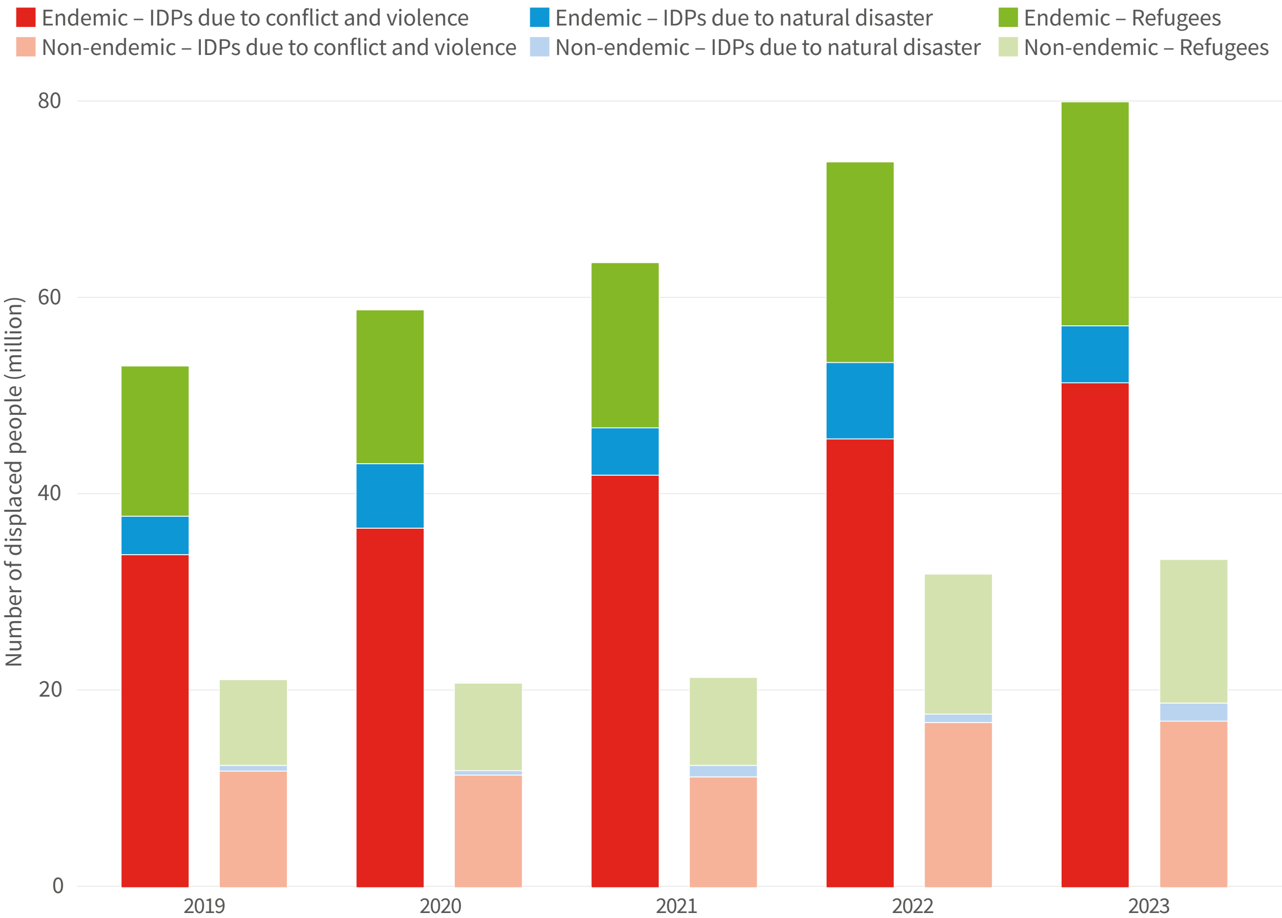
5.2.1 IDPs due to conflict and violence

Conflict and violence remains a primary driver of displacement worldwide, accounting for a large proportion of IDPs and refugees.

The total number of malaria endemic countries with IDPs due to conflict and violence increased from 39 to 43 between 2019 and 2023. In 2023, nearly 51.3 million displaced people (64.2%) in endemic countries were IDPs due to conflict and violence (**Fig. 5.2**). In Africa, where 95.4% of all estimated malaria cases were reported, IDPs accounted for 46% of all global displacements, with 93% of them displaced due to conflict and violence in the region. The African countries reporting the highest number of IDPs – the Sudan (the highest ever reported in a single country globally since 2008), the Democratic Republic of the Congo, Somalia, Ethiopia and Nigeria (*48*) (**Fig. 5.3**) – are also among those that have the highest malaria disease burden. In the Sudan, the near collapse of the health system has affected 70–80% of hospitals in the conflict-affected areas, deeming them non-functional, which has left almost two thirds of the population without access to health services, hindering disease response (*48*).

Countries such as the Democratic Republic of the Congo, Nigeria, Cameroon, Mali, the Niger, Yemen, Afghanistan, the Sudan and South Sudan have seen prolonged conflicts leading to mass displacement (*48*). The breakdown of health

Fig. 5.2. Comparison of displaced persons in endemic and non-endemic countries, 2019–2023[a] *Sources: IDMC and UNHCR.*



IDMC: Internal Displacement Monitoring Centre; IDPs: internally displaced persons; UNHCR: United Nations High Commissioner for Refugees.
[a] Refugees reflected here are those recorded under UNHCR mandate and other people in need of protection.

care systems in these regions may exacerbate the burden of malaria among displaced populations.

5.2.2 IDPs due to natural disaster

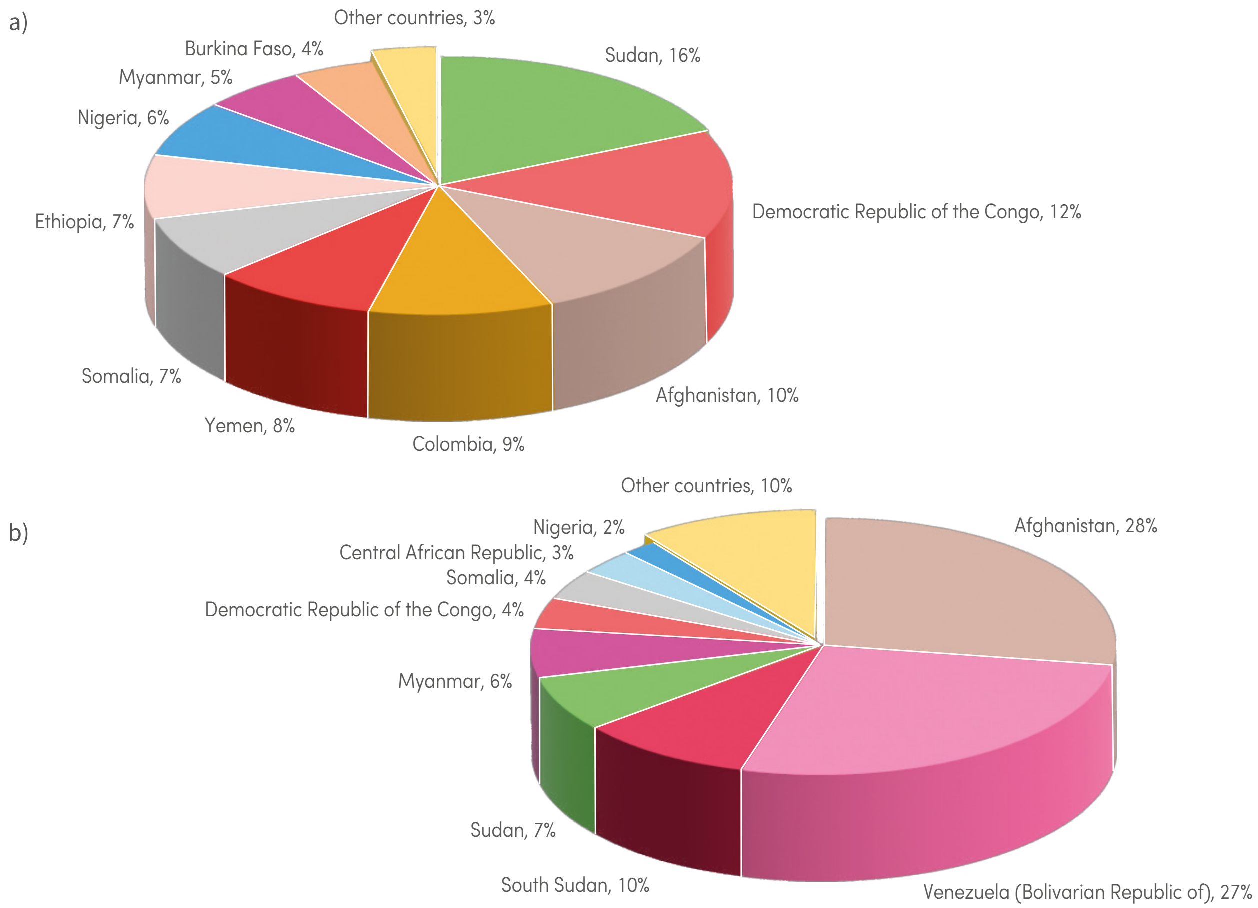
Natural disasters, such as floods, hurricanes and droughts, have increasingly become a driver of displacement, particularly in climate-vulnerable regions (*48*). Between 2019 and 2023, the number of countries affected by disaster ranged between 50 and 63. In 2023, natural disasters contributed to 10.9% of all displacements (7.6 million) (**Fig. 5.1**), a figure that is projected to rise due to the accelerating impacts of climate change.

IDPs due to natural disaster accounted for 5.8 million in malaria endemic areas. Natural disaster was mainly due to heavy flooding in the Horn of Africa following a period of drought. Cyclone Freddy, the largest storm to hit the region, caused displacements in Malawi and Mozambique (*48*). These two countries account for 1.7% and 3.5%, respectively, of estimated malaria cases in endemic countries globally. From 2022 to 2023, Malawi experienced an increase of 3.1% of estimated cases, and Mozambique saw an increase of 3.9%. In some predominantly rural areas of Malawi, roads, bridges and power supplies were extensively damaged, blocking the delivery of food and other supplies to remote communities.

5.2.3 Refugees

In 2023, a total of nearly 22.7 million displaced people (28%) in malaria endemic countries were refugees (**Fig. 5.1**). Many may have resided in makeshift camps with limited access to basic health care, including malaria prevention and treatment, and potentially experiencing higher morbidity and mortality from malaria (*49*). In this setting, children aged under 5 years and pregnant women and girls are particularly affected (*49*). Refugees fleeing disasters may also face an increased risk of malaria if relocated to areas with active transmission.

Fig. 5.3. Proportions of a) IDPs due to humanitarian emergencies in malaria endemic countries and b) refugees from malaria endemic countries, 2023[a,b] *Sources: IDMC and UNHCR.*



IDMC: Internal Displacement Monitoring Centre; IDPs: internally displaced persons; UNHCR: United Nations High Commissioner for Refugees.

[a] Humanitarian emergency IDPs are displaced due to disaster and conflict and violence. Refugees reflected here are those recorded under UNHCR mandate and other people in need of protection based on country of origin.

[b] The top 10 countries with the most IDPs due to humanitarian emergencies and refugees are shown.

5.3 IDPs and refugees in the HBHI countries

In 2023, the 11 HBHI countries (excluding India, and including the Sudan) were responsible for 66% of global malaria cases and 68% of deaths. Ten of the 11 HBHI countries experienced conflicts as of 2023 (only the United Republic of Tanzania did not). In 2023, the 11 HBHI countries accounted for nearly 24% of IDPs and refugees globally, mostly driven by conflict.

Within HBHI countries, the Sudan alone accounted for 39% of IDPs due to conflict, followed by the Democratic Republic of the Congo (29%) and Nigeria (14%). The Democratic Republic of the Congo accounted for 29% of IDPs due to natural disaster, followed by Mozambique (24%) and Nigeria (17%). The Sudan accounted for 45% of refugees, followed by the Democratic Republic of the Congo (29%) and Nigeria (12%) (**Fig. 5.4**).

5.4 Public health action

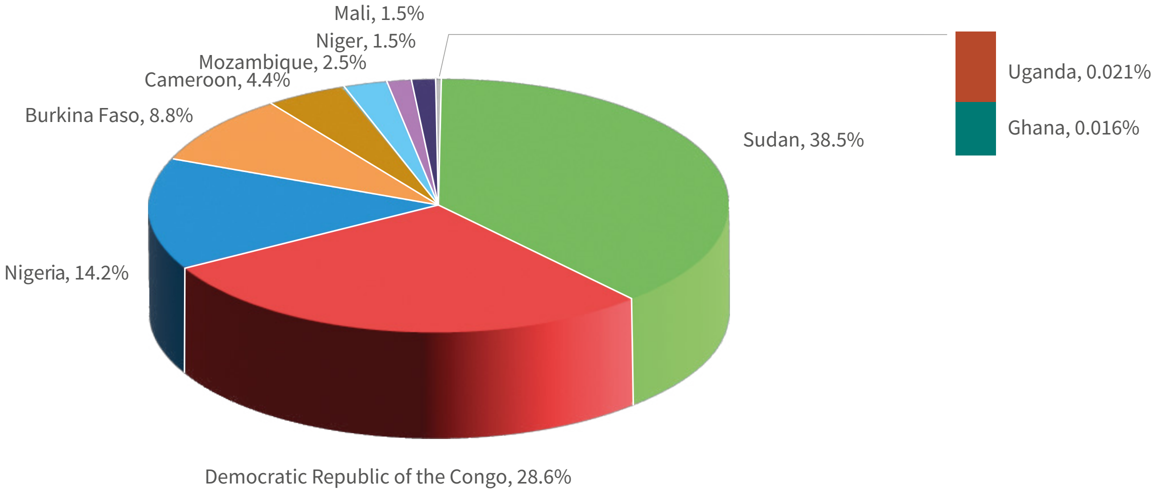
The global trends of displacement due to conflict and violence and natural disasters continue to rise, with IDPs and refugees facing severe health challenges. These populations, including infants and unaccompanied children, pregnant women and girls, older adults, persons with disabilities, and ethnic minorities, are disproportionately affected. In malaria endemic regions, displacement may affect malaria transmission and mortality. Addressing malaria prevention and control among displaced populations requires a comprehensive approach, identifying the barriers to access to care that displaced persons and groups face, integrating malaria control within broader humanitarian efforts, and ensuring that displaced populations in endemic areas have access to preventive and treatment services.

This strategy includes establishing robust leadership through emergency operations centres at national and regional levels, supported by regular coordination meetings to track progress and address emerging challenges. Collaboration with national and international organizations is essential to secure resources, logistical support and technical expertise. Strengthening health systems and staff is critical for building long-term resilience, while advocacy for increased funding is necessary to fill resource gaps and sustain the response.

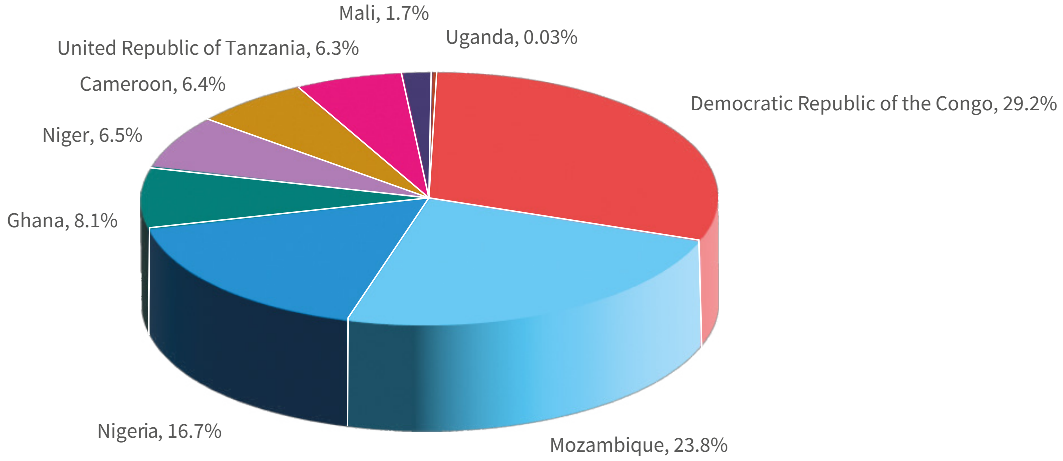
Malaria prevention and control must be a priority, ensuring that diagnostics and treatments reach all affected populations, including displaced individuals. Preventive measures, such as distributing bed nets and administering preventive chemotherapy, if required, should be implemented. Engagement and effective communication with most-at-risk populations play key roles in raising awareness about malaria prevention and recognizing symptoms to ensure timely diagnosis and treatment. Finally, robust surveillance systems are essential to monitor and evaluate the response, ensuring that strategies remain effective and adaptable to evolving conditions.

Fig. 5.4. Proportions of a) IDPs due to conflict and violence in HBHI countries, b) IDPs due to natural disaster in HBHI countries, and c) refugees in HBHI countries based on country of origin, 2023 *Sources: IDCM and UNHCR.*

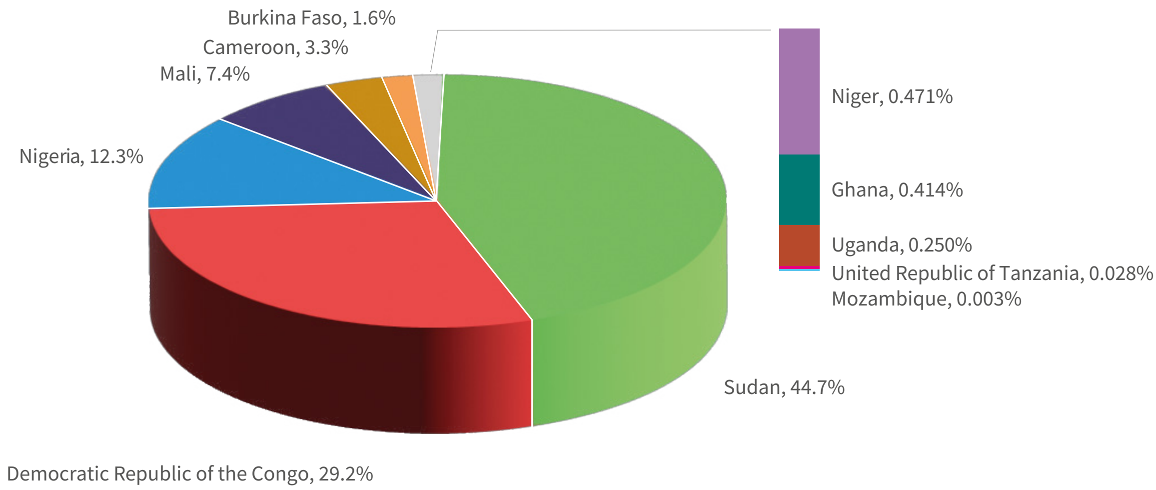
a)



b)



c)



HBHI: high burden to high impact; IDMC: Internal Displacement Monitoring Centre; IDPs: internally displaced persons; UNHCR: United Nations High Commissioner for Refugees.

6 Investments in malaria programmes and research

This chapter explores investments in malaria programmes and research. **Section 6.1** examines the latest trends in funding for malaria control and elimination efforts, using data from the 2000–2023 and 2010–2023 periods where available. It offers insights into funding sources and channels, analysing global investments alongside trends in key country groupings to provide a comprehensive view of the evolution of malaria financing. **Section 6.2** focuses on recent real gross domestic product (GDP) growth patterns. This analysis provides crucial context for understanding the economic conditions that influence malaria funding. **Section 6.3** delves into investments in malaria-related research and development (R&D) from 2014 to 2023, highlighting financial commitments towards advancements in malaria control, treatment and eventual elimination.

New initiatives and funding mechanisms for malaria programmes and research have proliferated since the 1990s. Key milestones include the launch of the RBM Partnership to End Malaria in 1998, the establishment of the Bill & Melinda Gates Foundation in 2000, the creation of the Global Fund in 2001, and the introduction of the United States President's Malaria Initiative in 2005 and Unitaid in 2006. In 2015, the SDGs were adopted, with malaria specifically addressed under SDG 3: Ensure healthy lives and promote well-being for all at all ages (*50*). The same year, WHO introduced the GTS (*35*). These initiatives, combined with bilateral and multilateral investments and domestic spending, have been crucial in elevating awareness about malaria and establishing global benchmarks for the funding necessary to ensure that resources for malaria interventions are adequate. The 2021 update of the GTS estimated the financial resources needed to meet key malaria targets by 2025 and 2030 (*51*). In 2020, the total annual funding needed was estimated at US$ 6.8 billion, with a projected increase to US$ 9.3 billion by 2025, and US$ 10.3 billion required by 2030 (*51*). Additionally, an estimated US$ 8.5 billion will be required for R&D between 2021 and 2030, translating to an average annual investment of US$ 851 million (*51*).

6.1 Funding trends for malaria control and elimination

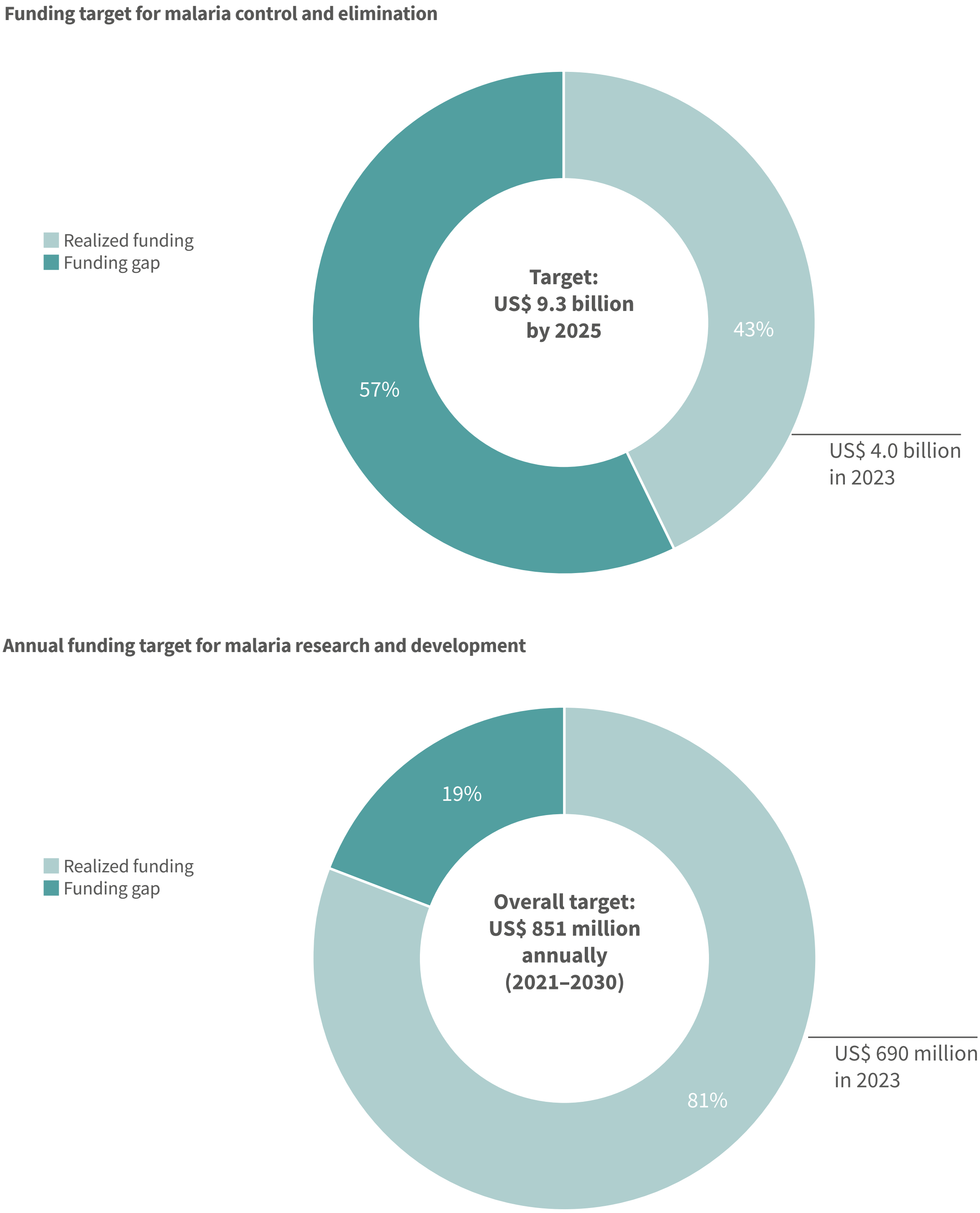
In 2023, the analysis of total funding for malaria control and elimination included 90 countries, comprising 83 endemic countries and seven non-endemic countries – four of which have been certified malaria free within the past 3 years. The non-endemic countries are included due to their contributions to significant financing trends over the past 2 decades, and some continue to receive support for malaria-related initiatives. Throughout this chapter, these 90 countries are collectively referred to as the "malaria endemic countries".

Total funding for malaria in 2023 was estimated at US$ 4.0 billion, showing a slight decrease from US$ 4.1 billion in 2022. However, this represents an increase from US$ 3.5 billion in 2021 and US$ 3.3 billion in 2020. Each year, the world malaria report provides funding data that have been adjusted for inflation, incorporating any updates where new information from countries, donors and institutions has become available. Unless stated otherwise, funding trends in this chapter are reported in constant 2023 United States dollars.

Despite the 2023 investment reaching US$ 4.0 billion, this falls short of the estimated US$ 8.3 billion needed globally to meet the GTS targets by 2023. The funding gap has widened over the past 5 years, increasing from US$ 2.6 billion in 2019 to US$ 4.3 billion in 2023, meaning that only 48% of the required funding was secured in 2023, down from 52% in 2022 (**Fig. 6.1**).

The sources of funding for malaria control and elimination efforts are outlined in **Table 6.1**. To determine the share of

Fig. 6.1. GTS funding targets for 2025 and 2030 (current 2023 US$) *Sources: GTS (35) and Impact Global Health (52).*



GTS: *Global technical strategy for malaria 2016–2030.*

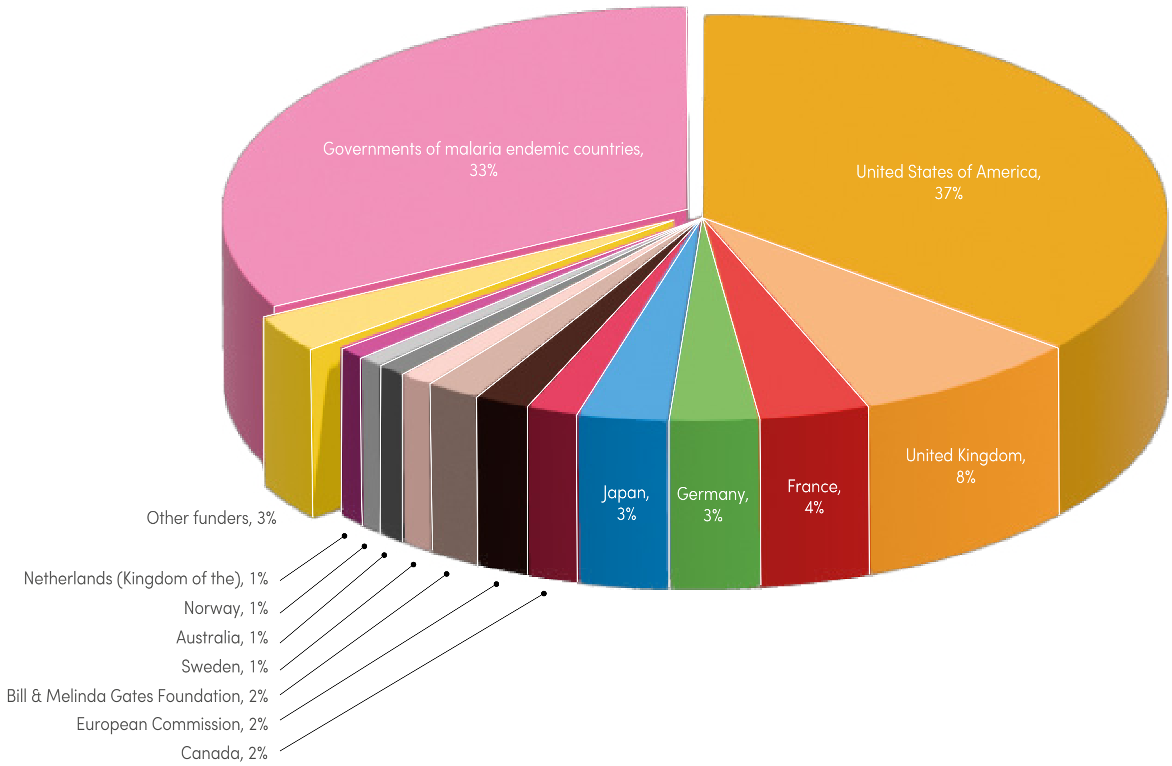
international funding by source for **Fig. 6.1** and **Fig. 6.2**, malaria-related annual contributions through multilateral agencies were estimated based on donors' contributions to the Global Fund and from the Organisation for Economic Co-operation and Development (OECD) creditor reporting system (CRS). Additionally, contributions from malaria endemic countries to multilateral agencies were reallocated to the governments of these endemic countries.

Table 6.1. Sources of data on funding for malaria

	International funding	
Domestic funding	**Multilateral**	**Bilateral**
NMP reported domestic budget or expenditures when available, or estimates from WHO/GMP 2000–2023	Donor contributions to the Global Fund 2010–2023 sourced from the Global Fund and WHO/GMP estimates Global Fund disbursements to malaria endemic countries 2003–2023, sourced from the Global Fund	United Kingdom final aid spend 2017–2023 from the Foreign, Commonwealth and Development Office
Patient care delivery estimates, 2010–2023 from WHO/GMP		United States funding for malaria 2001–2023, by agency and recipient country sourced from KFF (formerly Kaiser Family Foundation)
	Donor disbursements to multilateral funders 2011–2022 sourced from OECD members' total use of the multilateral system, and 2011 and 2022 data used as a proxy for 2010 and 2023	Donor disbursement to malaria endemic countries from OECD CRS (2002–2022, except for United Kingdom 2007–2016) and WHO/GMP estimates for 2023

CRS: creditor reporting system; Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; NMP: national malaria programme; OECD: Organisation for Economic Co-operation and Development; United Kingdom: United Kingdom of Great Britain and Northern Ireland; United States: United States of America; WHO/GMP: World Health Organization Global Malaria Programme.

Fig. 6.2. Funding for malaria control and elimination, 2010–2023 (% of total funding), by source of funds (constant 2023 US$) *Sources: United States Government's ForeignAssistance.gov, Global Fund, NMP reports, OECD CRS database, United Kingdom Department for International Development, WHO estimates and World Bank DataBank.*



CRS: creditor reporting system; Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; NMP: national malaria programme; OECD: Organisation for Economic Co-operation and Development; United Kingdom: United Kingdom of Great Britain and Northern Ireland; United States: United States of America; WHO: World Health Organization.

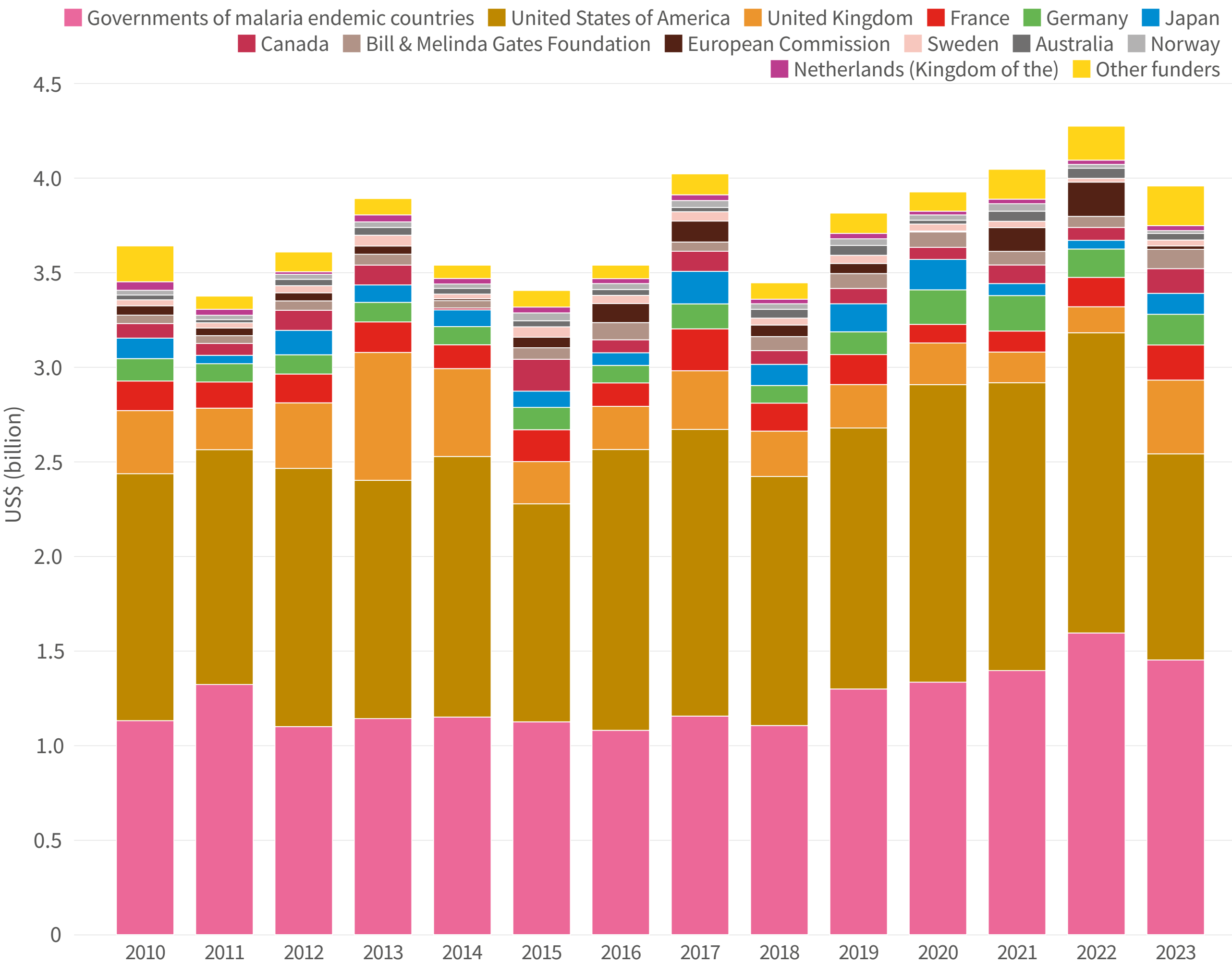
Note: The data sources, boundaries, accounting rules and estimation methods used in this report are different from those of the System of Health Accounts 2011 (SHA2011). The malaria expenditure data reported here and throughout this section are thus not comparable with the disease expenditure data, including for malaria, that are reported in WHO's Global Health Expenditure Database. These figures do not include out-of-pocket expenditures.

Fig. 6.2 illustrates the total share of malaria funding by source from 2010 to 2023, while **Fig. 6.3** breaks down each donor's annual share over the same period. Based on estimated contributions, international sources accounted for 67% of total malaria funding between 2010 and 2023, while domestic funding comprised 33%. This pattern remained consistent throughout much of the period, though recent years have seen a gradual rise in domestic contributions, increasing to 37% in 2023 from 33% in 2021.

The majority of international funding (67%) during this period came from key donors, including the United States of America (United States), United Kingdom of Great Britain and Northern Ireland (United Kingdom), France, Germany and Japan. Additional support was provided by other international donors, as shown in both figures. In 2023, the largest share was contributed by the United States (37%), with nearly US$ 1.1 billion – a decrease from over US$ 1.5 billion in 2022. This total includes both planned bilateral funding and the malaria-adjusted share of multilateral contributions. The decrease could be attributed to the timing of disbursements, as bilateral funding remained stable, rather than reflecting an actual reduction in funding commitments. Canada, France, Germany, Japan and the United Kingdom collectively contributed nearly US$ 1 billion, while more than US$ 0.4 billion came from other Development Assistance Committee (DAC) member countries and private sector donors. This sustained international funding, combined with the increasing share of domestic contributions, underscores the critical role of both global and local efforts in the fight against malaria.

Fig. 6.4 shows the funding for malaria control and elimination by domestic and international channels, beginning in 2000 when data were available. For the United

Fig. 6.3. Funding for malaria control and elimination, 2010–2023, by source of funds (constant 2023 US$) *Sources: United States Government's ForeignAssistance.gov, United Kingdom Foreign, Commonwealth and Development Office, Global Fund, NMP reports, OECD CRS database, the World Bank DataBank and WHO estimates.*



CRS: creditor reporting system; Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; NMP: national malaria programme; OECD: Organisation for Economic Co-operation and Development; United Kingdom: United Kingdom of Great Britain and Northern Ireland; United States: United States of America; WHO: World Health Organization.

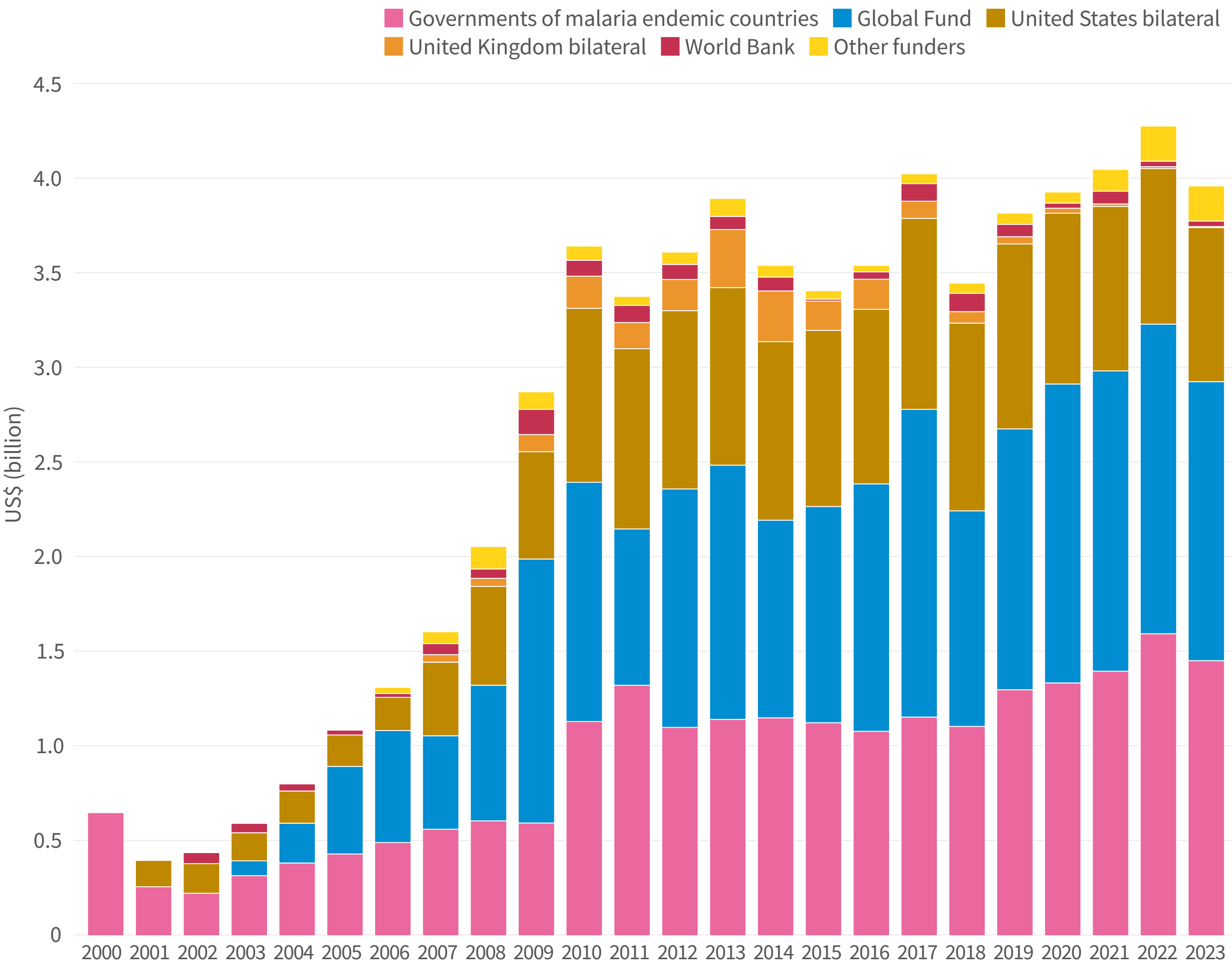
States, data on total annual planned funding from the United States Centers for Disease Control and Prevention (CDC), United States Department of Defense, and United States Agency for International Development (USAID) were available from 2001 to 2023, with USAID's country-level funding available starting in 2006. Data on annual disbursements by the Global Fund to malaria endemic countries were available from 2003 to 2023.

For the United Kingdom, disbursement data were sourced from the OECD CRS database on aid activities from 2007 to 2016. From 2017 to 2023, the data came from the United Kingdom's *Statistics on international development: final UK ODA spend 2023* report (*53*). Notably, reported United Kingdom funding has declined since 2017, particularly in the past year. This decline is partly because the final UK aid spend report does not fully capture all contributions affecting malaria outcomes. The United Kingdom's support for malaria control is multifaceted, including investments in health systems, R&D and contributions to the Global Fund, which may not be fully reflected in these estimates.

For all other donors, disbursement data were sourced from the OECD CRS database (*54*). Where data for a specific country or region were unavailable, this was labelled as "unspecified" (UNSPE) for those years, and no data imputation was applied for missing years. As a result, the trends presented in **Fig. 6.4** to **Fig. 6.8** should be interpreted with caution, especially for the years before 2010, when data gaps are more likely.

Domestic contributions combined government-reported funding and estimated patient care delivery costs. Patient care delivery costs were calculated using unit cost estimates from WHO's CHOosing Interventions that are Cost-Effective (WHO-CHOICE) initiative, as detailed in **Annex 1** (*55*).

Fig. 6.4. Funding for malaria control and elimination, 2000–2023, by channel (constant 2023 US$) *Sources: United States Government's ForeignAssistance.gov, Global Fund, NMP reports, OECD CRS database, United Kingdom Department for International Development, WHO estimates and World Bank DataBank.*



CRS: creditor reporting system; Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; NMP: national malaria programme; OECD: Organisation for Economic Co-operation and Development; United Kingdom: United Kingdom of Great Britain and Northern Ireland; United States: United States of America; WHO: World Health Organization.

In 2023, the governments of malaria endemic countries were among the major sources of funding, contributing nearly US$ 1.5 billion (37%), a figure that has remained stable but represents a significant increase from 31% in 2010. Of this, US$ 0.4 billion was allocated to malaria case management in the public sector, while nearly US$ 1.1 billion supported other malaria control activities. This growth in domestic contributions underscores the increasing commitment of malaria endemic countries to their own control and elimination efforts.

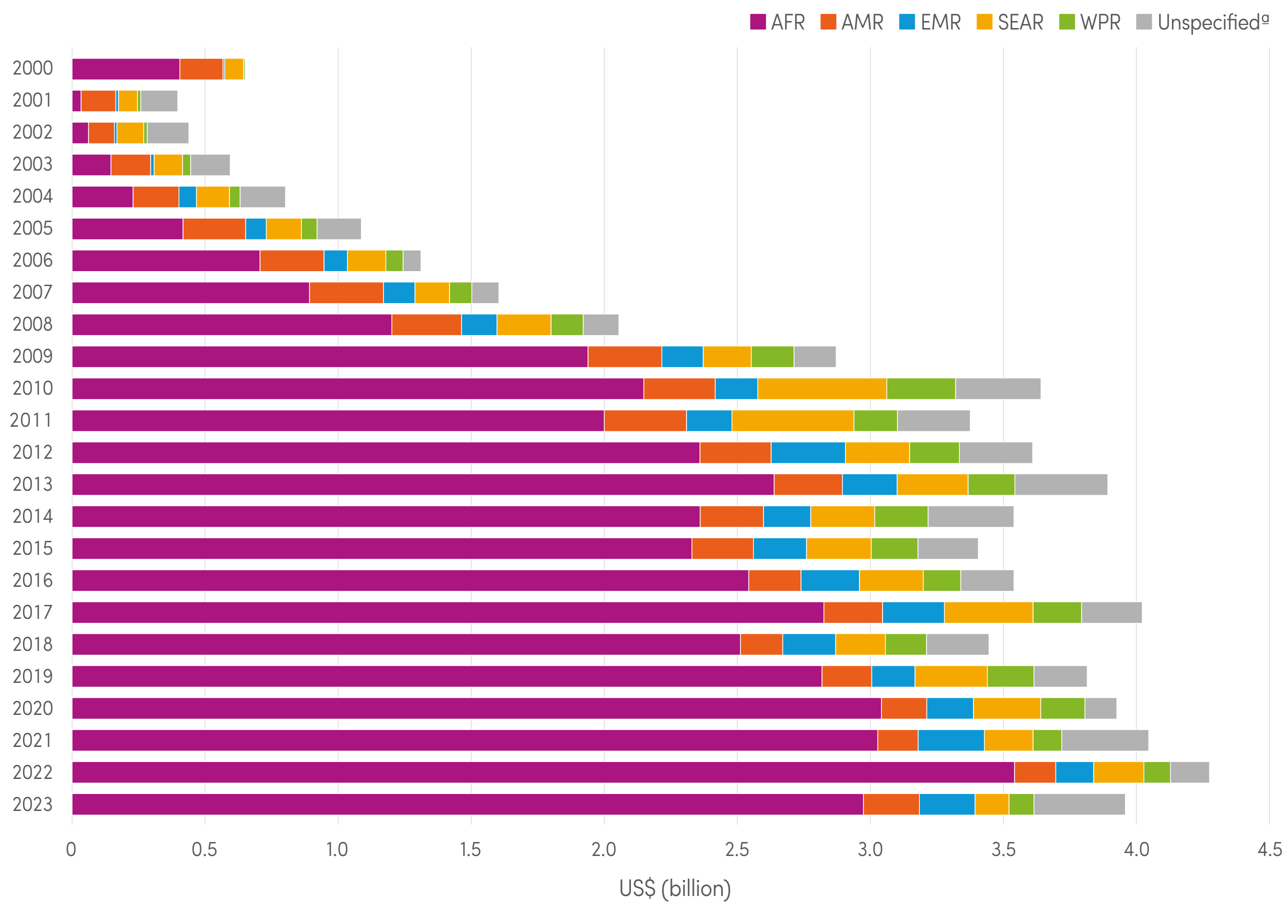
In 2023, US$ 1.5 billion (37%) was channelled through the Global Fund, maintaining its position as the largest and most prominent international funding source for malaria. Global Fund contributions have remained steady over the past 4 years, highlighting its central role in global malaria control efforts.

The United States planned to disburse US$ 0.8 billion as direct bilateral funding in 2023, similar to the previous year, maintaining its status as the largest bilateral donor. The United Kingdom, though contributing a smaller amount, remained the second largest bilateral donor. Other significant contributions came from the World Bank and DAC member countries.

In 2023, 75% of the US$ 4.0 billion in malaria funding was allocated to the WHO African Region, a slight decrease from 80% in 2022 and 78% in 2021. This reflects the region's overwhelming malaria burden, which accounts for over 90% of global cases and deaths. The WHO Region of the Americas and Eastern Mediterranean Region each received 5% of total funding, focusing on localized malaria control efforts in countries like Brazil, and targeting conflict-affected areas, such as Yemen and Afghanistan, where disrupted health systems and limited access to care complicate malaria control. The WHO South-East Asia and Western Pacific regions accounted for 3% of total funding each, focusing on malaria control efforts in countries such as India and Papua New Guinea.

An additional 9% of the funding was allocated to unspecified regions, supporting global malaria initiatives and research projects, which are critical for advancing innovation and

Fig. 6.5. Funding for malaria control and elimination, 2000–2023, by WHO or unspecified region (constant 2023 US$) *Sources: United States Government's ForeignAssistance.gov, United Kingdom Department for International Development, Global Fund, NMP reports, OECD CRS database, World Bank DataBank and WHO estimates.*



AFR: WHO African Region; AMR: WHO Region of the Americas; CRS: creditor reporting system; EMR: WHO Eastern Mediterranean Region; Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; NMP: national malaria programme; OECD: Organisation for Economic Co-operation and Development; SEAR: WHO South-East Asia Region; United Kingdom: United Kingdom of Great Britain and Northern Ireland; United States: United States of America; WHO: World Health Organization; WPR: WHO Western Pacific Region.

[a] "Unspecified" refers to funding flows with no information on the geographical localization of their recipients.

improving malaria control efforts worldwide. This regional allocation highlights the diverse challenges faced by different parts of the world in combating malaria, from high-burden regions requiring extensive resource mobilization, to areas where targeted control measures are essential to address localized transmission (**Fig. 6.5**).

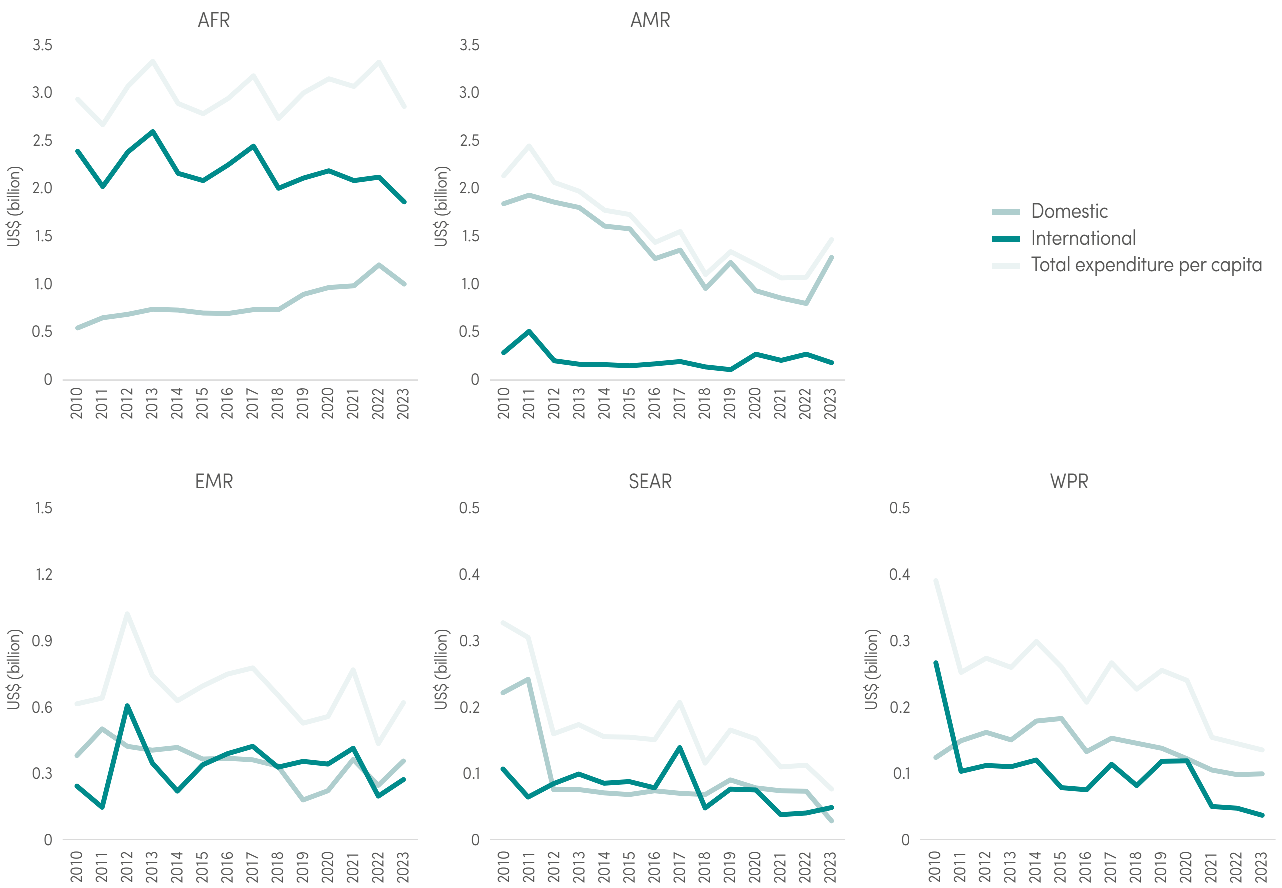
The assessment of malaria control and elimination funding per capita from domestic and international sources reveals significant variation in average funding per person at risk across WHO regions, with fluctuations observed annually. Details on the methodology for calculating the population at risk are provided in **Annex 1**. The majority of WHO regions have experienced substantial declines in total funding per capita since 2010, with the African and Eastern Mediterranean regions being the exceptions (**Fig. 6.6**).

The WHO African Region has maintained relatively stable funding per person at risk since 2010, averaging around US$ 3.00, with slight fluctuations. Over this period, international funding decreased, while domestic contributions more than doubled by 2023. However, total funding in 2023 was lower than in recent years, reflecting a 14% reduction compared with 2022, with per capita funding dropping from US$ 3.31 in 2022 to US$ 2.85 in 2023.

In the WHO Eastern Mediterranean Region, total funding per person at risk has experienced some significant peaks since 2010. The region has seen considerable fluctuations in both domestic and international funding, with international contributions varying more over the past 13 years, while domestic funding showed a more consistent decline, except for an increase in 2023. While funding per person at risk in 2023 was similar to levels in 2010, there was a significant 42% increase compared with 2022, rising from US$ 0.43 to US$ 0.61 in 2023.

The WHO Region of the Americas has experienced a 32% decrease in total funding per person at risk since 2010, with both international and domestic contributions declining, by 38% and 30%, respectively. In 2023, total funding per person at risk was nearly US$ 1.50, sourced primarily from domestic contributions (US$ 1.30), and the remainder

Fig. 6.6. Funding for malaria control and elimination per person at risk, 2010–2023, by WHO region (constant 2023 US$) *Sources: United States Government's ForeignAssistance.gov, NMP reports, OECD CRS database, United Kingdom Department for International Development, WHO estimates and World Bank DataBank.*



AFR: WHO African Region; AMR: WHO Region of the Americas; CRS: creditor reporting system; EMR: WHO Eastern Mediterranean Region; Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; NMP: national malaria programme; OECD: Organisation for Economic Co-operation and Development; SEAR: WHO South-East Asia Region; United Kingdom: United Kingdom of Great Britain and Northern Ireland; United States: United States of America; WHO: World Health Organization; WPR: Western Pacific Region.

from international sources (US$ 0.20). Compared with 2022, funding per person at risk increased by 36%, driven by a 60% rise in domestic funding and a 33% reduction in international funding.

The WHO South-East Asia Region has experienced a significant 76% decline in total funding per person at risk since 2010. However, 2010 and 2011 were marked by unusually high funding levels, primarily due to increased domestic contributions. From 2012 onward, funding per person at risk has remained relatively stable. In 2023, funding per person at risk was US$ 0.08, with the majority coming from international sources (63%) and the remainder from domestic contributions (37%). Compared with 2022, total funding per person at risk decreased by 27% in 2023.

Similarly, the WHO Western Pacific Region has followed a comparable trend, with a sharp 67% decline in total funding per person at risk since 2010. Like the WHO South-East Asia Region, 2010 stood out, with unusually high funding levels due to a significant contribution from the Global Fund. From 2011 onward, funding per person at risk stabilized, with a slow decline over the years. In 2023, funding per person at risk amounted to US$ 0.13, with the majority coming from domestic sources (73%) and the remaining 27% from international sources. The decrease in funding per person at risk in the Western Pacific Region was more modest, at only 7%, compared with 2022.

Fig. 6.7 highlights the substantial variation in the share of funding received by countries across different income groups, as defined by the World Bank classifications published in July 2024 (*56*). The World Bank classifications, based on the Atlas method, categorize economies annually: low-income economies are those with a gross national income (GNI) per capita of US$ 1145 or less in 2023; lower-middle-income economies range from US$ 1146 to US$ 4515; upper-middle-income economies from US$ 4516 to US$ 14 005; and high-income economies are those with a GNI per capita above US$ 14 005. The data reveal a trend where domestic funding for malaria increases as a country's income level rises. In upper-middle-income and high-income groups, domestic funding surpasses international funding.

In 2023, the low-income group included 25 countries. These countries received 38% of total malaria funding, down from 44% in 2022. Despite this decrease, low-income countries

Fig. 6.7. Funding for malaria control and elimination, 2000–2023, by World Bank 2024 income group and source of funding (constant 2023 US$) *Sources: United States Government's ForeignAssistance.gov, Global Fund, NMP reports, OECD CRS database, United Kingdom Department for International Development, WHO estimates and World Bank DataBank.*

CRS: creditor reporting system; Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; NMP: national malaria programme; OECD: Organisation for Economic Co-operation and Development; United Kingdom: United Kingdom of Great Britain and Northern Ireland; United States: United States of America; WHO: World Health Organization.

[a] Excludes out-of-pocket spending by households.

have seen a significant funding increase, with nearly 40% growth in overall funding from both international and domestic sources since 2010, making them the largest recipients among the income groups. In 2023, 76% of the funding for low-income countries came from international sources, with 24% from domestic sources, compared with 70% and 30%, respectively, in 2022.

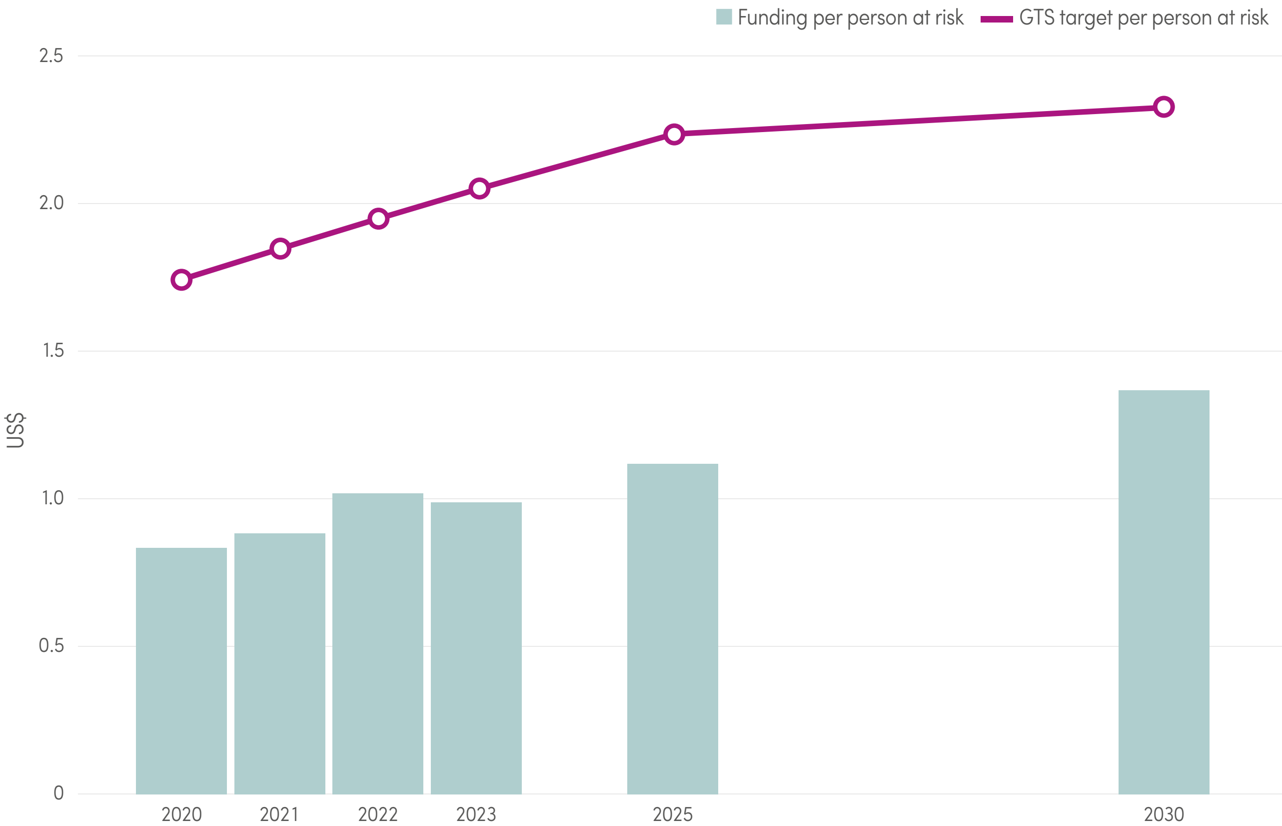
In 2023, the 40 lower-middle-income countries accounted for 45% of total malaria funding, with 55% coming from international sources and 45% from domestic sources, similar to the funding distribution in 2022. The upper-middle-income group, comprising 20 countries and accounting for 6% of total funding, received 9% of their malaria funding from international sources, with 91% coming from domestic sources – an increase from 87% in 2022. The low- and lower-middle-income groups account for over 90% of global malaria cases and deaths.

Finally, the four high-income countries represented 2% of total malaria funding, with 99% of their funding from domestic sources, compared with 100% in the previous two years. Malaria funding directed to regions without specific geographical information and to Venezuela, which has not been classified into an income group since 2021 (*56*), constituted the remaining 9% of total funding in 2023.

A review of total funding, alongside projected GTS targets and population data, shows that funding per person at risk has gradually increased each year, rising from US$ 0.80 in 2020 to US$ 1.00 in 2023. Despite this growth, current funding remains less than half of what is required to meet the GTS target of over US$ 2.00 per person at risk. Projections for 2025 and 2030, based on a forecast model using 2020–2023 funding data and population estimates, indicate that this funding gap will continue to widen. To align with GTS targets, an investment of over US$ 2.20 per person at risk is needed by 2025, rising to more than US$ 2.30 by 2030. With total funding in 2023 falling below 2022 levels, this gap has further increased.

Fig. 6.8 provides a visual comparison of historical funding per person at risk and projected estimates for 2025 and 2030, aligning with the GTS 2015 targets and its 2021 update. At the current funding trajectory, only 60% of the necessary funding per person at risk will be met by future targets – down from the 70% forecasted in 2022.

Fig. 6.8. Funding for malaria control and elimination per person at risk, globally, and the 2025 and 2030 targets (current US$) *Sources: GTS (35, 51) and WHO estimates.*



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

Note: The data sources, boundaries, accounting rules and estimation methods used in this report are different from those of the System of Health Accounts 2011 (SHA2011). The malaria expenditure data reported here are thus not comparable with the disease expenditure data, including for malaria, that are reported in WHO's Global Health Expenditure Database.

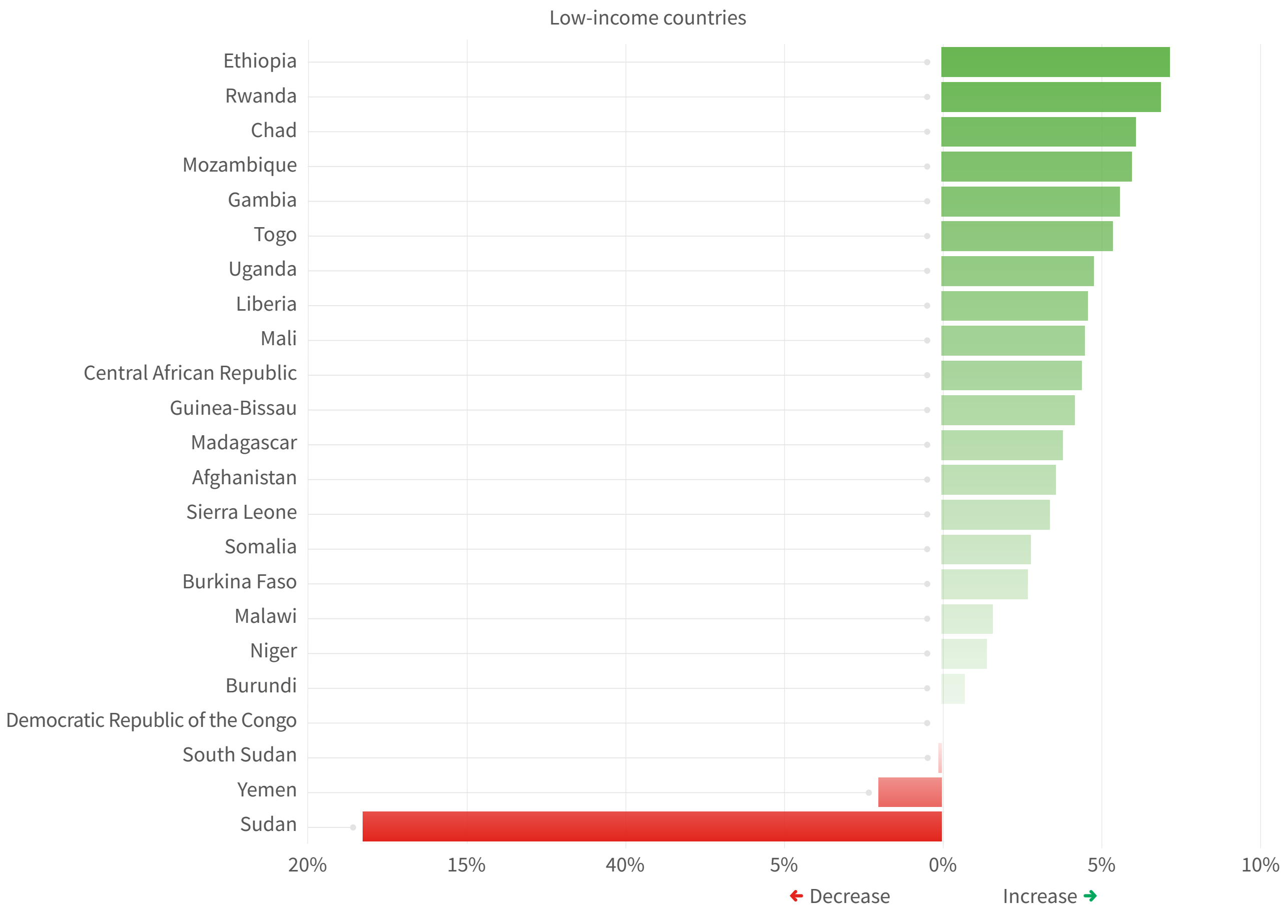
6.2 Global trends in real GDP growth and out-of-pocket health expenditure (*35, 51*)

Many nations have faced significant economic shocks to their real GDP due to the COVID-19 pandemic, coupled with other global crises, such as emerging infectious diseases (e.g. mpox), climate-related events, natural disasters and geopolitical conflicts (*57*). These challenges have led to considerable variation in GDP growth rates across countries since the onset of the pandemic, with some economies experiencing deep contractions (*58*). However, by 2023, a positive trend in GDP growth emerged across most low-income countries and lower-middle-income countries. Despite this overall positive shift, some countries continued to face challenges, including Yemen, South Sudan, the Sudan, Pakistan, Sao Tome and Principe and Haiti, where ongoing conflicts, political instability and economic disruptions hampered their recovery.

While some nations have experienced robust recovery, others, particularly in sub-Saharan Africa where malaria remains a significant public health issue, have struggled to keep pace. In these regions, economic progress is frequently hindered by the ongoing health and financial burdens of malaria, which strain health care systems and reduce workforce productivity. Despite international funding efforts, such as those through the Global Fund and the United States, malaria's toll on human capital – through lost work days and diminished productivity – continues to slow economic progress. As a result, these countries' economic trajectories lag behind broader global recovery trends, emphasizing the need for targeted health and economic support to address both the disease burden and underlying structural challenges.

In 2020, 70% of malaria endemic countries classified as LMIC experienced a contraction in their annual real GDP, according to International Monetary Fund (IMF) data (*58*). Among these, 34 countries, half of which were in the WHO African Region, saw their economies shrink by more than 1%. By 2023, the situation had improved, with only six LMIC experiencing economic contractions, ranging from –0.2% to –18.3% (**Fig. 6.9**). Although this indicates a positive shift compared to the height of the COVID-19 pandemic, it also represents an increase in the severity and number of economic shocks compared with 2022 (*59*).

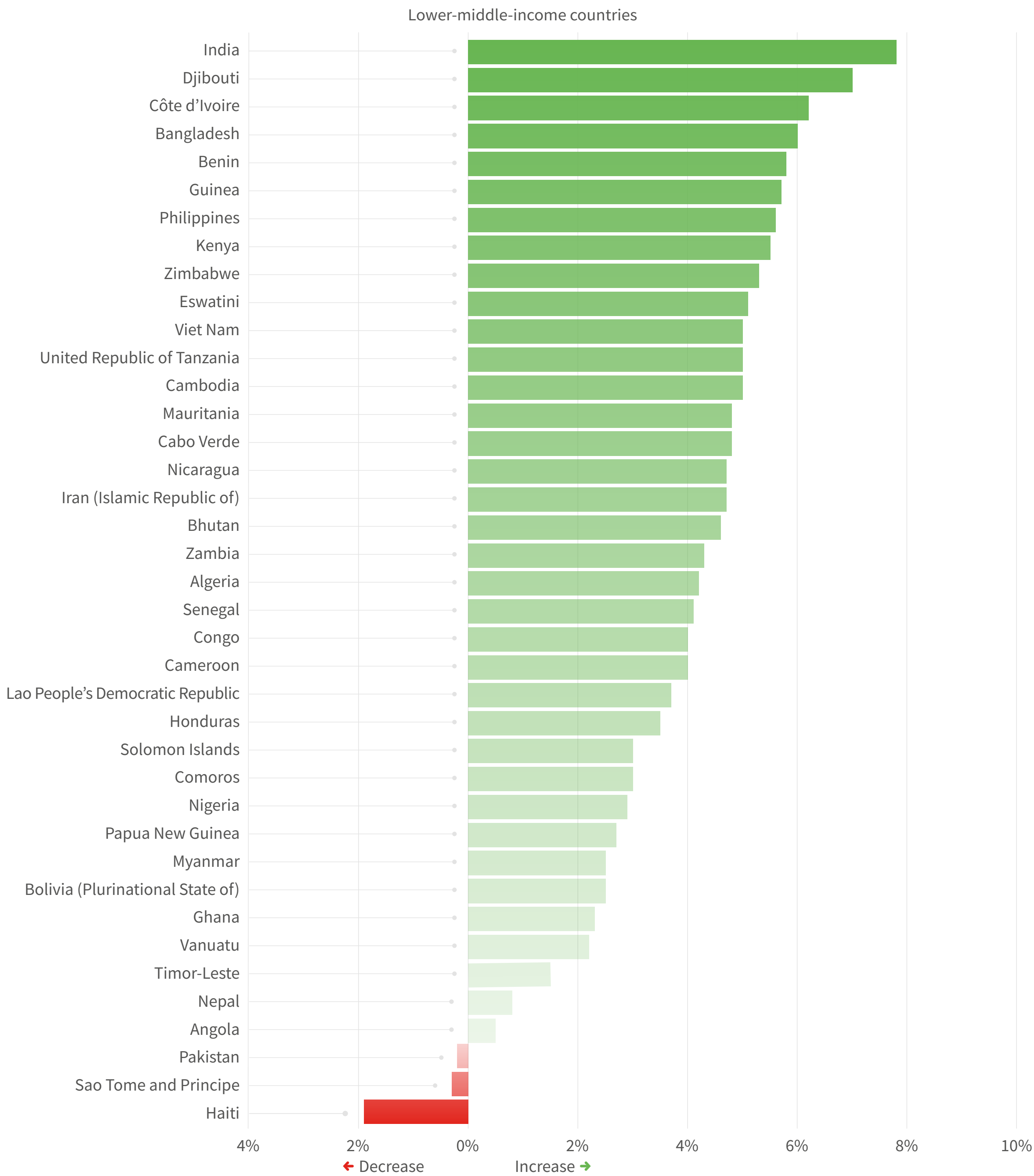
Fig. 6.9. Real GDP growth annual per cent change by World Bank income classification, 2023 *Sources: IMF data mapper (58) and World Bank DataBank (56).*



GDP: gross domestic product; IMF: International Monetary Fund.

Although significant economic advances have been made, real GDP growth does not capture shifts in income distribution within a country, nor does it necessarily indicate the sustainability of a country's growth rate. A high GDP growth rate does not always translate to equitable improvements in well-being among populations. This is particularly true in LMIC, where the burden of malaria remains high and continues to challenge efforts to achieve inclusive economic growth (*57*).

Despite improvements in real GDP growth following the pandemic, a large number of low-income countries, particularly in the WHO African Region, face weaker growth prospects (*57*). This does not account for the significant financial burden malaria places on households, particularly in LMIC, where malaria is most prevalent and affects populations living in poverty. The heavy burden of out-of-pocket health care expenses strains families, limiting their ability to meet other essential needs (see **Chapter 9**).



6.3 Investments in malaria-related R&D

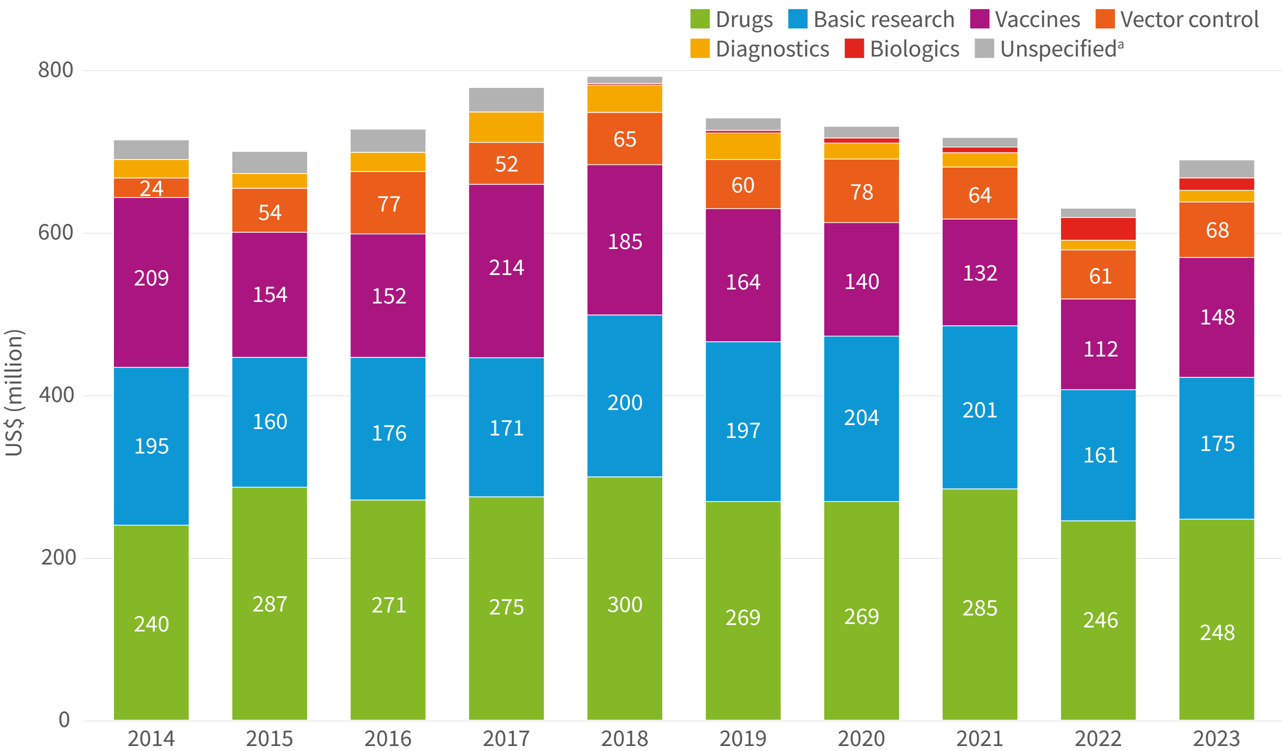
In 2023, global funding for malaria basic research and product development reached US$ 690 million, representing a 9% increase (US$ 60 million) compared with 2022 (**Fig. 6.10**). However, nearly half of this rise was due to contributions from funders who participated in the G-FINDER survey for the first time (*52*). Among ongoing survey participants, who provide a clearer view of year-on-year trends, funding grew by a more modest 5%. This increase marks an encouraging shift in malaria R&D funding after 4 consecutive years of decline, although it remains at its second-lowest level in the past decade and 5% below the long-term average.

Over 90% of the increase in reported funding from new G-FINDER participants was directed towards the clinical development of *P. falciparum* vaccines. As a result, vaccine R&D funding reached its highest levels since 2019, at US$ 148 million (an increase of US$ 36 million, or 32%), reversing the downward trend in vaccine funding since 2017. Not all of the 2023 increase in vaccine funding came from new survey participants; a rebound in funding from the Bill & Melinda Gates Foundation contributed, returning to US$ 23 million after 2 years of decline (up by US$ 15 million, or 186%, bringing it back to around its 2020 level), with the additional funding mainly channelled to the Bill & Melinda Gates Medical Research Institute.

While funding growth – from both new participants and existing funders – was concentrated on vaccines, almost every product area saw some increase in 2023. The sole exception was funding for biologics, which nearly halved to US$ 15 million (a reduction of US$ 12 million, or 45%) after a notable spike in 2022. Like the fluctuations in vaccine funding, the rise in 2022 and decline in 2023 for biologics R&D were largely driven by changes in Bill & Melinda Gates Foundation contributions, which accounted for about 80% of malaria biologics R&D funding in both years. Even after its 2023 drop, however, funding for biologics remained more than double its 2021 level.

Funding for the remaining product areas remained comparatively stable. Drugs continued to receive the largest

Fig. 6.10. Malaria R&D funding by product type, 2014–2023 (constant 2023 US$) *Source: G-FINDER data portal.*



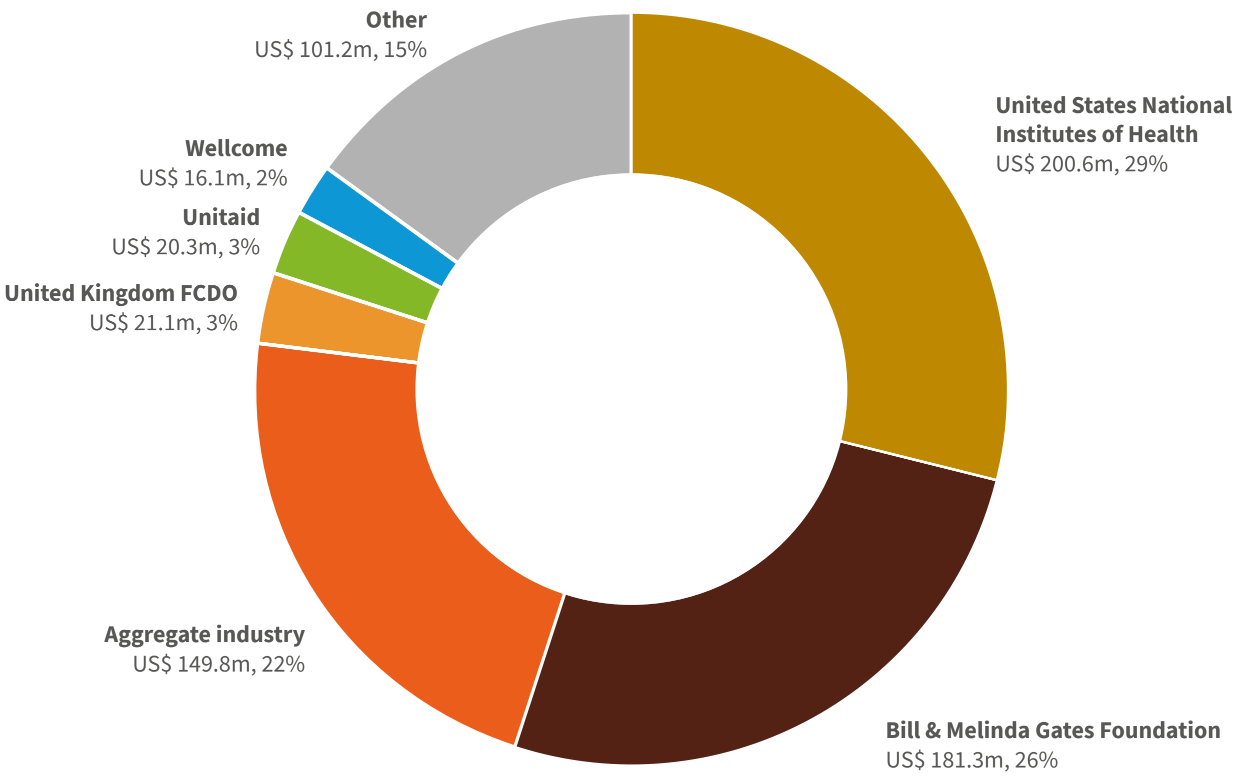
R&D: research and development.

[a] "Unspecified" refers to funding flows with no information on the product type.

share of funding (US$ 248 million, 36%), followed by basic research (US$ 175 million, 25%). Funding for vector control products rose to US$ 68 million (up US$ 7.7 million, or 13%), following 2 years of decline from a peak of US$ 78 million in 2020. This increase in 2023 was driven by heightened contributions from the Bill & Melinda Gates Foundation and the United Kingdom Foreign, Commonwealth and Development Office (FCDO), which both directed funding to the Innovative Vector Control Consortium (IVCC). The IVCC captured 41% of the vector control funding, focusing on the development of novel IRS and LLIN. Although diagnostics funding saw a slight recovery, it remained the smallest funding category, at US$ 14 million (2.1%), or just 60% of its long-term average. The reduction stems from the gradual withdrawal of contributions from the United Kingdom FCDO, United Kingdom Department of Health and Social Care, and Gates Ventures, which had driven the funding peak for diagnostics in 2017–2018.

With the Bill & Melinda Gates Foundation increasing its funding across all product categories except biologics, its funding rose to US$ 181 million (up US$ 23 million, or 15%) and accounted for 26% of malaria R&D funding (**Fig. 6.11**). As in previous years, the Bill & Melinda Gates Foundation was second only to the United States National Institutes of Health, which provided US$ 201 million, or 29% of global funding. Despite growth in malaria cases in the southern United States, funding from the United States CDC fell to a record low of just US$ 0.3 million (down US$ 4.1 million, or 93%). The CDC's reduction came mostly in the form of reduced drug R&D funding, its major area of focus over the past decade and the beneficiary of a sudden spike in funding in 2022. Similarly, United States Department of Defense funding dropped to a record low of US$ 7 million, down 87% from its 2018 level after 5 consecutive years of decline, with most cuts targeting drug R&D. The cuts in 2023, and the majority of the overall drop since 2018, fell on drug R&D. Partly as a result of the cuts in funding from the United States and, in previous years, United Kingdom public organisations, the number of funders providing at least US$ 10 million in malaria R&D funding has fallen from 15 in 2018 to just 10 in 2023, with a broadly similar fall in the numbers of smaller funders contributing at least US$ 1 million.

Fig. 6.11. Top funders for malaria-related R&D, 2023 (constant 2023 US$) *Source: G-FINDER data portal (52).*



FCDO: Foreign, Commonwealth and Development Office; R&D: research and development; USA: United States of America.

7 Distribution and coverage of malaria prevention, diagnosis and treatment

7.1 Distribution and coverage of ITNs

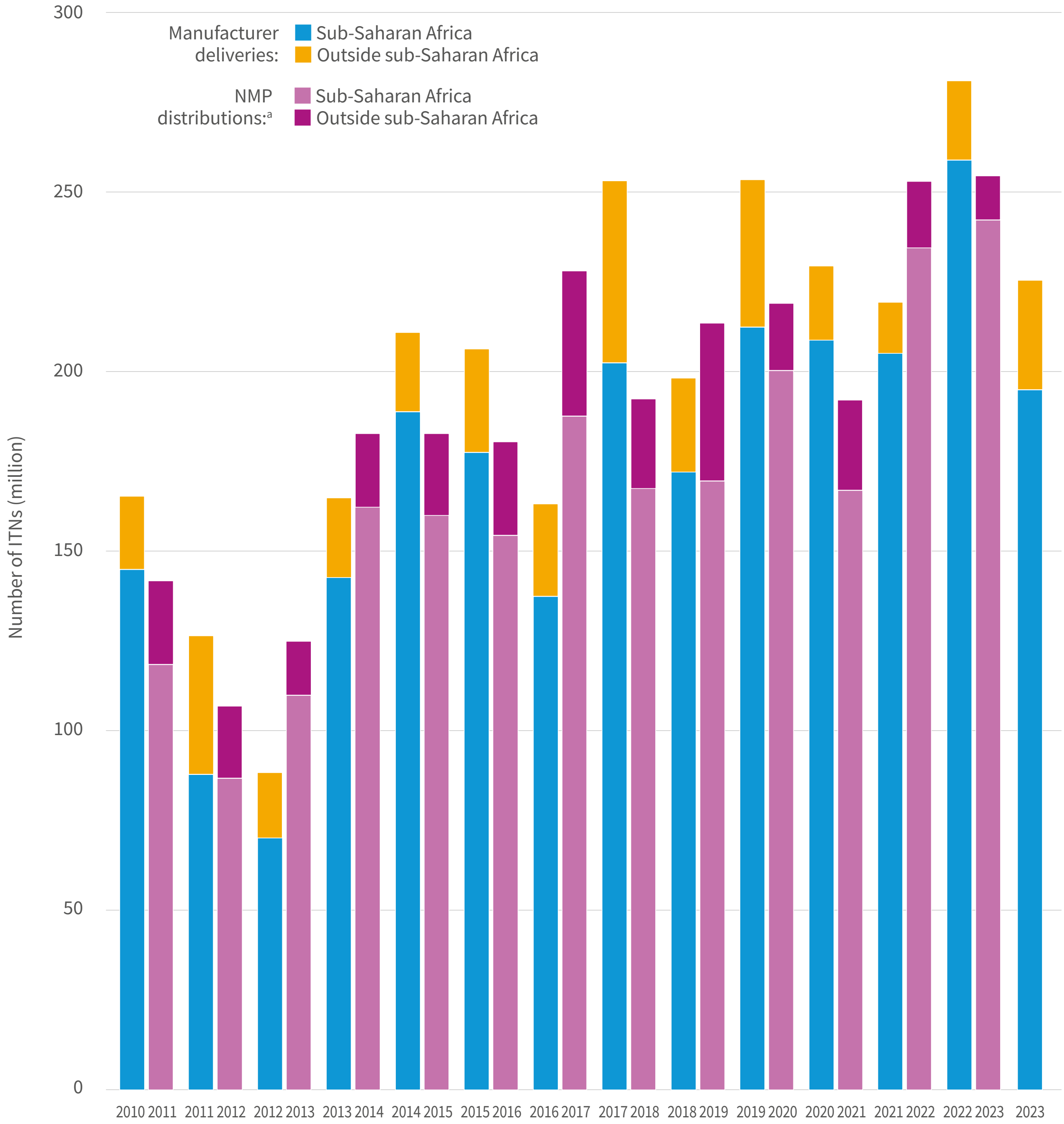
Manufacturers delivered about 226 million ITNs to malaria endemic countries in 2023, a decrease of 20% compared with 2022 (**Fig. 7.1**). Among the ITNs delivered in 2023, 195.4 million (86%) were delivered to sub-Saharan Africa, of which 43 million (22%) were standard ITNs, 112.6 million (58%) were pyrethroid–piperonyl butoxide (PBO) nets and 39.8 million (20%) were dual active ingredient ITNs. The proportion of ITNs delivered by manufacturers to sub-Saharan Africa that were pyrethroid-PBO or dual active ingredient ITNs has increased from 2022, when 51% of ITNs delivered were pyrethroid-PBO and 8% were dual active ingredient. Conversely, the proportion of standard ITNs delivered decreased from 41% in 2022. More than half of the ITNs delivered to endemic countries in sub-Saharan Africa in 2023 were delivered to five countries: Uganda (22.5 million), Nigeria (22.1 million), the Democratic Republic of the Congo (20.3 million), Ghana (19.2 million) and the United Republic of Tanzania (18.8 million). Data from 2010–2023 are presented here; however, manufacturers' delivery data from 2004 to 2023 show that more than 3.1 billion ITNs were supplied globally over this period, of which 2.7 billion (87%) were supplied to sub-Saharan Africa.

In 2023, a total of 255 million ITNs were distributed through all channels by NMPs in malaria endemic countries, about 1.5 million more than in 2022. Of these ITNs, 243 million (95%) were distributed in sub-Saharan Africa, about half of which were distributed in five countries: the Democratic Republic of the Congo (45.8 million), Uganda (30.5 million), Nigeria (24 million), Ethiopia (20 million) and Zambia (14.3 million). Outside sub-Saharan Africa, 12.3 million ITNs (5% of the total) were distributed, with the largest distributions in Pakistan (2 million), Yemen (1.7 million), Bangladesh (1.4 million), Papua New Guinea (1.3 million) and India (1.1 million). It is likely that the total number of nets distributed is even higher, given that 13 malaria endemic countries did not provide data on ITN distributions in 2023. Data on mass campaigns reported by countries, and supplemented by data from the Alliance for Malaria Prevention, the RBM Partnership to End Malaria and the Global Fund, indicated that 34 countries were planning mass ITN campaigns in 2023. The total number of ITNs planned for distribution in 2023, including the 21.9 million carried over from 2022, was 232.7 million nets. By the end of 2023, 202 million (87%) of the 232.7 million ITNs planned for distribution through mass campaigns in 2023 had been distributed. The following nine countries had distributed less than 60% of what they had planned to distribute through mass campaigns in 2023: Cambodia, Cameroon, the Comoros, Myanmar, Pakistan, Solomon Islands, Somalia, Viet Nam and Zimbabwe (see **Annex 2**).

Indicators of population-level coverage of ITNs were estimated for sub-Saharan African countries in which ITNs are the main method of vector control. The following indicators were estimated from household surveys, manufacturer deliveries and NMP distributions:

- ITN use (i.e. 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; and
- percentage of the population with access to an ITN within their household (assuming access is limited to one ITN for every two people).

Fig. 7.1. Number of ITNs delivered by manufacturers and distributed[a] by NMPs[b], 2010–2023 *Sources: Milliner Global Associates and NMP reports.*



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

[a] A lag between manufacturer deliveries to countries and NMP distributions of about 6–12 months is expected; thus, deliveries by manufacturers in a given year are often not reflected in distributions by NMPs in that year. Also, distributions of ITNs reported by NMPs do not always reflect all the nets that have been distributed to communities, depending on completeness of reporting. These issues 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 but have not yet been distributed by NMPs and those sold through the private sector that are not reported by programmes.

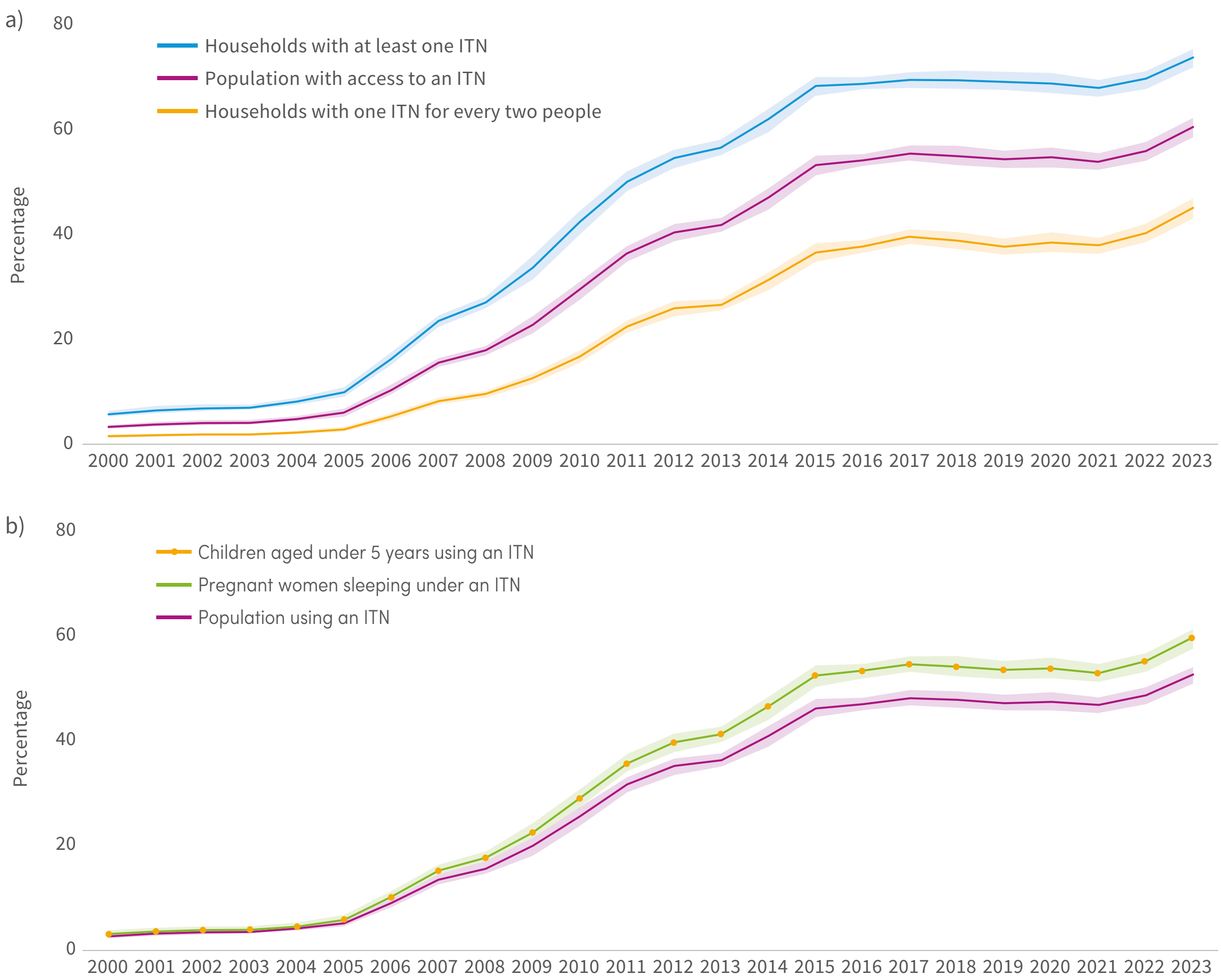
[b] In 2023, ITN distribution data were unavailable from 13 countries and areas: Angola, Botswana, Colombia, the Democratic People's Republic of Korea, French Guiana, Gabon, Guyana, Mayotte, the Niger, Peru, the Plurinational State of Bolivia, the Republic of Korea and South Africa.

By 2023, 73% of households in sub-Saharan Africa had at least one ITN, increasing from about 5% in 2000 and from 68% in 2015. The percentage of households owning at least one ITN for every two people increased from 1% in 2000 to 36% in 2015, and to 45% in 2023. In the same period, the percentage of the population with access to an ITN within their household increased from 3% in 2000 to 53% in 2015, and to 60% in 2023. The percentage of the population sleeping under an ITN also increased between 2000 and 2023, for the whole population (from 2% to 52%), for children aged under 5 years (from 3% to 59%) and for pregnant women and girls (from 3% to 59%). In 2023, there was an overall increase in access to and use of ITNs compared with 2022 (**Fig. 7.2**).

The steady increase in access over time can be traced back to 2008, when the UN Secretary-General called for universal coverage of malaria interventions. The Global Malaria Action Plan of 2008 called for scaling up and sustaining universal coverage of appropriate malaria interventions for the entire population at risk (*60*). This led to the mass distribution of ITNs and community delivery supported by routine services (*60*, *61*). Free distribution campaigns targeted poor and rural areas, resulting in higher ITN usage among populations in situations of vulnerability (*62*).

Between 2014 and 2021, there was little change in coverage. However, there has been a marked increase in coverage for all indicators since 2021. The cause of this recent increase is not fully understood and requires further investigation, especially to understand whether it is being driven by specific countries and how it may be linked to strong investments in procuring and delivering interventions, as well as efforts to promote their use during and after the disruptions caused by COVID-19. Survey results on key ITN coverage indicators, by country, are shown in **Annex 4-Ea**.

Fig. 7.2. Indicators of a) population-level access to ITNs and b) population-level use of ITNs, sub-Saharan Africa, 2000–2023 *Source: ITN coverage model by the Malaria Atlas Project (63, 64).*



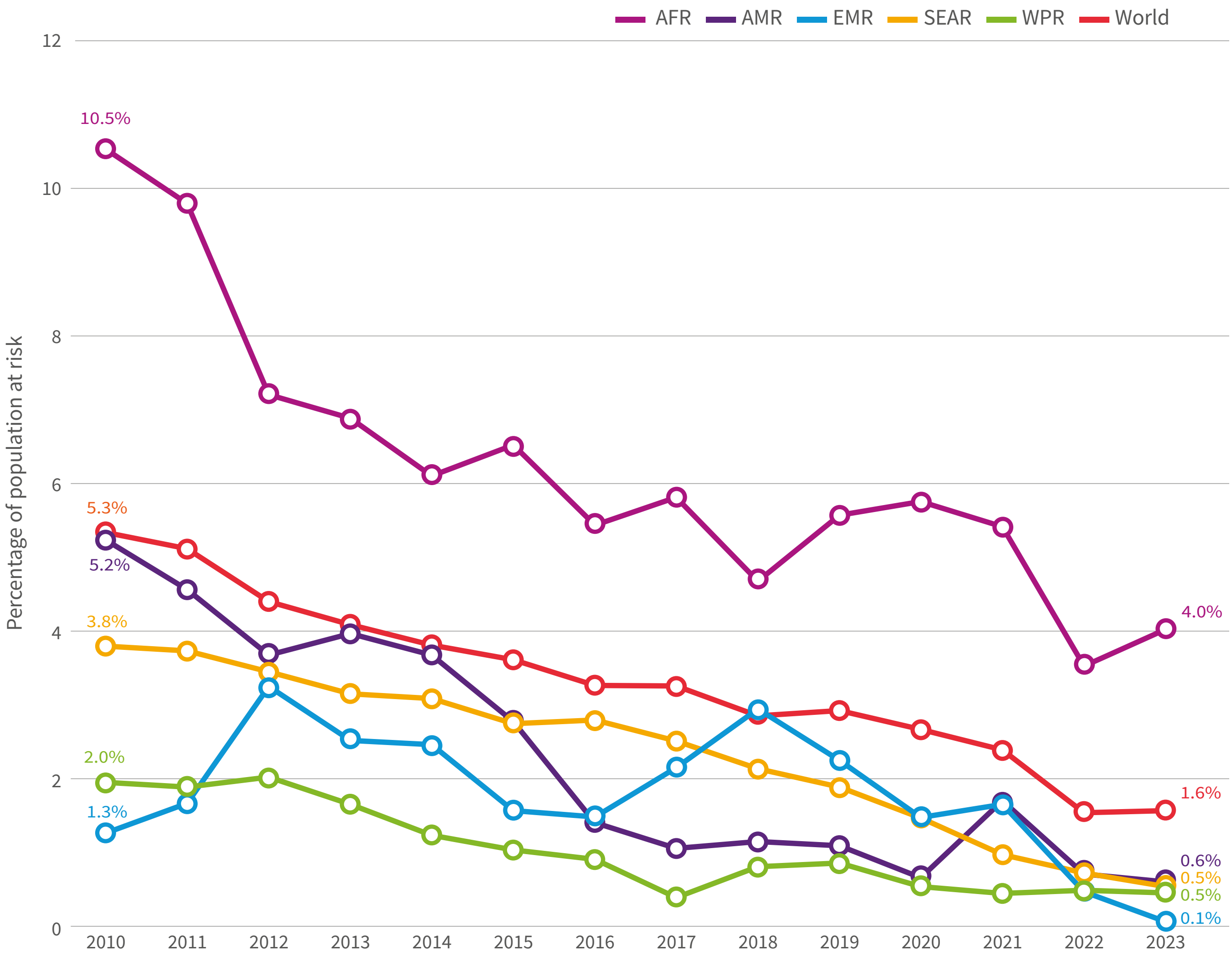
ITN: insecticide-treated mosquito net.

7.2 Population protected with IRS

In 2023, 42 countries[1] implemented IRS to prevent malaria. Globally, the percentage of the population at risk protected by IRS in countries that are currently malaria endemic declined from 5.3% in 2010 to 1.6% in 2023. Since 2015, the percentage of the population at risk protected by IRS has remained below 6% in each WHO region (**Fig. 7.3**). The number of people protected by IRS globally fell from 151 million in 2010 to 55 million in 2023. The drop in the proportion of people protected was notable in India, where there were 3 million fewer people protected by IRS in 2023 than in 2022. While the percentage of the population protected by IRS out of the total population at risk is low (1.6% in 2023), the coverage of those targeted for IRS reached 88.4%.

[1] The 42 malaria endemic countries that implemented IRS nationally in 2023 and provided data are: Afghanistan, Bhutan, Botswana, Brazil, Burundi, Chad, the Comoros, Costa Rica, Djibouti, the Dominican Republic, Ecuador, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, the Gambia, Ghana, Honduras, India, Indonesia, the Islamic Republic of Iran, Kenya, the Lao People's Democratic Republic, Madagascar, Mexico, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Peru, the Philippines, Rwanda, Sierra Leone, Solomon Islands, South Africa, Thailand, Uganda, the United Republic of Tanzania, Viet Nam, Zambia and Zimbabwe.

Fig. 7.3. Percentage of the population at risk protected by IRS, by WHO region, 2010–2023[a] *Sources: IVCC data and NMP reports.*



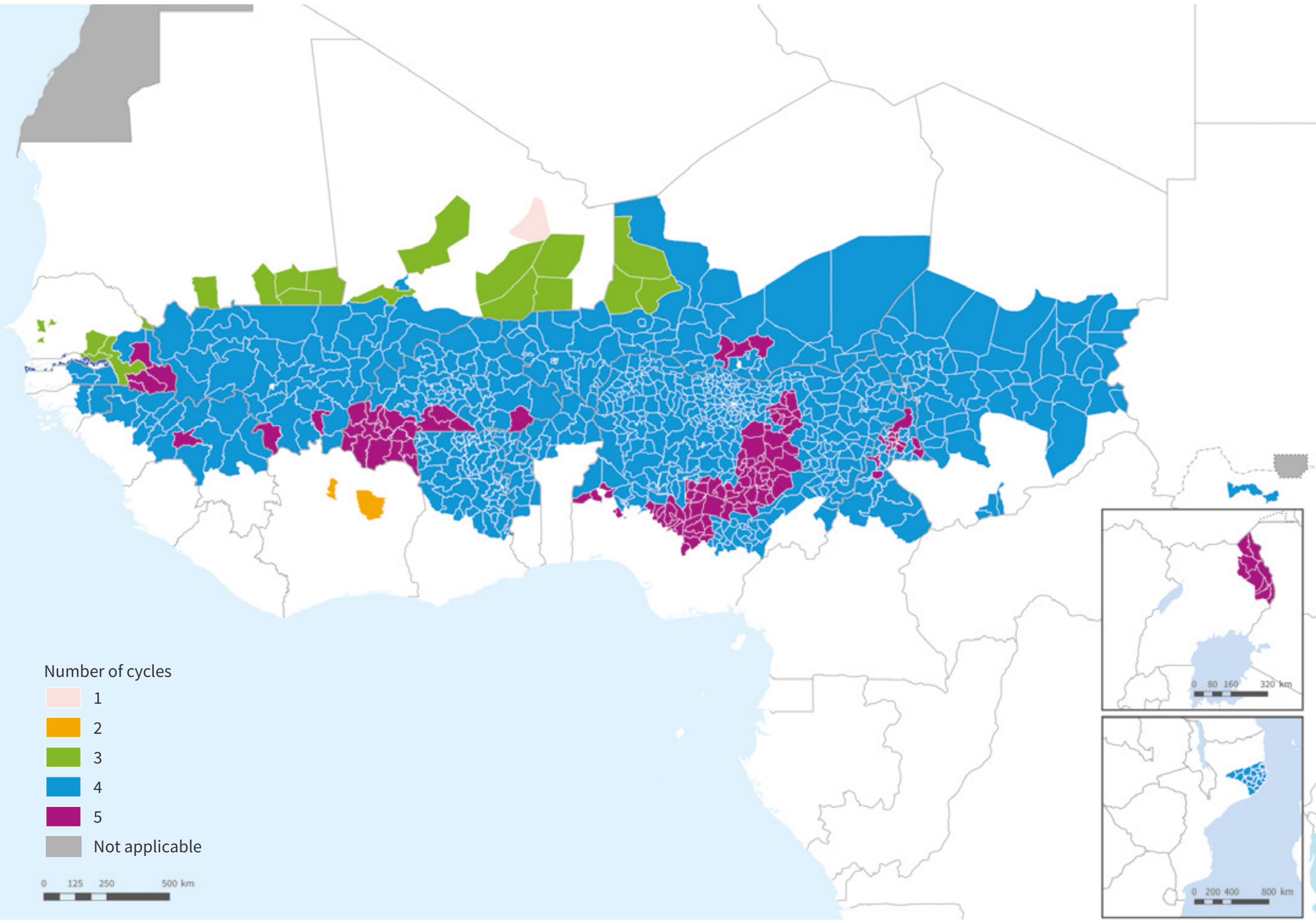
AFR: WHO African Region; AMR: WHO Region of the Americas; EMR: WHO Eastern Mediterranean Region; IRS: indoor residual spraying; IVCC: Innovative Vector Control Consortium; NMP: national malaria programme; SEAR: WHO South-East Asia Region; WHO: World Health Organization; WPR: WHO Western Pacific Region.

[a] Among malaria endemic countries, 2023.

7.3 Scale-up of SMC

SMC is currently being implemented in 19 countries in the Sahel and other seasonal areas of sub-Saharan Africa (**Table 7.1**). In 2023, SMC was implemented in Côte d'Ivoire and Madagascar for the first time. The average number of children treated per cycle of SMC has increased overall, from about 170 000 in 2012 to 53 million in 2023. In 15 of the 17 countries that also implemented SMC in 2022, more children were treated in 2023 than in 2022, with an additional 4 million children treated per cycle. Nigeria made the largest contribution to these figures, with an average of 28.6 million children treated per cycle, more than half of all children treated. In Mali, there was a slight decrease (<1%) in the number of children treated with SMC in 2023 (3 808 664) compared with 2022 (3 838 060). In Togo, there was a 12% decrease in the number of children treated in 2023 (453 404) compared with 2022 (519 141). The number of SMC treatment doses delivered to implementing countries increased, from 203.8 million to 221.4 million in 2023 (**Table 7.2**). The subnational areas in each country where SMC was delivered in 2023, together with the number of cycles in each district, are shown in **Fig. 7.4**.

Fig. 7.4. Subnational areas where SMC was delivered, and number of treatment cycles per district, in implementing countries in sub-Saharan Africa, 2023[a] *Source: LSHTM.*



LSHTM: London School of Hygiene & Tropical Medicine; SMC: seasonal malaria chemoprevention.

[a] Subnational data for implementation in Madagascar not shown.

Table 7.1. Average number of children treated with at least one dose of SMC, by year, in countries implementing SMC, 2012–2023 *Sources: WHO, LSHTM and MMV.*

Country	2012[b]	2013[b]	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Benin	0	0	0	0	0	0	0	114 165	236 639	374 560	414 523	447 401
Burkina Faso	0	0	307 770	954 047	2 647 713	2 970 117	3 298 397	3 298 397	4 136 042	4 409 619	4 542 230	4 766 047
Cameroon	0	0	0	0	1 428 964	1 581 183	1 636 658	1 681 737	1 780 742	1 908 941	2 021 094	2 039 978
Chad	10 000	263 972	27 307	500 153	824 806	998 595	1 184 706	1 627 324	2 259 852	2 512 920	2 664 662	2 786 338
Côte d'Ivoire	0	0	0	0	0	0	0	0	0	0	0	39 652
Gambia	0	0	65 271	76 450	73 710	76 601	112 841	110 870	121 834	76 045	79 205	84 051
Ghana	0	0	0	115 309	303 019	327 446	329 953	964 956	1 033 812	1 322 251	1 382 709	1 435 474
Guinea	0	0	0	201 283	442 177	575 927	840 120	841 090	1 088 194	1 122 434	1 163 812	1 196 584
Guinea-Bissau[a]	0	0	0	0	42 097	166 162	42 571	86 107	86 107	108 394	113 002	116 031
Mali	160 000	537 294	524 742	1 999 987	3 980 684	3 990 096	4 299 242	3 767 820	3 767 099	3 357 846	3 838 060	3 808 664
Mauritania	0	0	0	0	0	0	0	0	0	0	57 574	90 582
Madagascar[b]	0	0	0	0	0	0	0	0	0	0	0	200 701
Mozambique	0	0	0	0	0	0	0	0	0	119 254	1 299 671	1 319 628
Niger	0	225 970	528 681	624 121	2 361 924	2 545 885	3 952 400	4 151 103	4 516 729	4 457 575	4 686 792	4 745 805
Nigeria	0	209 451	370 280	787 399	1 696 770	3 538 757	3 508 924	4 191 166	13 236 139	23 922 101	25 571 387	28 612 433
Senegal	0	55 709	595 745	614 581	621 503	631 897	0	879 652	687 959	748 116	801 729	839 886
South Sudan	0	0	0	0	0	0	0	0	0	0	18 000	69 596
Togo	0	119 222	170 165	0	411 811	420 451	434 161	453 907	486 716	475 997	519 141	453 404
Uganda	0	0	0	0	0	0	0	0	0	81 899	212 158	263 016
Total	**170 000**	**1 411 618**	**2 589 961**	**5 873 330**	**14 835 178**	**17 823 117**	**19 639 973**	**22 168 294**	**33 437 864**	**44 997 952**	**49 385 749**	**53 315 271**

LSHTM: London School of Hygiene & Tropical Medicine; MMV: Medicines for Malaria Venture; SMC: seasonal malaria chemoprevention; WHO: World Health Organization.
[a] Values for 2020 were imputed from 2019.
[b] WHO data.

Table 7.2. Number of treatment doses delivered, by year, in countries implementing SMC, 2012–2023 *Sources: WHO, LSHTM and MMV.*

Country	2012[b]	2013[b]	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Benin	0	0	0	0	0	0	0	456 661	856 491	1 498 240	1 658 092	1 789 602	6 259 086
Burkina Faso	0	0	1 231 081	3 816 187	10 590 851	11 799 603	13 193 588	13 193 588	16 544 168	18 603 883	19 174 212	20 088 248	128 235 409
Cameroon	0	0	0	0	4 286 893	6 324 731	6 546 632	6 726 947	7 122 967	7 635 762	8 611 913	8 810 953	56 066 798
Chad	40 000	1 055 888	109 226	1 850 623	3 299 222	3 658 346	4 738 823	5 935 118	9 039 408	10 142 392	10 772 891	11 145 353	61 787 290
Côte d'Ivoire	0	0	0	0	0	0	0	0	0	0	0	79 303	79 303
Gambia	0	0	195 812	305 800	294 839	306 405	406 044	443 478	487 334	304 180	316 821	336 204	3 396 917
Ghana	0	0	0	461 236	606 037	1 309 782	1 319 813	3 859 822	4 135 249	4 803 223	5 530 837	5 741 895	27 767 894
Guinea	0	0	0	805 131	1 768 708	2 303 709	3 360 479	3 003 612	4 352 774	4 533 292	4 703 712	4 836 861	29 668 278
Guinea-Bissau[a]	0	0	0	0	146 718	664 647	170 284	344 429	344 429	433 574	452 008	464 123	3 020 212
Mali	640 000	2 149 176	2 098 969	7 999 948	15 398 687	15 960 382	17 113 605	15 068 821	14 956 952	12 906 775	15 016 899	15 034 772	134 344 986
Mauritania	0	0	0	0	0	0	0	0	0	0	230 297	271 747	502 044
Madagascar[b]	0	0	0	0	0	0	0	0	0	0	0	802 803	802 803
Mozambique	0	0	0	0	0	0	0	0	0	477 016	5 198 685	5 278 512	10 954 213
Niger	0	903 880	2 072 438	2 484 694	7 977 379	10 183 541	15 243 535	16 604 412	18 066 916	17 830 299	19 099 420	19 342 524	129 809 038
Nigeria	0	837 804	1 481 118	3 149 597	6 316 916	9 298 163	13 842 931	16 764 663	52 944 556	96 002 997	107 414 919	121 007 735	429 061 399
Senegal	0	222 836	1 787 236	1 887 211	1 910 656	1 942 868	0	2 684 527	2 107 303	2 290 288	2 467 495	2 934 346	20 234 766
South Sudan	0	0	0	0	0	0	0	0	0	0	90 000	278 383	368 383
Togo	0	476 888	510 494		1 235 433	1 529 275	1 302 483	1 185 327	1 946 863	1 903 986	2 076 563	1 813 614	13 980 926
Uganda	0	0	0	0	0	0	0	0	0	409 495	1 000 206	1 315 080	2 724 781
Total	**680 000**	**5 646 472**	**9 486 374**	**22 760 427**	**53 832 339**	**65 281 452**	**77 238 217**	**86 271 405**	**132 905 410**	**179 775 402**	**203 814 970**	**221 372 058**	**1 059 064 526**

LSHTM: London School of Hygiene & Tropical Medicine; MMV: Medicines for Malaria Venture; SMC: seasonal malaria chemoprevention; WHO: World Health Organization.
[a] Values for 2020 were imputed from 2019.
[b] WHO data.

7.4 Coverage of IPTp use by dose

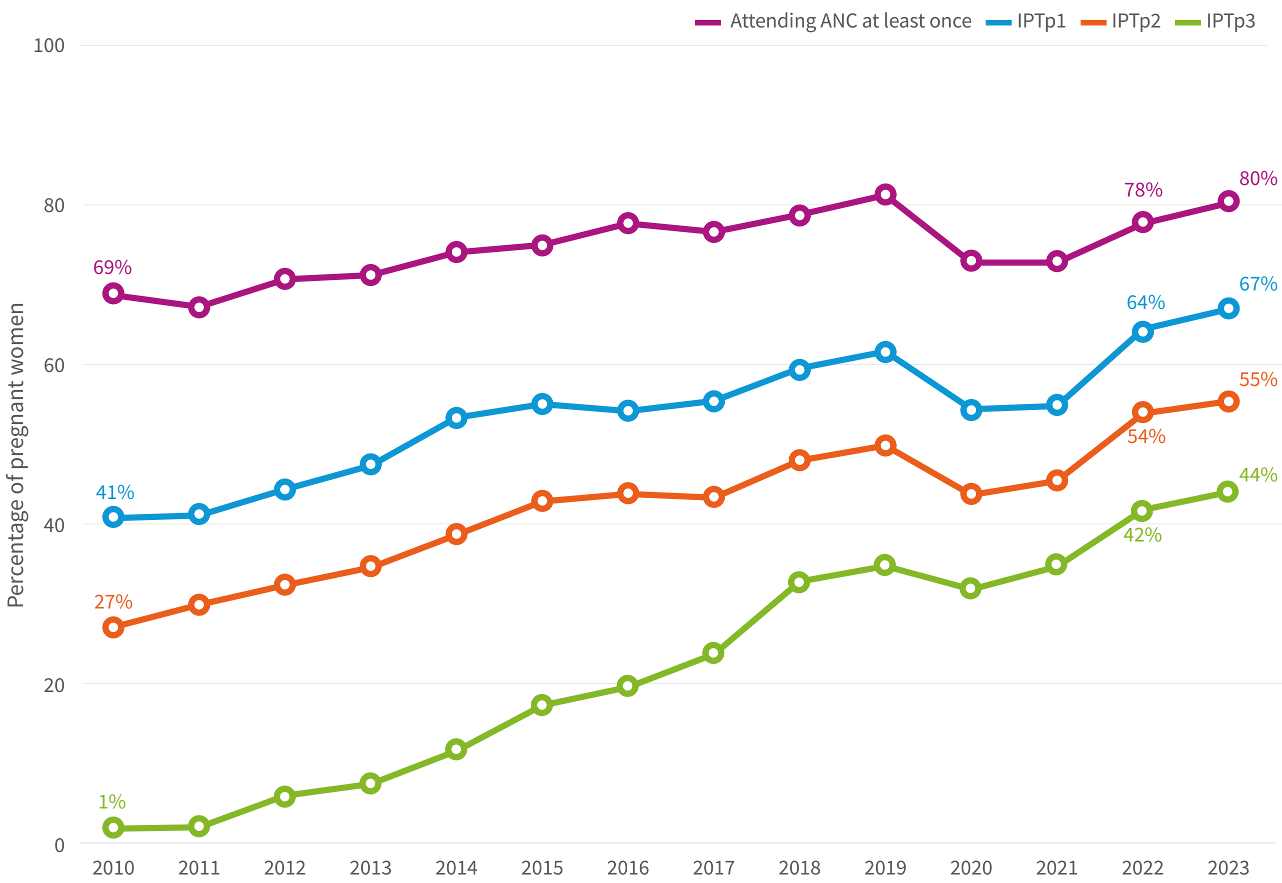
To date, 38 countries[1] have adopted IPTp to reduce the burden of malaria during pregnancy. Among the 34 countries conducting IPTp in the WHO African Region, 33 countries[2] with moderate and high malaria transmission reported routine data from health facilities in the public sector on the number of women and girls visiting ANC clinics, and the number receiving the first, second, third and fourth doses of IPTp (i.e. IPTp1, IPTp2, IPTp3 and IPTp4). Using annual expected pregnancies as the denominator (adjusted for fetal loss and stillbirths), the percentage of IPTp use by dose was computed. ANC and IPTp coverages reported for 2020 and 2021 were adjusted for disruptions in ANC services, as explained in **Annex 1**. The coverage of attending ANC at least once increased from 78% in 2022 to 80% in 2023 (**Fig. 7.5**).

The coverage of IPTp1, IPTp2 and IPTp3 also increased, from 64%, 54% and 42% in 2022 to 67%, 55% and 44%, respectively, in 2023. While the percentage of pregnant women and girls attending an ANC clinic at least once has reached the target of 80%, and the coverage of IPTp1, IPTp2 and IPTp3 in 2023 was the highest ever recorded, coverage for receiving the three doses still remains well below the target of 80%. Although there has been progress in increasing the number of women attending ANC and receiving preventive treatments, significant barriers to ANC access persist, including health care facility challenges, gender and social determinants, family and community influences, poor infrastructure and sociodemographic factors, highlighting the need for targeted, community-informed interventions.

[1] There are 34 countries implementing IPTp in the WHO African Region: Angola, Benin, Burkina Faso, Burundi, Cameroon, the Central African Republic, Chad, the Congo, Côte d'Ivoire, the Democratic Republic of the Congo, Equatorial Guinea, Gabon, the Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, the Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone, South Sudan, Togo, Uganda, the United Republic of Tanzania (Mainland), Zambia and Zimbabwe. There are four countries conducting IPTp outside of the African Region: Solomon Islands, Somalia, the Sudan and Papua New Guinea.

[2] Sao Tome and Principe was not included due to its low malaria burden.

Fig. 7.5. Percentage of pregnant women and girls attending an ANC clinic at least once and receiving IPTp, by number of SP doses, sub-Saharan Africa, 2010–2023 *Sources: NMP reports, CDC and WHO estimates.*



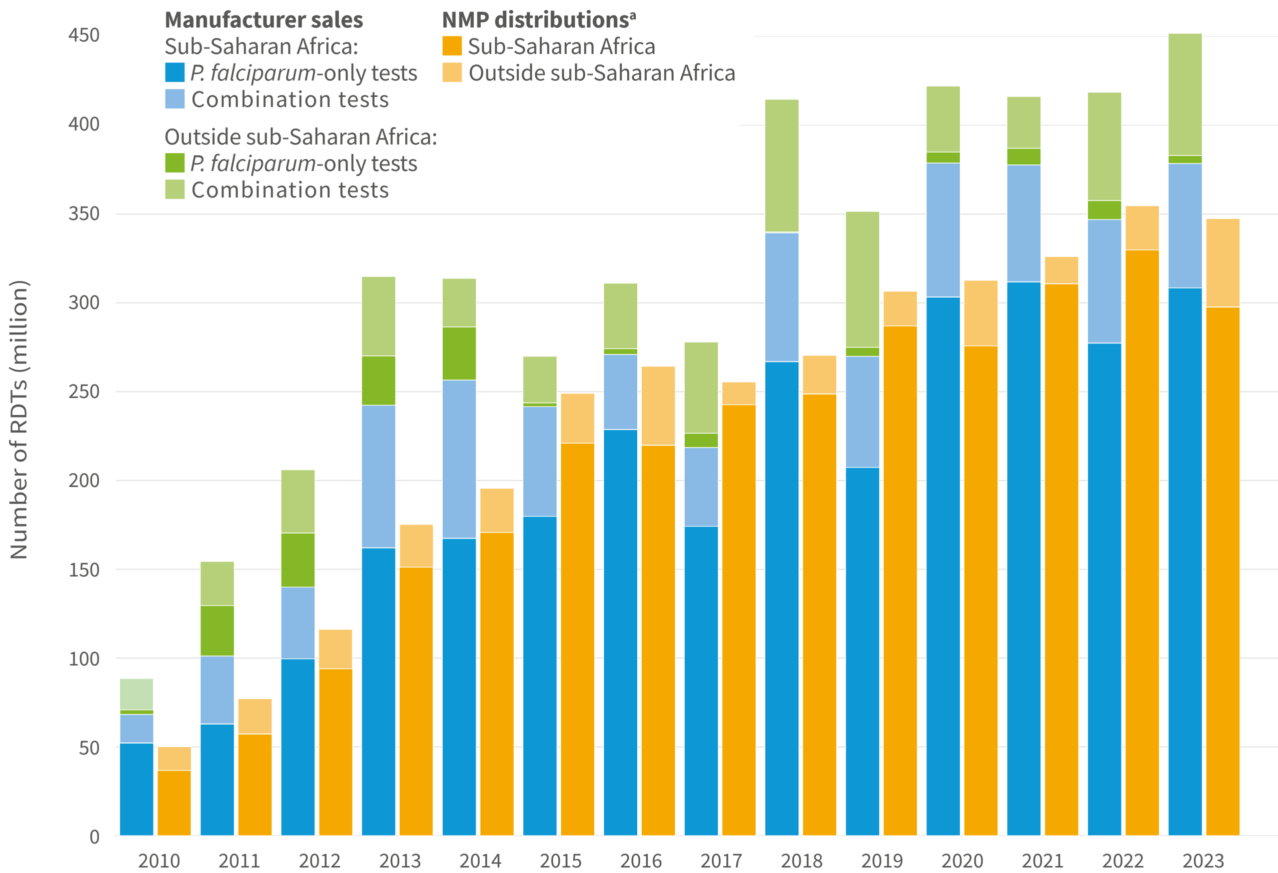
ANC: antenatal care; CDC: United States Centers for Disease Control and Prevention; IPTp: intermittent preventive treatment in pregnancy; IPTp1: first dose of IPTp; IPTp2: second dose of IPTp; IPTp3: third dose of IPTp; NMP: national malaria programme; SP: sulfadoxine–pyrimethamine; WHO: World Health Organization.

7.5 Malaria diagnosis and treatment

This section presents information on manufacturer sales and deliveries and national distribution of rapid diagnostic tests (RDTs) and artemisinin-based combination therapies (ACTs), treatment seeking for fever in children aged under 5 years, and population-level coverage of malaria diagnosis and treatment with ACTs. Data reflect RDT sales by manufacturers eligible for procurement (i.e. under the Malaria RDT Product Testing Programme) from 2010 to 2017, RDTs eligible for WHO prequalification since 2018, and NMP distributions of RDTs. Manufacturer data on ACTs have been provided by eligible companies for WHO-prequalified products.

Globally, 4.4 billion RDTs for malaria were sold by manufacturers between 2010 and 2023, with more than 82% of sales in sub-Saharan African countries. Over the same period, NMPs distributed a total of 3.3 billion RDTs, with 89% of distributions in sub-Saharan Africa (**Fig. 7.6**). The difference between sales and distribution is likely because RDTs that are yet to be distributed to health facilities are not reported, or because of underreporting of RDTs used in the private sector. In 2023, manufacturers reported about 448.5 million RDT sales, with all 10 eligible manufacturers reporting in 2023. NMPs distributed 345 million RDTs in 2023, about 7 million fewer than in 2022. It is possible that the total number of RDTs distributed is even higher, given that six malaria endemic countries did not provide data on RDT distributions in 2023. Unlike in previous reports, no proxy data were used to replace missing data.

Fig. 7.6. Number of RDTs sold by manufacturers and distributed by NMPs for use in testing suspected malaria cases, 2010–2023[a] *Sources: NMP reports and sales data from manufacturers eligible for the WHO Malaria RDT Product Testing Programme.*



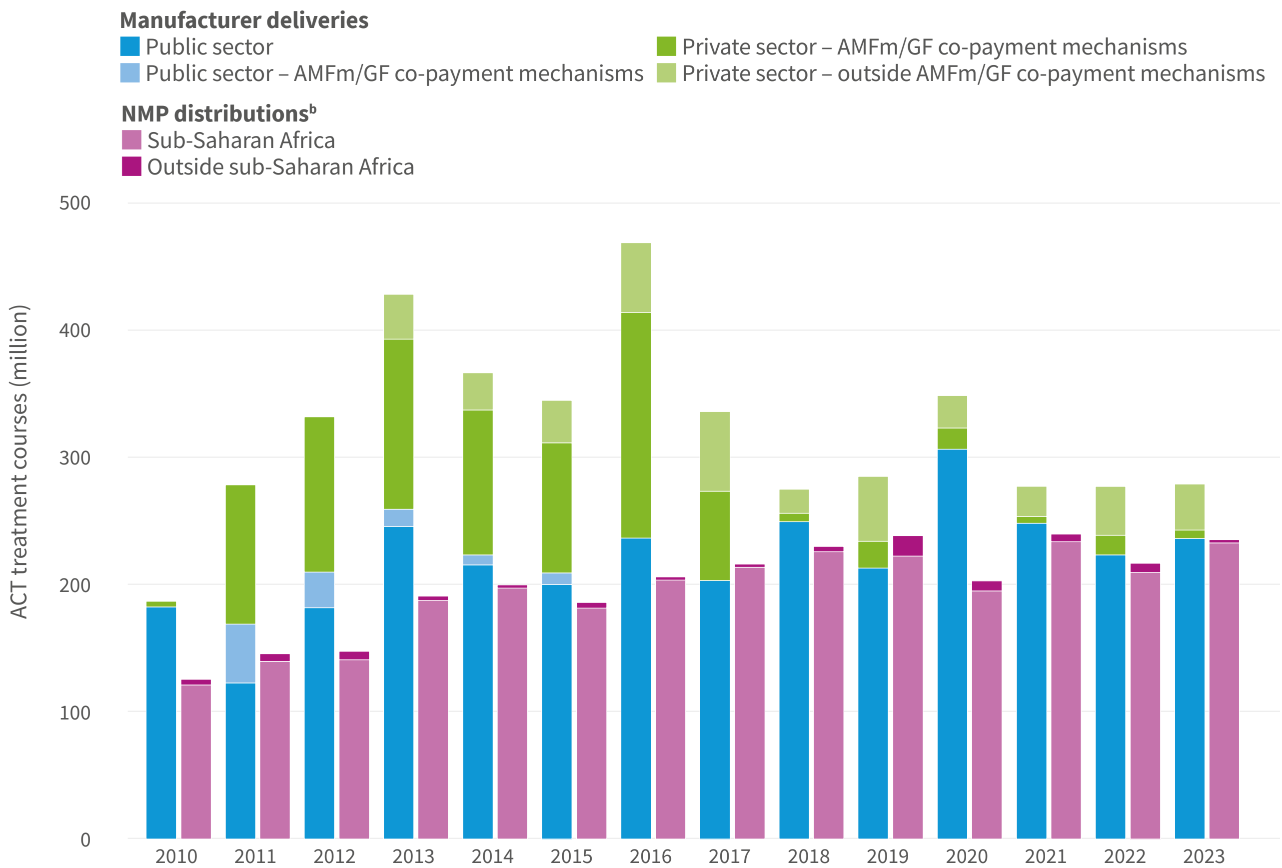
NMP: national malaria programme; *P. falciparum*: *Plasmodium falciparum*; RDT: rapid diagnostic test; WHO: World Health Organization.
[a] NMP distributions do not reflect RDTs that are still in storage and are yet to be delivered to health facilities and community health workers.

More than 4.5 billion treatment courses of prequalified ACTs (henceforth referred to as "ACTs") were delivered globally by manufacturers between 2010 and 2023 (**Fig. 7.7**). About 3.1 billion (68%) of these deliveries were to the public sector in malaria endemic countries, and the remaining were either the 1 billion (22%) public or private sector deliveries made through the Affordable Medicines Facility for malaria (AMFm) or the Global Fund co-payment mechanism, or the 410 million (9%) private sector deliveries outside the Global Fund co-payment mechanism. National data reported by NMPs show that, in the same period, 2.8 billion ACTs were delivered to health service providers to treat people with malaria in the public health sector. In 2023, about 236.1 million ACTs were delivered by manufacturers to the public health sector. NMPs distributed 235 million ACTs in 2023, of which 99% were in sub-Saharan Africa, where about 145 million ACTs were distributed in five countries: Nigeria (40 million), Uganda (29.2 million), Zambia (27.8 million), the Democratic Republic of the Congo (26.2 million) and Mozambique (21.5 million). It is likely that the total number of ACTs distributed is even higher, given that 13 malaria endemic countries did not provide data on ACT distributions in 2023. Unlike in previous reports, no proxy data were used to replace missing data.

Treatment coverage was assessed using country-reported data on the total number of malaria cases and the number of malaria cases treated with antimalarials. Where data on the number of cases treated were missing, the number of treatments distributed was used as a proxy (these estimates are based on routinely reported data and may differ from other sources, such as household surveys). Among the 41 malaria endemic countries in sub-Saharan Africa that were included in the analysis,[1] 34 countries

[1] Among the 41 countries included in the analysis, the following 34 countries had a treatment coverage of 80% or more in either 2022 or 2023: Angola, Benin, Burkina Faso, Burundi, the Central African Republic, the Democratic Republic of the Congo, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, the Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Madagascar, Malawi, Mali, Mozambique, Namibia, the Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, South Africa, South Sudan, Togo, Uganda, the United Republic of Tanzania, Zambia and Zimbabwe. The six countries with a treatment coverage of between 20% and 80% in 2022 or 2023 and which did not have coverage of more than 80% in either 2022 or 2023 were Cameroon, Chad, the Comoros, the Congo, Côte d'Ivoire and Liberia. Mauritania had a treatment coverage rate of less than 20% in 2023. Data were missing for Eritrea and Mauritania in 2022 and from Chad, the Comoros, Liberia and Malawi in 2023. Data on the number of treatments distributed were used as a proxy for the number of cases treated for Burundi, Ethiopia and Senegal in 2022, and the Central African Republic, Equatorial Guinea, Eritrea, Ethiopia, Namibia and Zambia in 2023. In Angola in 2023, the data on treatment distributions were determined to be a poor proxy for cases treated, so it was excluded from the 2023 calculation.

Fig. 7.7. Number of ACT treatment courses delivered by manufacturers and distributed by NMPs to people with malaria, 2010–2023[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 deliveries to patients reflect consumption reported in the public health sector.

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

achieved a treatment coverage rate of 80% or higher in either 2022 or 2023. Among the remaining countries, six countries had a treatment coverage rate of between 20% and 80%, and one country had a treatment coverage of less than 20%. Low treatment coverage rates may be due to stock-outs of antimalarials or poor data quality. In 2022, countries reported a total of 164.6 million cases treated among 190.3 million cases (86.5%). In 2023, countries reported 157.6 million cases treated among 172.6 million cases (91.3%).

Aggregated data from household surveys conducted in sub-Saharan Africa between 2005 and 2023 were used to analyse coverage of treatment seeking, diagnosis and use of ACTs by children aged under 5 years (**Table 7.3**). Data were included from 26 countries[1,2] that undertook surveys – either demographic and health surveys (DHS) or malaria indicator surveys (MIS) – in this period (baseline, 2005–2011 or most recent, 2017–2023). Comparing the baseline and latest surveys, there was a slight drop in the prevalence of fever within the 2 weeks preceding the survey (median: 26% versus 21%) and little change in treatment seeking for fever (median: 65% versus 64%). Comparing the source of treatment for fever between the baseline and most recent surveys, the proportion of people who received care from public health facilities increased from a median of 58% to 67%.

[1] The 26 countries were: Angola (MIS 2011), Benin (DHS 2006; DHS 2017), Burkina Faso (DHS 2010; DHS 2021), Burundi (DHS 2010), Cameroon (DHS 2011; MIS 2022), Côte d'Ivoire (AIDS Indicator Survey 2005; DHS 2021), Gabon (DHS 2019), the Gambia (DHS 2019), Ghana (DHS 2008; DHS 2022), Guinea (DHS 2005; MIS 2021), Kenya (DHS 2008; DHS 2022), Liberia (MIS 2011; MIS 2022), Madagascar (MIS 2011; DHS 2021), Malawi (DHS 2010; MIS 2017), Mali (DHS 2006; MIS 2021), Mauritania (DHS 2020), Mozambique (DHS 2011; DHS 2022), the Niger (DHS 2006; MIS 2021), Nigeria (MIS 2010; MIS 2021), Rwanda (DHS 2010; DHS 2019), Senegal (DHS 2010; DHS 2023), Sierra Leone (DHS 2008; DHS 2019), Togo (MIS 2017), Uganda (DHS 2011; MIS 2018), the United Republic of Tanzania (DHS 2010; DHS 2022) and Zambia (DHS 2007; DHS 2018).

[2] Although surveys were available from Zimbabwe, data were not included due to low case numbers. In addition, Ethiopia could not be included because the interim mini-survey conducted in 2019 did not include questions on care seeking behaviour or fever.

Table 7.3. Summary of coverage of treatment seeking for fever, diagnosis and use of ACTs for children aged under 5 years, from household surveys in sub-Saharan Africa, at baseline (2005–2011) and most recently (2017–2023) *Source: Household surveys.*

Children aged under 5 years	Baseline (2005–2011)			Most recent surveys (2017–2023)		
Indicator	**Median estimate**	**Lower bound**	**Upper bound**	**Median estimate**	**Lower bound**	**Upper bound**
Prevalence of fever						
With fever in past 2 weeks	25.9%	20.1%	34.3%	20.7%	16.5%	27.1%
Treatment seeking for fever						
With fever in past 2 weeks for whom treatment was sought	65.1%	59.2%	71.6%	64.4%	57.0%	71.2%
Source of treatment for fever among those who were treated						
Public sector (health facility)	57.7%	47.2%	78.1%	66.8%	44.9%	76.8%
Public sector (community health worker)	2.0%	0.2%	3.4%	1.6%	0.2%	5.3%
Private sector (formal and informal)	40.5%	21.6%	53.2%	33.2%	21.7%	47.8%
Diagnosis among those with fever and for whom care was sought						
Received a finger or heel prick	29.8%	12.2%	38.4%	48.3%	38.2%	61.4%
Use of ACTs among those for whom care was sought						
Received treatment with ACTs	12.8%	6.9%	30.7%	27.2%	14.8%	40.2%
Use of ACTs among those for whom care was sought and who received a finger or heel prick						
Received ACTs	20.6%	16.3%	41.7%	37.8%	22.3%	54.3%
Use of ACTs among those for whom care was sought and who were treated with an antimalarial drug						
Received ACTs	38.0%	19.7%	67.9%	71.0%	47.1%	84.5%

ACT: artemisinin-based combination therapy.

Use of community health workers was low in both periods, with a median of 2% in both the baseline and more recent surveys. The proportion of children aged under 5 years who received care from the private sector fell from a median of 40% at baseline to 33% in the more recent surveys, indicating an increase in population access to the public health sector and consequently to the associated public surveillance system. Increases in reported cases may occur as more patients use the public sector; this has implications for commodities planning and for the estimation of burden trends using routine data (which are primarily collected from the public sector in all countries).

The proportion of children aged under 5 years who sought care for a fever and who received a diagnosis with a finger or heel prick increased from a median of 30% at baseline to 48% in the latest surveys, indicating an improvement in case management. Use of ACTs among those who sought care increased from a median of 13% at baseline to 27% in the latest surveys. Among those who received a finger or heel prick, the use of ACTs increased from a median of 21% at baseline to 38% in the latest surveys. These results could indicate either an improvement in treatment rates or an increase in test positivity rates among the children tested; hence, this indicator should be interpreted according to individual country context, given a lack of information on the type of diagnostic test performed or the result of the test. ACT use among children who sought care and who were treated with an antimalarial drug increased from 38% at baseline to 71% in the latest surveys, suggesting an increase in the use of the recommended first-line treatment for *P. falciparum* in the countries included in the analysis.

Data from the most recent household surveys, conducted between 2017 and 2023, were used to analyse coverage of treatment seeking, diagnosis and use of ACTs by children aged under 5 years, by country (**Table 7.4**). The percentage of children with fever for whom care was sought ranged from 32.2% in Mauritania to 86.9% in Uganda, indicating varying levels of access to care between countries. Further disaggregation of data subnationally can be used to inform health service planning, tailor the malaria response and inform estimation of community-level malaria burden (given the evidence it provides about the coverage of the surveillance system used).

The percentage of children with fever for whom care was sought and who received a diagnosis ranged from 12.1% in Mauritania to 81.7% in Burkina Faso. This finding highlights the varying levels of adherence to the recommended malaria diagnosis guidelines between countries, and the challenges in adequately identifying all malaria cases among those with fever who seek care.

Among those for whom care was sought, the percentage who received ACTs ranged from 1.9% in Senegal to 61.8% in Uganda; and the proportion who received ACTs and received a finger or heel prick ranged from 4.1% in Senegal to 73.2% in Liberia. The differences in the levels of ACT treatment after testing reflect the varying levels of transmission in the countries included in **Table 7.4**. However, by its nature, this indicator (i.e. use of ACTs among those for whom care was sought and who received a finger or heel prick) includes factors that cannot be independently evaluated through the survey data (e.g. treatment rates among people infected with malaria and variations in the quality of diagnostic results).

The percentage of antimalarial drugs prescribed that were ACTs ranged from 17.9% in Senegal to 97.4% in Malawi, although this indicator is likely to be affected by recall bias. The differences seen between countries indicate different levels of use of the recommended first-line treatment, and highlights that countries experience challenges in distributing ACTs, depending on the country context; these challenges include stock-outs, inadequate training and supervision of health staff, and alternative markets for antimalarial drugs.

Table 7.4. Summary of coverage of treatment seeking for fever, diagnosis and use of ACTs for children aged under 5 years from the most recent household survey for countries in sub-Saharan Africa *Source: Household surveys.*

Country	Latest survey	Treatment seeking for fever Median (lower bound–upper bound)	Diagnosis among those with fever and for whom care was sought Median (lower bound–upper bound)	Use of ACTs among those for whom care was sought Median (lower bound–upper bound)	Use of ACTs among those for whom care was sought and who received a finger or heel prick Median (lower bound–upper bound)	Use of ACTs among those for whom care was sought and who were treated with an antimalarial Median (lower bound–upper bound)
Benin	DHS 2017	53.9 (50.7–57.0)	29.3 (26.4–32.4)	10.9 (9.1–12.9)	18.7 (14.7–23.4)	38.3 (32.8–44.0)
Burkina Faso	DHS 2021	75.7 (73.4–78.0)	81.7 (79.1–84.0)	36.2 (33.0–39.6)	39.8 (36.2–43.5)	49.4 (45.5–53.4)
Cameroon	MIS 2022	56.4 (51.2–61.5)	43.1 (37.4–49.0)	37.8 (32.8–43.0)	45.7 (39.4–52.1)	67.7 (61.6–73.2)
Côte d'Ivoire	DHS 2021	65.4 (61.9–68.7)	52.7 (48.3–57.0)	16.9 (13.7–20.7)	22.7 (17.8–28.5)	40.2 (33.7–47.0)
Gabon	DHS 2019	76.4 (72.8–79.6)	15.9 (11.6–21.4)	18.7 (14.9–23.3)	28.1 (16.7–43.2)	55.5 (46.0–64.7)
Gambia	DHS 2019	64.8 (60.8–68.6)	39.4 (34.7–44.2)	3.0 (1.7–5.2)	5.2 (2.5–10.5)	59.9 (36.2–79.7)
Ghana	DHS 2022	63.3 (59.7–66.8)	62.8 (57.5–67.8)	50.7 (45.2–56.1)	58.6 (51.9–65.0)	78.7 (73.4–83.2)
Guinea	MIS 2021	62.2 (57.3–66.9)	43.1 (38.0–48.3)	25.2 (21.3–29.6)	36.6 (29.6–44.2)	53.1 (46.5–59.6)
Kenya	DHS 2022	69.8 (67.3–72.2)	42.9 (40.0–45.9)	22.8 (20.8–25.0)	38.2 (34.7–41.8)	83.5 (79.2–87.1)
Liberia	MIS 2022	63.7 (59.5–67.8)	53.5 (47.4–59.6)	61.6 (56.8–66.2)	73.2 (67.1–78.5)	84.5 (80.0–88.1)
Madagascar	DHS 2021	45.4 (41.8–49.1)	40.0 (35.8–44.4)	15.0 (12.0–18.6)	26.9 (20.9–33.8)	55.1 (46.9–63.0)
Malawi	MIS 2017	54.1 (49.0–59.2)	64.8 (58.2–70.8)	49.0 (42.4–55.7)	61.0 (53.7–67.9)	97.4 (94.2–98.9)
Mali	MIS 2021	64.8 (61.8–67.7)	34.8 (31.1–38.8)	14.2 (11.9–16.9)	20.8 (16.5–25.8)	30.3 (25.9–35.2)
Mauritania	DHS 2020	32.2 (29.3–35.2)	12.1 (9.2–15.8)	9.6 (6.9–13.3)	9.3 (3.6–22.2)	19.7 (14.3–26.6)
Mozambique	DHS 2022	66.0 (61.8–70.0)	72.9 (69.0–76.4)	29.1 (24.5–34.1)	37.5 (32.3–43.1)	84.5 (78.1–89.3)
Niger	MIS 2021	67.5 (62.3–72.3)	47.1 (41.8–52.5)	43.1 (37.6–48.8)	53.7 (46.9–60.3)	78.3 (72.8–82.9)
Nigeria	MIS 2021	64.0 (61.1–66.7)	31.2 (28.1–34.4)	39.1 (34.8–43.6)	56.1 (47.7–64.2)	74.4 (69.4–78.8)
Rwanda	DHS 2019	62.9 (60.0–65.7)	60.9 (57.2–64.6)	12.2 (9.5–15.7)	18.9 (14.8–23.8)	92.3 (84.7–96.3)
Senegal	DHS 2023	44.3 (40.7–47.9)	28.5 (24.6–32.7)	1.9 (1.0–3.5)	4.1 (2.1–8.0)	17.9 (9.4–31.2)
Sierra Leone	DHS 2019	75.5 (72.7–78.1)	71.9 (68.2–75.3)	22.5 (19.2–26.2)	22.9 (19.2–27.0)	31.7 (27.4–36.4)
Togo	MIS 2017	57.1 (51.4–62.7)	49.4 (43.8–55.1)	39.4 (33.2–45.9)	62.6 (53.4–71.0)	76.4 (68.2–83.0)
Uganda	MIS 2018	86.9 (84.7–88.8)	58.0 (53.8–62.2)	61.8 (56.9–66.5)	64.9 (59.0–70.3)	87.9 (83.9–91.0)
United Republic of Tanzania	DHS 2022	78.5 (73.9–82.4)	60.3 (54.5–65.7)	38.2 (33.4–43.2)	49.7 (43.7–55.7)	94.8 (91.5–96.9)
Zambia	DHS 2018	77.2 (74.2–79.9)	76.9 (72.5–80.7)	42.7 (38.2–47.4)	51.7 (46.8–56.5)	96.9 (94.8–98.2)

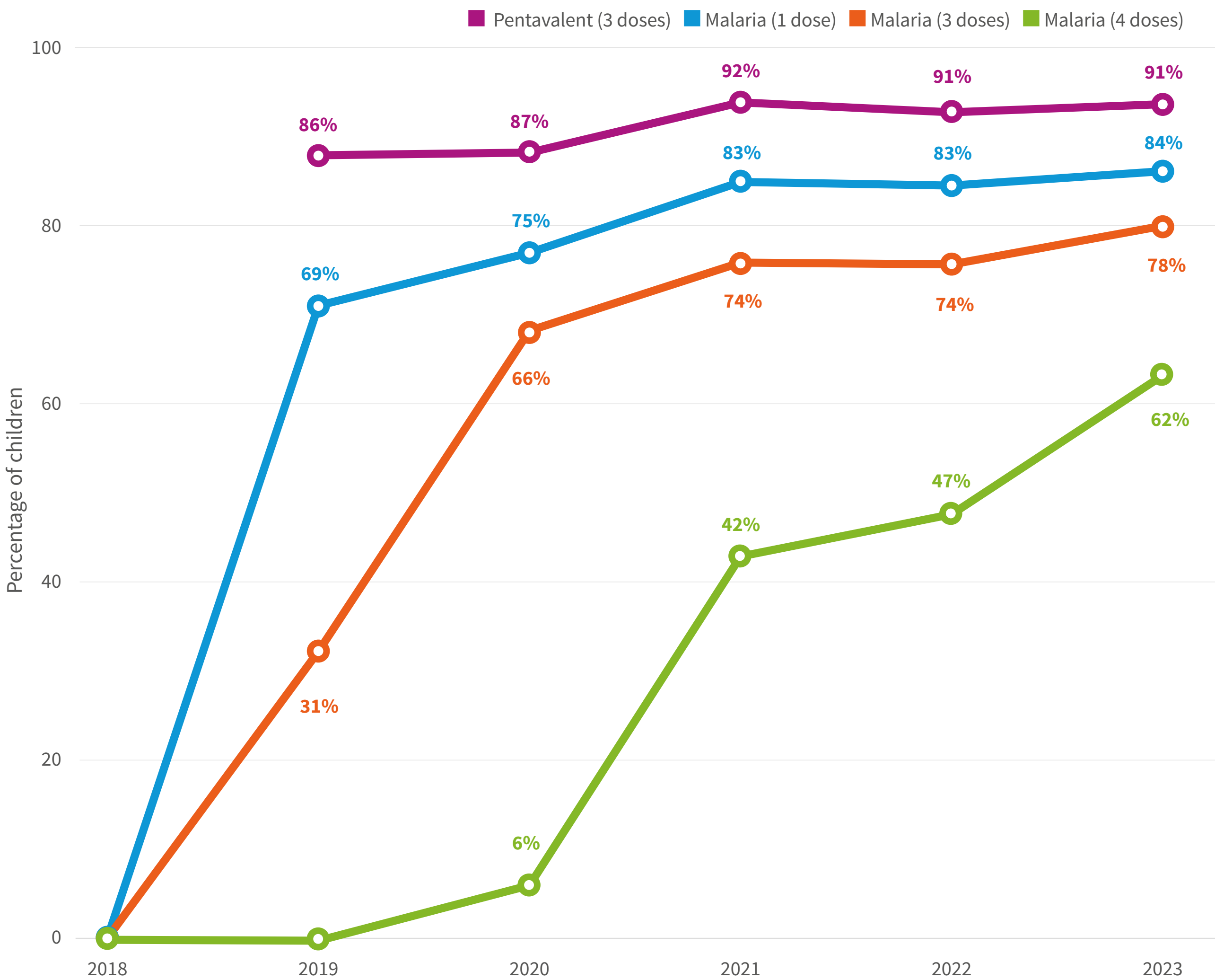
ACT: artemisinin-based combination therapy; DHS: demographic and health survey; MIS: malaria indicator survey.

7.6 Rollout of malaria vaccines for the prevention of *P. falciparum* malaria in children

WHO recommends malaria vaccines for the prevention of *P. falciparum* malaria in children living in areas where malaria is endemic, prioritizing areas of moderate and high transmission. Two malaria vaccines are recommended for use: RTS,S and R21. Since 2019, Ghana, Kenya and Malawi have been delivering malaria vaccine, subnationally, through their respective routine child immunization programmes to children from 5 months of age. The RTS,S malaria vaccine was initially provided through the Malaria Vaccine Implementation Programme (MVIP).

During the MVIP, from 2019 to 2023, more than 6 million vaccine doses were delivered, reaching about 2 million children. A rigorous evaluation demonstrated that vaccine introduction resulted in a statistically significant 13% reduction in all-cause mortality (excluding injury) and a 22% reduction in hospitalized severe malaria among children age-eligible for vaccination. These gains in child survival and health were made during vaccine scale-up, when, on average, 63–75% of children had received three doses of malaria vaccine, and uptake of the fourth dose ranged from 33 to 54%, indicating that even higher impact can be anticipated now that coverage has increased (**Fig. 7.8**). In addition, the vaccine demonstrated a good safety profile, and there were no reductions in ITN use or care seeking behaviour (*65*).

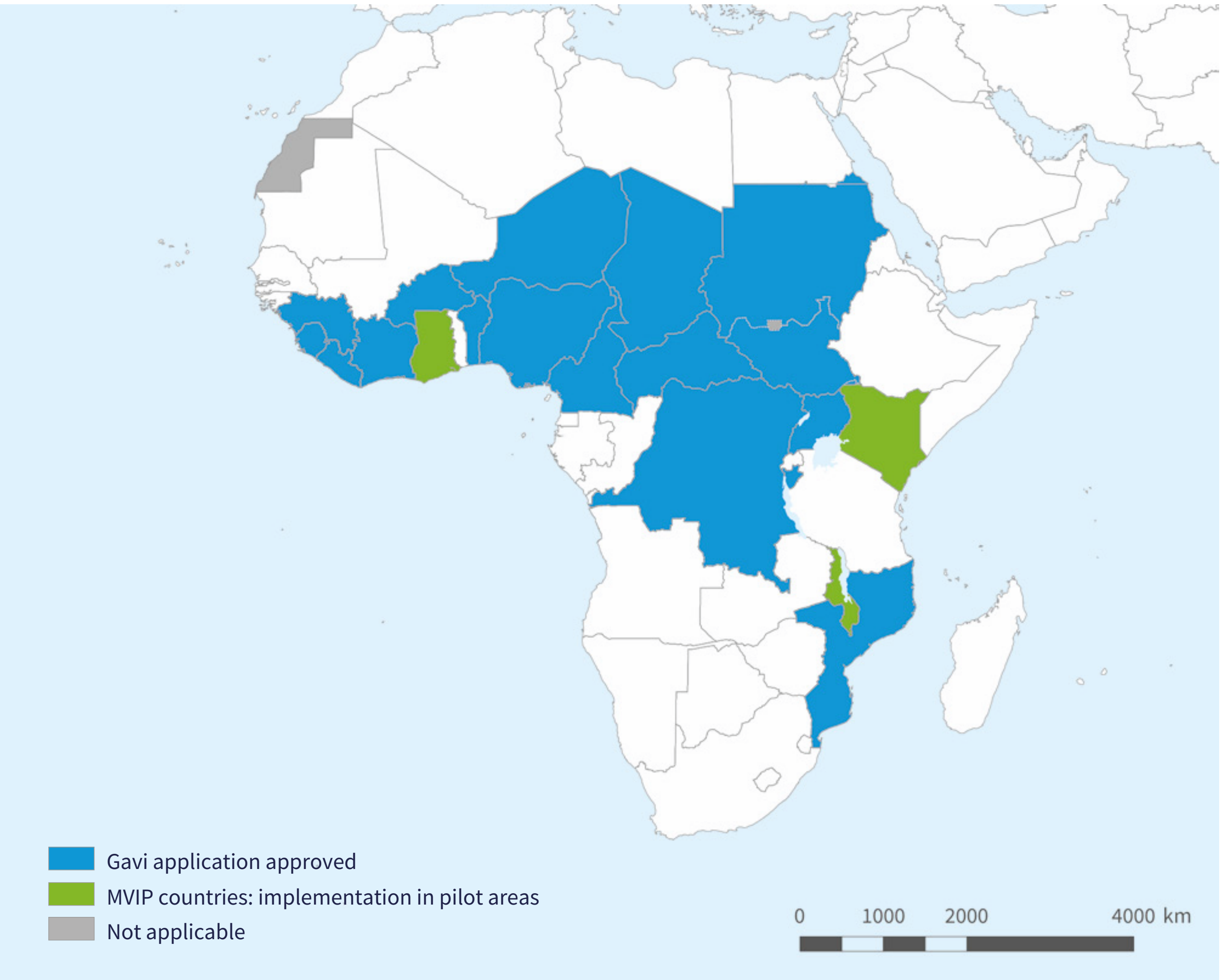
Fig. 7.8. Percentage of children in the target population receiving pentavalent and malaria vaccines, by number of doses, in Ghana, Kenya and Malawi, 2019–2023 *Source: Administrative data from ministries of health.*



In all countries, information, education and communication materials regarding the malaria vaccine included the importance of continuing other forms of malaria prevention and seeking prompt diagnosis and treatment for fever. Notably, the important reductions in mortality and hospitalized malaria were on top of the benefits provided from other malaria control interventions and demonstrate the important additional impact that can be gained when malaria vaccine is included in the mix of malaria prevention tools.

Gavi has established a Malaria Vaccine Programme, through which Gavi-eligible countries can receive support to introduce malaria vaccines. In 2023, 20 countries in total have implemented malaria vaccine or been approved to receive Gavi support (**Fig. 7.9**). With two WHO-recommended vaccines, RTS,S and R21, supply is sufficient to meet the high demand.

Fig. 7.9. Countries implementing malaria vaccine or approved to receive Gavi support in 2023 *Source: Gavi.*



MVIP: Malaria Vaccine Implementation Programme.

8 Biological threats to malaria interventions

8.1 Deletions in *pfhrp2/3* genes

Most of the RDTs used to detect *P. falciparum* malaria target the histidine-rich protein 2 (HRP2) antigen; thus *P. falciparum* parasites that do not express HRP2 may escape detection by RDTs that are based on detection of HRP2. At high parasite densities, histidine-rich protein 3 (HRP3), a homologue of HRP2 (i.e. with a common evolutionary origin), can cross-react with the monoclonal antibodies that detect HRP2. *P. falciparum* parasites that express neither HRP2 nor HRP3 will completely evade detection by these RDTs, about 448.5 million of which were sold in 2023 (according to data provided by 10 manufacturers).

Deletions in the *P. falciparum* genes for HRP2 (encoded by the *pfhrp2* gene) and HRP3 (*pfhrp3*) were first reported in 2010 in the Peruvian Amazon basin, by researchers characterizing blood samples that were negative by HRP2-based RDTs but positive by microscopy (*66*). In recent years, *pfhrp2/3*-deleted parasites have been documented outside of South America, including in Africa, Asia and the Middle East. Prevalence estimates vary widely, both within and between countries. In Djibouti, Eritrea and Peru, the prevalence of dual *pfhrp2*- and *pfhrp3*-deleted parasites among symptomatic patients was as high as 80% in some areas; this finding demonstrates that these parasites can become dominant in the population, posing a serious global threat to people with malaria and increasing the risk that missed cases will progress to severe disease or death (*67*).

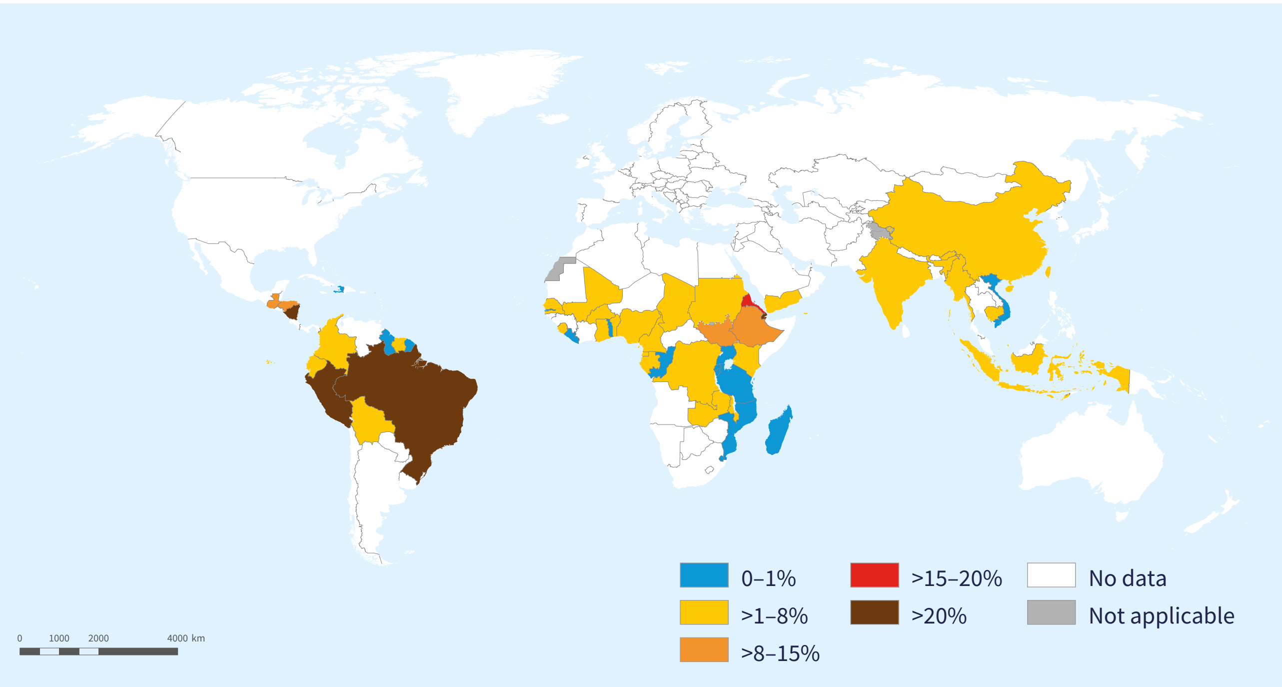
WHO has published guidance on investigating suspected *pfhrp2/3* deletions (*68*) and recommends that countries with reports of *pfhrp2/3* deletions, and neighbouring countries, conduct representative baseline surveys among suspected malaria cases to determine whether the prevalence of *pfhrp2/3* deletions causing false negative RDT results exceeds the threshold that requires a change of RDT. This threshold is currently set at more than 5% *pfhrp2* deletions causing false negative RDT results. Alternative RDT options (e.g. based on detection of *Plasmodium* lactate dehydrogenase) are limited; in particular, there are currently no WHO-prequalified non-HRP2 combination tests that can detect and distinguish between *P. falciparum* and *P. vivax*.

WHO is tracking published reports of *pfhrp2/3* deletions using the Malaria Threats Map application (*69*) and is encouraging a harmonized approach to mapping and reporting of *pfhrp2/3* deletions through publicly available survey protocols (*70*). Based on literature searches informing the Malaria Threats Map, 24 articles were published between January 2023 and September 2024, with data from 17 countries within the WHO African Region (Benin, Burkina Faso, Cameroon, Chad, the Congo, the Democratic Republic of the Congo, Eritrea, Ethiopia, Gabon, Ghana, Kenya, Nigeria, Rwanda, South Sudan, Togo, Uganda and the United Republic of Tanzania), as well as India and Peru. Studies of *pfhrp2/3* deletions were published for the first time in Burkina Faso, Chad and the Congo (2023), and in Togo (2024). A study from Indonesia published in 2021 but only recently incorporated into the database was also included. In Burkina Faso, four studies were conducted in the province of Boulkiemdé in 2020; *pfhrp2* deletions were detected in all four sites: Kindi (3%), Saow (7.8%), Pella (11.1%) and Nanoro (23.9%) (*71*). In Chad, results from a study conducted in 2020 were combined for several sites (Koyom, Mayo Kebbi Est; Kelo, Tandjile; and Doba, Logone Oriental); *pfhrp2* deletions were confirmed among 4.7% of 216 samples (*72*). In Togo, *pfhrp2* deletions from a study conducted in 2021 were confirmed in a small proportion of samples in Kouvé (0.5%); no deletions were found in Anié (*73*). In Indonesia, *pfhrp2/3* deletions were reported for the first time in Papua Province (*74*). Among the countries included in the 24 recent publications, *pfhrp2/3* gene deletions have been detected in all, with the exception of the Congo.

The Malaria Threats Map of *pfhrp2/3* gene deletions includes 122 studies published between 2010 and 2024, from 55 countries, of which 50 are malaria endemic (*69*). The estimated prevalence of *pfhrp2* gene deletions in the 41 malaria endemic countries where it was detected was <1% in six countries, more than 1% and less than 15% in 30 countries, and more than 15% in five countries (Brazil, Djibouti, Eritrea, Nicaragua and Peru). The estimated prevalence of *pfhrp2* gene deletions globally is shown in **Fig. 8.1**.

The WHO response plan for *pfhrp2/3* deletions outlines several areas for action beyond scaling up of surveillance (*9*). Areas for action include identifying new biomarkers, improving the performance of non-HRP2 RDTs, undertaking market forecasting and strengthening of laboratory networks to support the demand for using molecular characterization to determine the presence or absence of these gene deletions.

Fig. 8.1. Estimated prevalence of *pfhrp2* gene deletions, 1996–2023 *Source: Review of published literature included in the Malaria Threats Map (69).*



8.2 Status of antimalarial drug efficacy and resistance (2015–2024)

Effective treatment for malaria is critical in the global fight against this disease. The emergence of partial resistance to artemisinin, defined as delayed clearance after treatment with a drug containing an artemisinin, and resistance to ACT partner drugs are significant threats to efforts aimed at reducing the global burden of malaria (*35*). In Africa, mutations linked to partial artemisinin resistance in *P. falciparum* have been identified in the Horn of Africa (2016–2019), eastern Africa (2016–2020) and, more recently, southern Africa (2023). The emergence and spread of artemisinin partial resistance in Africa is of great concern, requiring an urgent response. In November 2022, WHO launched the *Strategy to respond to antimalarial drug resistance in Africa* (*75*). While this strategy provides a comprehensive overview of potential actions, countries will need to adapt it to the local context for effective implementation.

Artemisinin partial resistance and resistance to ACT partner drugs continue to be threats in other parts of the world. In South America, mutations associated with resistance to the ACT partner drug piperaquine have been detected; resistance to piperaquine has been identified in French Guiana, Guyana and Suriname, compromising the efficacy of the ACT dihydroartemisinin–piperaquine (DHA-PPQ). In the GMS, the low number of *P. falciparum* cases in Cambodia, the Lao People's Democratic Republic, and Viet Nam suggests that elimination is within reach in countries where resistance was once a major threat. However, in Myanmar and western Thailand, an increase in malaria cases in areas previously affected by artemisinin partial resistance is a cause for concern. As part of the response to counter the threat of antimalarial drug resistance, WHO has called on malaria endemic countries and global malaria partners to strengthen the surveillance of antimalarial drug efficacy and resistance, and to ensure that the most effective treatments are selected for national treatment policy.

Antimalarial drug efficacy is monitored through therapeutic efficacy studies (TES), which track clinical and parasitological outcomes among patients receiving antimalarial treatment. TES are considered the gold standard by which NMPs can best determine their national treatment policies. Studies conducted according to the criteria established in the WHO protocol (*76*) help to detect changes in treatment efficacy over time. Polymerase chain reaction correction is required to distinguish between cases with treatment failure caused by reinfection and those due to recrudescence. In 2021, WHO updated its guidance on the methodology used to distinguish reinfection from recrudescence in Africa (*77*). In countries where malaria transmission is low and in countries pursuing elimination, surveillance systems for case management have been strengthened so that all malaria cases are detected, treated and followed up to ensure cure. In this context, drug efficacy monitoring can be conducted by integrated drug efficacy surveillance (iDES) as part of the routine case-based surveillance and response system.

Antimalarial drug resistance can be assessed through molecular surveillance. For some drugs, genetic changes associated with reduced drug sensitivity have been identified. For example, several *P. falciparum* Kelch13 (*Pfkelch13*) mutations are associated with delayed parasite clearance after a treatment containing artemisinin. Surveys of these mutations can provide information on the emergence and spread of artemisinin partial resistance. Resistance to SP, an ACT partner and chemoprevention drug, can be monitored by the detection of mutations in the dihydrofolate reductase (*dhfr*) and dihydropteroate synthase (*dhps*) genes of *P. falciparum*. Resistance to mefloquine is associated with an increase in *Pfmdr1* copy numbers, and resistance to piperaquine is associated with an increase in *Pf plasmepsin 2/3* copy numbers and mutations in the *P. falciparum* chloroquine resistance transporter (*PfCRT*) (*78*). Some mutations have only been validated as markers associated with resistance in parasite strains from specific regions.

The status of antimalarial drug efficacy and resistance in malaria endemic countries is summarized below. Key results are presented for each WHO region for TES for *P. falciparum* and *P. vivax* from 2015 to 2024. Treatment failure rates were calculated using the per protocol method unless otherwise indicated. A minimum sample size of 20 patients was applied to the analysis. Details of studies referenced here, and other studies from the WHO antimalarial drug resistance database, can be found in the Malaria Threats Map (*69*).

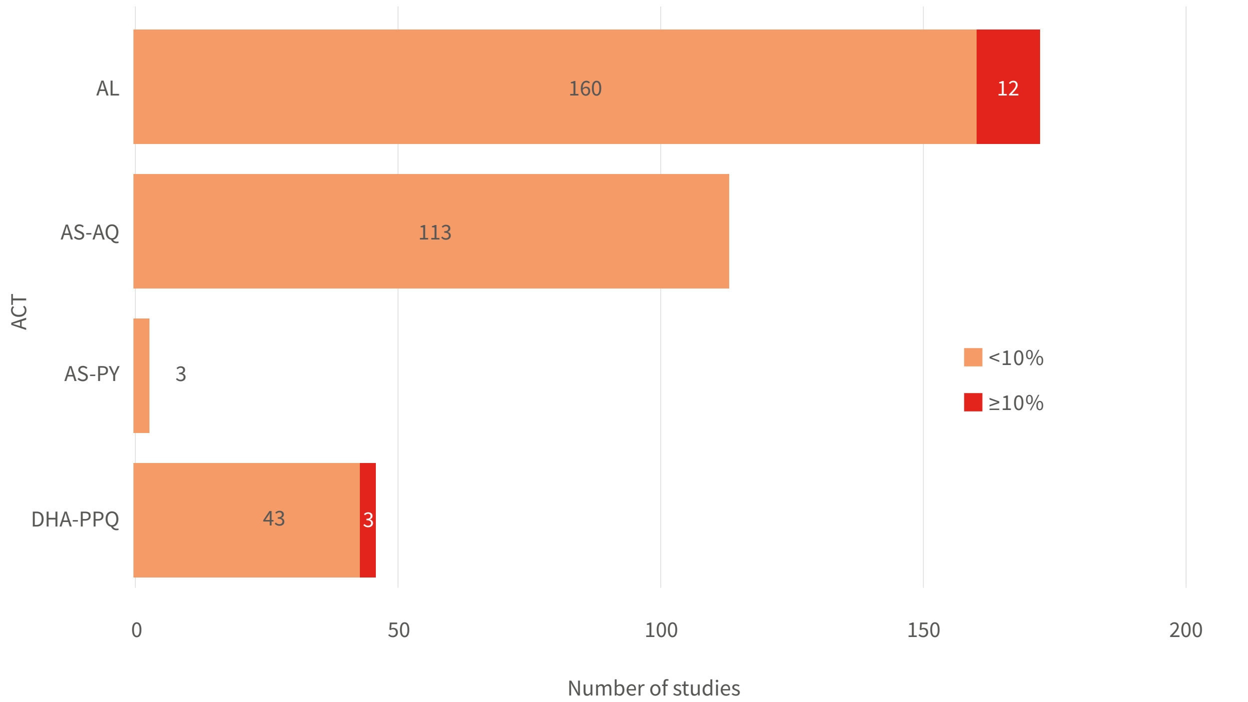
8.2.1 WHO African Region

In the WHO African Region, most TES conducted according to the WHO standard protocol have demonstrated good efficacy (**Fig. 8.2**) to ACTs. However, some studies have reported higher levels of treatment failure, which warrant further investigation, as they could indicate the emergence of resistance to ACT partner drugs. **Fig. 8.2** shows 15 studies reporting treatment failure rates of greater than or equal to 10% after treatment with artemether–lumefantrine (AL) (*n*=12) and DHA-PPQ (*n*=3). Several of these studies should be interpreted with caution due to significant deviations from the WHO standard protocol. For example, in three studies of AL from Burkina Faso, while treatment was fully supervised and genotyping was conducted according to WHO protocol, only half of the intended dose was provided for the children in the 5–9 kg weight group (*79*). Further, in three studies of AL from Angola (*80–82*) and one study of AL from Kenya (*83*), the evening doses were not supervised. Microsatellites and Bayesian analysis were used to distinguish between reinfection and recrudescence in one study of AL and one study of DHA-PPQ from the Democratic Republic of the Congo (*84*), four AL studies from Uganda (*85*, *86*) and three AL studies from Angola (*80–82*). Further, for the studies of AL and DHA-PPQ in Burkina Faso (*79*), there have been concerns over the quality of the microscopy (*87*).

Surveillance of *Pfkelch13* polymorphisms associated with artemisinin partial resistance has been conducted in several countries in the WHO African Region (*69*), and there is evidence of artemisinin partial resistance associated with *Pfkelch13* mutations in Eritrea (*89*), Rwanda (*90*), Uganda (*91*) and the United Republic of Tanzania (*92*). In Rwanda, the R561H mutation was first identified in 2014. Several studies undertaken in 2018 and 2019 found R561H in more than 15% of samples (*93*). Furthermore, the presence of the R561H mutation has been associated with delayed parasite clearance among patients treated with AL (*93*, *94*). Rwanda was the first country in the WHO African Region to confirm the presence of artemisinin partial resistance. In Uganda, molecular surveillance has shown increases in prevalence and geographical spread of multiple *Pfkelch13* mutations (*91*, *95*). Additionally, R622I, a validated marker of artemisinin resistance, has been found in an increasing proportion of samples in the Horn of Africa, particularly in Eritrea, where there is also evidence of delayed clearance after treatment with ACTs. In Eritrea and Ethiopia, parasites carrying both R622I and *pfhrp2/3* deletions have been detected (*89*, *96*). The United Republic of Tanzania has become the fourth country in Africa to confirm artemisinin partial resistance; studies in Kagera provided evidence of delayed clearance after treatment with AL and artesunate–amodiaquine (AS-AQ), and a high prevalence of the R561H mutation (*92*). Recently, molecular surveys carried out in southern Africa showed a high prevalence of *Pfkelch13* mutations in two countries, Namibia and Zambia (unpublished data).

P. vivax is endemic in few countries in the WHO African Region. Studies conducted in Ethiopia between 2018 and 2021 found high therapeutic efficacy, with treatment failure rates of less than 5% in nine studies of chloroquine (CQ) and no treatment failures among three studies of DHA-PPQ.

Fig. 8.2. Number of *P. falciparum* TES finding more or less than 10% of treatment failures in the WHO African Region, by ACT (2015–2024), among studies with at least 20 patients *Source: WHO, 2024 (88).*



ACT: artemisinin-based combination therapy; AL: artemether–lumefantrine; AQ: amodiaquine; AS: artesunate; DHA-PPQ: dihydroartemisinin–piperaquine; *P. falciparum*: *Plasmodium falciparum*; PY: pyronaridine; TES: therapeutic efficacy studies; WHO: World Health Organization.

8.2.2 WHO Region of the Americas

Limited data are available from this region. TES undertaken using AL for the treatment of *P. falciparum* in Brazil (2015) (*97*) and Colombia (2018) (*98*) demonstrated high efficacy of this drug. In a recent publication, a high prevalence of molecular markers associated with piperaquine resistance was reported in samples from Guyana (2014–2017), Suriname (2010–2013) and French Guiana (2006–2018) (*99*). A small study (*n*=6) in French Guiana, in 2016–2018, found that DHA-PPQ therapeutic failure in patients was associated with these markers of piperaquine resistance (*99*). In Guyana, the C580Y mutation was sporadically observed between 2010 and 2017 (*100*); however, the mutation has not been found in any recent samples, suggesting that it has likely disappeared. The efficacy of CQ for the treatment of *P. vivax* was found to be high in Brazil.

8.2.3 WHO Eastern Mediterranean Region

TES conducted in 2015 detected high treatment failure rates with artesunate plus sulfadoxine–pyrimethamine (AS+SP) alone in Somalia (*101*) and the Sudan (*102*) (**Fig. 8.3a**), which prompted a change in treatment policy to AL in both countries. Data on the efficacy of AL for the treatment of *P. falciparum* are available from Afghanistan, Djibouti, Pakistan, Somalia, the Sudan and Yemen (2015–2024), and TES on the efficacy of DHA-PPQ are available from Pakistan, Somalia and the Sudan; all studies demonstrated high treatment efficacy. In a recent review of antimalarial drug resistance in the region, a high prevalence of the *Pfkelch13* R622I mutation was detected in the Sudan in 2016 and 2020 (*103*). This finding underscores the need for close monitoring of the efficacy of recommended ACTs and *Pfkelch13* mutations in the region. Studies conducted on the efficacy of first-line treatments for *P. vivax* are available from one study of AL in Somalia (2018) and three studies of CQ in Afghanistan (2016 and 2022); no treatment failures were observed.

8.2.4 WHO South-East Asia Region

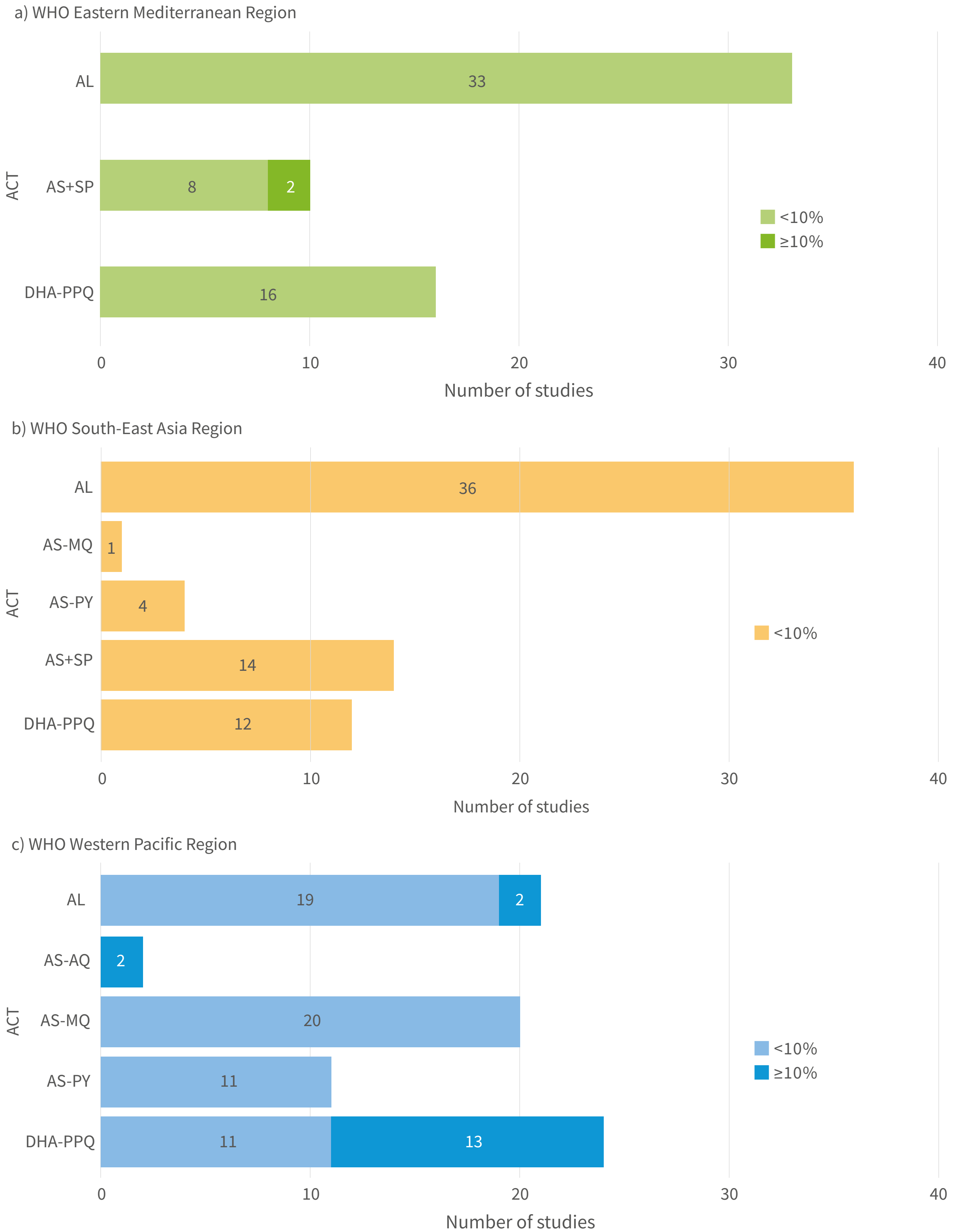
As seen in **Fig. 8.3b**, among the 67 TES conducted, no studies reported a treatment failure rate of more than 10%. However, there are limited recent data. Failure rates with AS+SP treatment remained low in India, but findings from a study in Chhattisgarh state between 2015 and 2017, examining *dhfr* and *dhps* mutations (*104*), could serve as an early warning of changes that prompted the need for a treatment policy shift from AS+SP in northeastern India. In Thailand, drug efficacy is assessed using iDES (*105*); therefore, these results are not included in **Fig. 8.3b**. In 2019, a disproportionately high treatment failure rate was detected in Sisaket Province, with failure rates of up to 50%. This led Thailand to change its first-line treatment to artesunate–pyronaridine (AS-PY) in 2020 in Sisaket and Ubon Ratchathani. In the GMS, *Pfkelch13* mutations associated with artemisinin partial resistance have reached a high prevalence. Among samples collected in Myanmar and western Thailand between 2015 and 2020, *Pfkelch13* wild-type parasites were found in 65.5% of samples (*69*). High treatment efficacy for *P. vivax* was found in all studies of CQ, DHA-PPQ and AS-PY.

8.2.5 WHO Western Pacific Region

In this region, high treatment failure rates have been detected with TES conducted on AL, AS-AQ and DHA-PPQ (**Fig. 8.3c**). In the Lao People's Democratic Republic, a high treatment failure rate was observed with AL in one study in Salavanh Province in 2017 (17.2%); however, the study was limited to 29 patients. Between 2019 and 2022, studies of AL found it effective in the Lao People's Democratic Republic, with treatment failure rates of up to 5%. A failure rate of 13.5% following treatment with AL was found in a study with 37 patients enrolled in 2018–2020 in western Cambodia (*106*). The presence of AQ resistance was documented in Cambodia in 2016–2017, with high failure rates after treatment with AS-AQ in the provinces of Mondulkiri (22.6%) and Pursat (13.8%) (*107*). Previously, high rates of treatment failure were detected with DHA-PPQ in Cambodia (2015–2017), the Lao People's Democratic Republic (2016) and Viet Nam (2015–2019). In Cambodia, the findings prompted the replacement of DHA-PPQ with artesunate–mefloquine (AS-MQ) as the first-line treatment in 2016. A recent study of AL from Papua New Guinea (2022) reported treatment failure rates of less than 10%. In Viet Nam, AS-PY has replaced DHA-PPQ as the first-line treatment in provinces where high treatment failure rates were detected; the treatment failure in 2022 was less than 10%. *Pfkelch13* wild-type parasites were found in 29.9% of samples collected between 2015 and 2020 in Cambodia, the Lao People's Democratic Republic and Viet Nam. In Papua New Guinea, the *Pfkelch13* C580Y mutation emerged in 2016–2018 and appears to be spreading (*108*).

TES conducted on the efficacy of CQ for the treatment of *P. vivax* in Viet Nam in 2015 found a treatment failure rate of 9.8%. In 2018, the efficacy of AS-PY for the treatment of *P. vivax* in Viet Nam found high treatment efficacy (*109*). Continued surveillance of both antimalarial treatment efficacy and molecular markers of drug resistance is needed to fully establish current trends.

Fig. 8.3. Number of *P. falciparum* TES finding more or less than 10% treatment failures, a) in the WHO Eastern Mediterranean Region, b) in the WHO South-East Asia Region and c) in the WHO Western Pacific Region, by ACT (2015–2024), among studies with at least 20 patients *Source: WHO, 2024 (88).*



Data as of 30 September 2024.

ACT: artemisinin-based combination therapy; AL: artemether–lumefantrine; AQ: amodiaquine; AS: artesunate; DHA-PPQ: dihydroartemisinin–piperaquine; MQ: mefloquine; *P. falciparum*: *Plasmodium falciparum*; PY: pyronaridine; SP: sulfadoxine–pyrimethamine; TES: therapeutic efficacy studies; WHO: World Health Organization.

8.3 Vector resistance to insecticides

The emergence and spread of mosquito resistance to insecticides has been a significant challenge in the prevention of malaria. Insecticide resistance has led to the use of different classes of insecticides for use on ITNs and for IRS.

For ITNs, a common feature of all prequalified nets is the presence of a pyrethroid insecticide on the ITN. The development of resistance to pyrethroids has led to the addition of different compounds on ITNs to maintain effectiveness. The first compound added to ITNs was the synergist PBO. Although PBO does not kill mosquitoes, it enhances the ability of pyrethroids to kill pyrethroid-resistant mosquitoes. In 2023, WHO recommended two new classes of dual active ingredient ITNs, with different modes of action: pyrethroid–chlorfenapyr nets, which combine a pyrethroid and a pyrrole insecticide to enhance the killing effect of the net; and pyrethroid–pyriproxyfen nets, which combine a pyrethroid with an insect growth regulator that disrupts mosquito growth and reproduction. Over the past 5 years, the proportion of ITNs delivered by manufacturers that were pyrethroid-PBO or dual active ingredient ITNs has increased dramatically. For example, the proportion of ITNs delivered that were pyrethroid-PBO increased from 3% of all ITNs delivered in 2018 to 58% of all ITNs delivered in 2023. Similarly, the proportion of ITNs delivered that were dual active ingredient increased from 2% in 2019, the first year for which data were available, to 20% in 2023. Conversely, the proportion of ITNs delivered which were pyrethroid-only has decreased from 97% in 2018 to 22% in 2023.

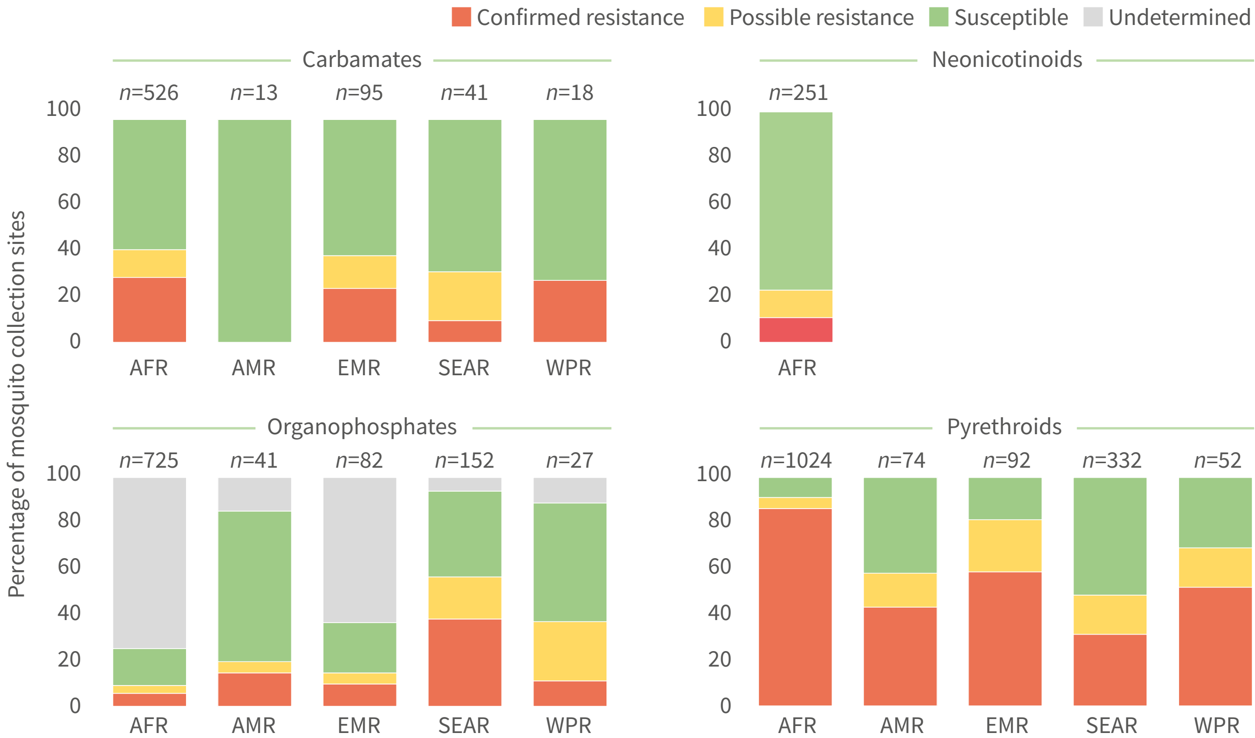
Recent years have seen an increase in the number of insecticides available for IRS. There are now prequalified IRS insecticides in five classes: pyrethroids, carbamates, organophosphates, neonicotinoids and meta-diamides. DDT (an organochlorine) is still used in a limited number of countries but is being phased out, and there is no prequalified DDT product. The availability of insecticides for IRS allows a preventive rotation strategy to prevent the build-up of insecticide resistance; however, the use of IRS has been declining, in large part due to cost.

Insecticide resistance is not limited to insecticides used for ITNs and IRS, and resistance should be monitored for any insecticide being used for public health purposes. Insecticide resistance status is determined based on the percentage of mosquito mortality. Following the protocols and the standard discriminating concentrations recommended by WHO (*110*), resistance status is assessed by the mosquito mortality following exposure to the standard discriminating concentration. Specifically, if there is less than 90% mortality, resistance is confirmed. Resistance is considered possible if mortality is between 90% and 97%. Mosquitoes are considered susceptible if mortality is greater than or equal to 98%. WHO test procedures have been expanded to include discriminating concentrations and procedures for chlorfenapyr, clothianidin, transfluthrin, flupyradifurone and pyriproxyfen. In addition, discriminating concentrations for pirimiphos-methyl and alpha-cypermethrin were revised. This new WHO guidance was published in 2022 (*110*). Note that, to date, WHO has not received any test results that meet all the new criteria for demonstrating chlorfenapyr resistance, and bioassay results of pirimiphos-methyl using the WHO tube-test results are only available for the formerly recommended concentration (0.25%). For this reason, results using the previously recommended discriminating concentrations are listed as undetermined. Countries are encouraged to align their insecticide resistance monitoring protocols with those recommended in the WHO *Manual for monitoring insecticide resistance in mosquito vectors and selecting appropriate interventions* (*110*).

Between 2018 and 2023, data on insecticide resistance status was available from 71 countries, of which 66 are currently considered malaria endemic. Among the 66 malaria endemic countries from which data were reported between 2018 and 2023, no new countries reported resistance. Resistance to at least one insecticide, in one site, was confirmed in 57 countries (86%). Pyrethroids continue to represent the largest share of discriminating concentration bioassay results reported to WHO, accounting for 54.7% of all bioassay results reported since 2018. Among the 64 countries that reported on pyrethroid resistance, resistance was confirmed in 55 countries (86%). Among all bioassay results, organophosphates made up 16.7%; resistance to organophosphates was confirmed in 16 of the 55 countries where it was monitored (29%). Bioassays of carbamates made up 9.9% of those reported; among the 48 countries that monitored this insecticide, resistance was confirmed in 28 (57.4%). Bioassays of neonicotinoids made up 2.8% of all bioassays, with resistance confirmed in five of the 16 countries where it was monitored. The number of countries reporting insecticide resistance for carbamates, neonicotinoids, organophosphates and pyrethroids is summarized for each region in **Annex 3**. The percentage of sites in which resistance was detected, for each insecticide class and in each region, is shown in **Fig. 8.4**.

Insecticide resistance data collected according to WHO procedures are included in the WHO global database on insecticide resistance (*111*) and are publicly available via the Malaria Threats Map (*69*). The latter provides a map with an overview of the status of phenotypic resistance and resistance mechanisms in each country, as well as visualizations on insecticide resistance indicators in a separate dashboard. Datasets are available for download. New data reported to WHO are regularly updated to the Malaria Threats Map application.

Fig. 8.4. Reported insecticide resistance status as a proportion of sites for which monitoring was conducted, by WHO region (2018–2023), for carbamates, neonicotinoids, organophosphates and pyrethroids[a]
Sources: Reports from NMPs and national health institutes, their implementation partners, research institutions and scientific publications.



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

[a] Status was based on mosquito mortality, where <90% = confirmed resistance, 90–97% = possible resistance and ≥98% = susceptibility. The undetermined category represents those data collected with pirimiphos-methyl discriminating concentration of 0.25%, which is no longer recommended. Where multiple insecticide classes or types, mosquito species or time points were tested at an individual site, the highest resistance status was considered. The numbers indicate the total number of sites from which data were reported.

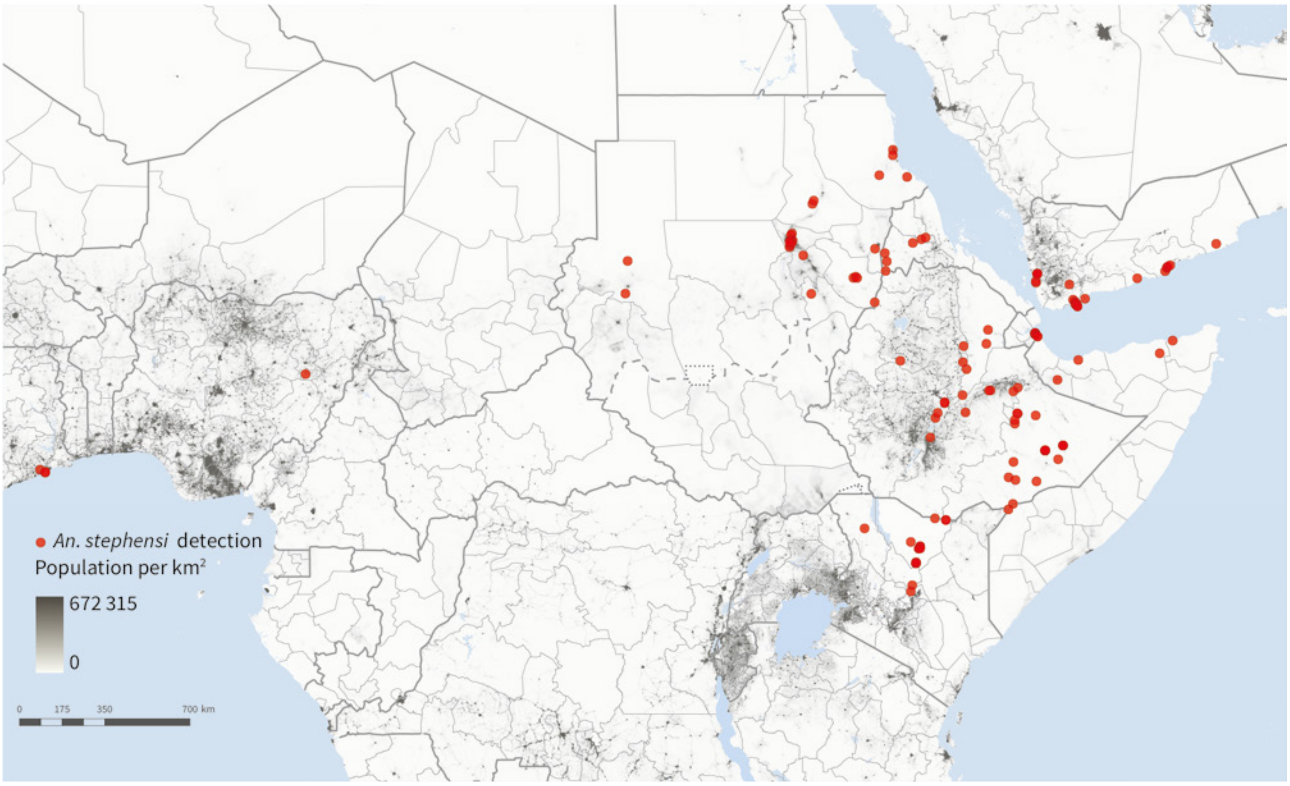
8.4 *An. stephensi* invasion and spread

An. stephensi is an efficient vector of both *P. falciparum* and *P. vivax* parasites. It was originally native to parts of Asia and the Arabian Peninsula, where it is a major malaria vector in rural and urban areas. It was first detected in Djibouti in 2012 and was implicated in malaria outbreaks (*112*). Since then, WHO has received reports of *An. stephensi* detections from Eritrea, Ethiopia, Ghana, Kenya, Nigeria, Somalia, Sri Lanka, the Sudan and Yemen (**Fig. 8.5**). There have been no new countries reporting the detection of *An. stephensi* in 2024; however, *An. stephensi* was detected in 10 new sites in Kenya in 2023 and 2024.

The characteristics of this vector make its control challenging. *An. stephensi* breeds in human-made water storage containers in urban areas and appears to quickly adapt itself to the local environment (including cryptic habitats, such as deep wells). It also survives extremely high temperatures during the dry season, when malaria transmission usually reaches a seasonal low. Insecticide resistance data reported to WHO show that *An. stephensi* has exhibited resistance to pyrethroids, organophosphates, carbamates and organochlorines in the Arabian Peninsula and Asia. In the Horn of Africa, it has exhibited resistance to pyrethroids, organophosphates and carbamates.

An. stephensi poses a threat to malaria control and elimination in Africa, the Arabian Peninsula and southern Asia. If uncontrolled, its spread across Africa, combined with rapid and poorly planned urbanization, may increase the risk of malaria transmission in African cities. WHO therefore encourages countries where *An. stephensi* invasion is suspected or has been confirmed to take immediate action. WHO recommends that countries increase vector surveillance to delineate the geographical spread of this vector. Surveillance is particularly needed in the areas between the Horn of Africa and west Africa, where little surveillance data have been published or shared with WHO. Research institutions and implementation partners are encouraged to immediately report any detection of *An. stephensi* to ministries of health and to WHO, to inform national and global responses. Countries should not limit their response to surveillance but should implement interventions aimed at preventing its further spread (particularly larval source management), especially into urban and periurban areas. Further guidance on how to monitor and control *An. stephensi* is provided in the relevant WHO vector alert (*113*).

Fig. 8.5. Detections of *An. stephensi* in the WHO African and Eastern Mediterranean regions, as reported to WHO since 2012 *Sources: Reports from NMPs and national health institutes, their implementation partners, research institutions and scientific publications. Population data provided by WorldPop (114).*



An. stephensi: *Anopheles stephensi*; NMP: national malaria programme; WHO: World Health Organization.

9 Gender equality, human rights and health equity

Failure to control malaria will impede progress towards the SDGs (*115*). Adopted by all UN Member States in 2015, the SDGs provide a paradigm for sustainable and equitable development grounded in human rights and non-discrimination.

As highlighted in this year's world malaria report, the global malaria response contributed to averting an estimated 2.2 billion malaria cases and 12.7 million malaria deaths in the period 2000–2023. Nevertheless, progress towards achieving the GTS targets has stalled. The complexity of responding to malaria has been further heightened by health and humanitarian emergencies (*45*), as well as climate change (*116*). These overlapping global crises are reversing advancements in gender equality (*117*), widening health inequities and undermining gains related to health and human rights. Malaria remains both a cause and a consequence of poverty (*118*), disproportionately affecting people and communities living in poverty, further impoverishing families and households, reducing productivity, discouraging investment and weakening national economies (*119*).

Addressing malaria and its effects will require an intersectional approach – one that emphasizes gender equality, human rights and health equity, and action on social and environmental determinants of health. By understanding and addressing the multiple and intersecting forms of discrimination, countries and their development partners can reduce malaria vulnerability and improve access to preventive and treatment services for those most affected.

The 2030 Agenda for Sustainable Development envisages a world of universal respect for human rights, human dignity and non-discrimination (*120*). Health is recognised as a fundamental human right in the *Constitution of the World Health Organization* (*121*). The right to health is also included in various legally binding international (*122–128*) and regional human rights instruments, such as the African Charter on Human and Peoples' Rights (*129*). The right to the highest attainable standard of physical and mental health encompasses the availability, accessibility, acceptability and quality of health services, as well as underlying determinants of health (*130*). The right to health is related to, and dependent upon, the realization of other key human rights, including the rights to food, housing, work, education, human dignity, life, non-discrimination, equality, the prohibition against torture, privacy, access to information, and the freedoms of association, assembly and movement. It is a right to which all people are entitled, without distinction of any kind, such as race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status. Aligned with this universal commitment, SDG 10 calls for a reduction in inequalities within and among countries. Specific goals and targets aim to "leave no one behind" and "reach those furthest behind first" (*120*).

Despite political and legal commitments, health-related rights are not universally advanced or realized. Social and economic circumstances, coupled with environmental factors, can prevent individuals from achieving the highest possible standard of health. Their health and well-being may be undermined by poverty, social inequities and discrimination, and the realization of their rights can be further impeded by a lack of access to information, employment, nutritious food, housing, education and opportunities to participate in public affairs (*131*, *132*).

These inequities are evident when analysing data on access to timely and appropriate health care, including barriers faced within the health system itself. More than half the global population – about 4.5 billion people – is not fully covered by essential health services (*133*, *134*). One in four people suffer financial hardship due to out-of-pocket expenditure incurred when accessing health services (*133*).

In 2021, about 3 million preventable deaths resulted from the underutilization of health care services, while 5 million deaths were attributable to inadequate quality of care (*135*). Families living in situations of poverty, displaced people and those facing discrimination, stigmatization and exclusion experience the most severe impacts of poor-quality care (*136*), with these inequities extending to malaria.

To overcome these barriers, countries must address the underlying determinants of health and build or strengthen health systems that ensure timely access to appropriate malaria interventions and health care services. These services must be available, accessible, acceptable and of good quality (*137*). Equally important is ensuring the active participation of the population in all health-related decision-making processes at the community, national and international levels (*130*). Engaging a diverse group of stakeholders – especially women in all their diversity and people whose voices have been previously excluded – in priority-setting, policy design and decision-making can help ensure that national public health strategies and action plans address gender and other factors and are informed by the perspectives of citizens, researchers, patients and health care providers, among others (*130*). Without addressing these critical factors, inequities will persist, and the malaria targets will remain out of reach.

9.1 Vulnerability to malaria

Despite the substantial contributions of NMPs and their partners in implementing prevention and control measures, too many people remain at risk of malaria and lack access to effective interventions and quality care.

Various factors – biological, environmental, social, structural and economic – increase vulnerability to malaria. They often intersect, with individuals facing multiple factors that compound their risk of disease and its consequences.

Biological vulnerability pertains to physiological characteristics, such as sex characteristics, age, immune response and other genetic factors. Some physiological factors, such as nutritional status, are also influenced by gender inequalities and other social factors (*118*). For example, young children and pregnant women and girls face a heightened risk of malaria mortality because of a combination of biological and social determinants and therefore require targeted interventions within malaria response efforts.

Features of the local physical environment can also affect people's proximity and exposure to vectors and parasites. In most malaria endemic countries, rural areas have experienced higher rates of transmission, placing the greatest burden of malaria on rural populations. Although increasing urbanization may lead to a reduction in malaria cases, inadequate urban planning can result in disproportionately high disease burdens among underserved urban communities (*138*). Additionally, invasive mosquito species, such as *An. stephensi*, which can thrive in urban settings, may increase malaria risk among urban populations. Changes in local ecology due to climate variability and shifting land-use patterns can further heighten malaria risk. Broad contextual changes, such as conflict and migration, may deepen vulnerability to malaria through increased exposure to the disease and health service disruptions.

This chapter focuses on vulnerability linked to health determinants that increase malaria risk and limit access to preventive, promotive and curative health services. These determinants include, but are not limited to, socioeconomic status, gender, disability, ethnicity (including Indigeneity) and migrant status. Addressing vulnerabilities (as well as strengths and protective factors) linked to these determinants requires data-driven policies and actions that are gender-transformative, equity-oriented and grounded in human rights principles.

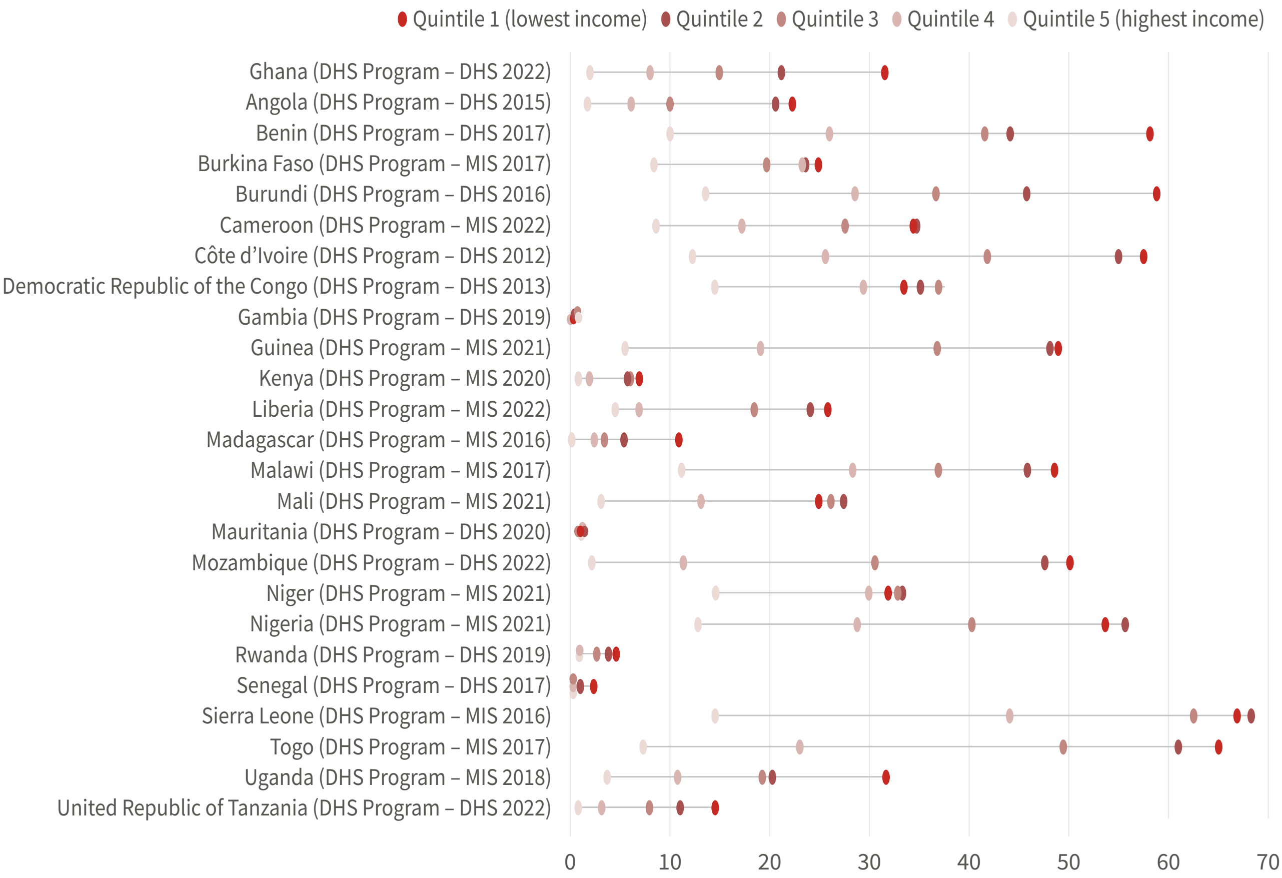
9.2 Economic vulnerability and malaria

In sub-Saharan Africa, data from the WHO Health Inequality Data Repository (HIDR) reveal that malaria prevalence among children aged under 5 years is disproportionately highest among households living in poverty and decreases with rising economic status, highlighting that wealth strongly influences malaria risk (**Fig. 9.1**).

The heightened malaria risk stems from various dimensions of poverty, including poor housing conditions (*139*), limited knowledge of malaria and barriers to accessing preventive measures (*140*). Additionally, poverty intersects with harmful gender norms, racial or ethnic discrimination, irregular or vulnerable migrant situations and other forms of social exclusion, which further reinforce inequalities and increase the risk of malaria.

In impoverished areas, housing is often substandard, with poor ventilation and poor sanitation that can create conditions conducive to mosquito breeding and elevate the risk of malaria transmission (*141*). People in low-income households frequently lack the financial means to implement mosquito-proofing measures, making them more vulnerable to mosquito bites at night. People in poverty and facing gender inequalities and other forms of discrimination are confronted with significant challenges in securing effective coverage of health services due to a

Fig. 9.1. Prevalence of malaria detected by RDT in children aged under 5 years, by economic status, in 25 countries *Source: Health Inequality Data Repository.*



DHS: demographic and health survey; MIS: malaria indicator survey; RDT: rapid diagnostic test; WHO: World Health Organization.

range of barriers affecting the availability, accessibility, acceptability and quality of health services (*142*).

WHO HIDR data also reveal inequities in health care access, where children from wealthier households are more likely to receive timely medical attention for fever, compared with those from low-income households. This implies that higher economic status enables better access to health care services. Children in the lower income quintiles are often underserved, with the lowest income quintile showing notably lower rates of timely care (**Fig. 9.2**).

Care seeking decisions for a sick child are influenced by various factors, including cultural beliefs, perceptions of disease severity and perceived benefits of treatment. Financial concerns, the distance to health care facilities and the quality of available services significantly affect whether caregivers seek or delay care (*141*). These factors also affect the choice of provider, which may range from formal health care services to informal medicine providers or traditional healers.

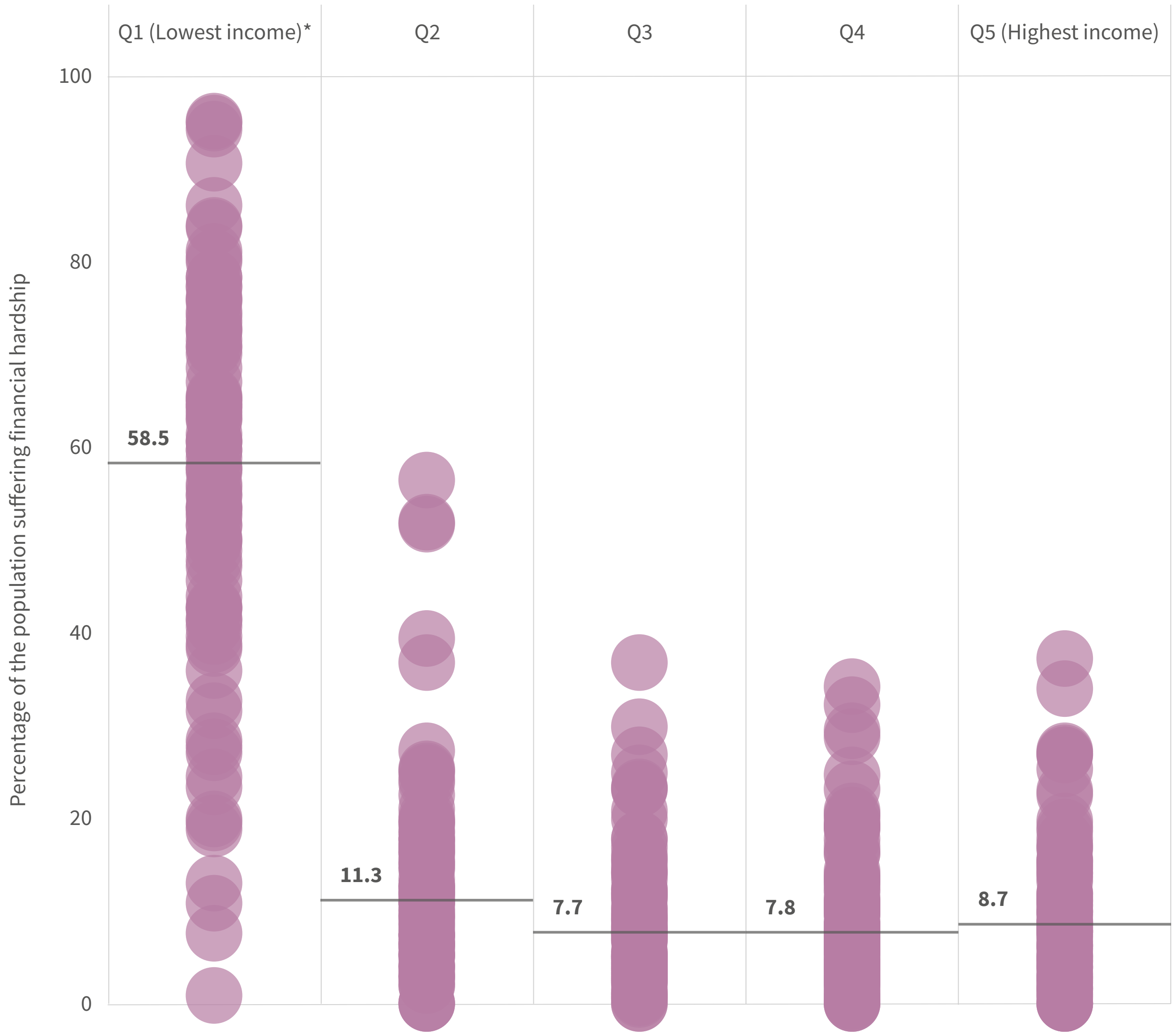
There is a strong association between out-of-pocket expenditure and malaria, as it is a barrier to accessing malaria prevention services and may delay or deter people from seeking malaria treatment and care (*140*). Many households living in poverty struggle to afford transportation, health care expenses at facilities and the cost of malaria treatment (*133*). Financial barriers are particularly pronounced for women from lower socioeconomic groups, who often lack the resources needed for treatment or transportation, especially in rural areas, where access is limited due to long and costly journeys to health care facilities (*143*).

Fig. 9.2. Treatment seeking behaviour in children aged under 5 years with fever who sought advice or treatment on the same or the next day, by economic status, in 34 countries *Source: Health Inequality Data Repository.*

DHS: demographic and health survey; MICS: multiple indicator cluster survey; MIS: malaria indicator survey; UNICEF: United Nations Children's Fund; WHO: World Health Organization.

In 2019, about 1 billion people faced catastrophic health spending, with more than 10% of their household budget going towards out-of-pocket health care expenses. An estimated 1.3 billion people were pushed into relative poverty by out-of-pocket health spending, and about 2 billion faced some form of financial hardship. The likelihood of incurring such financial hardship is substantially higher for populations that are in the lowest wealth quintile and people living in rural areas (*133*) (**Fig. 9.3**), who are also the populations at greater risk of malaria infection.

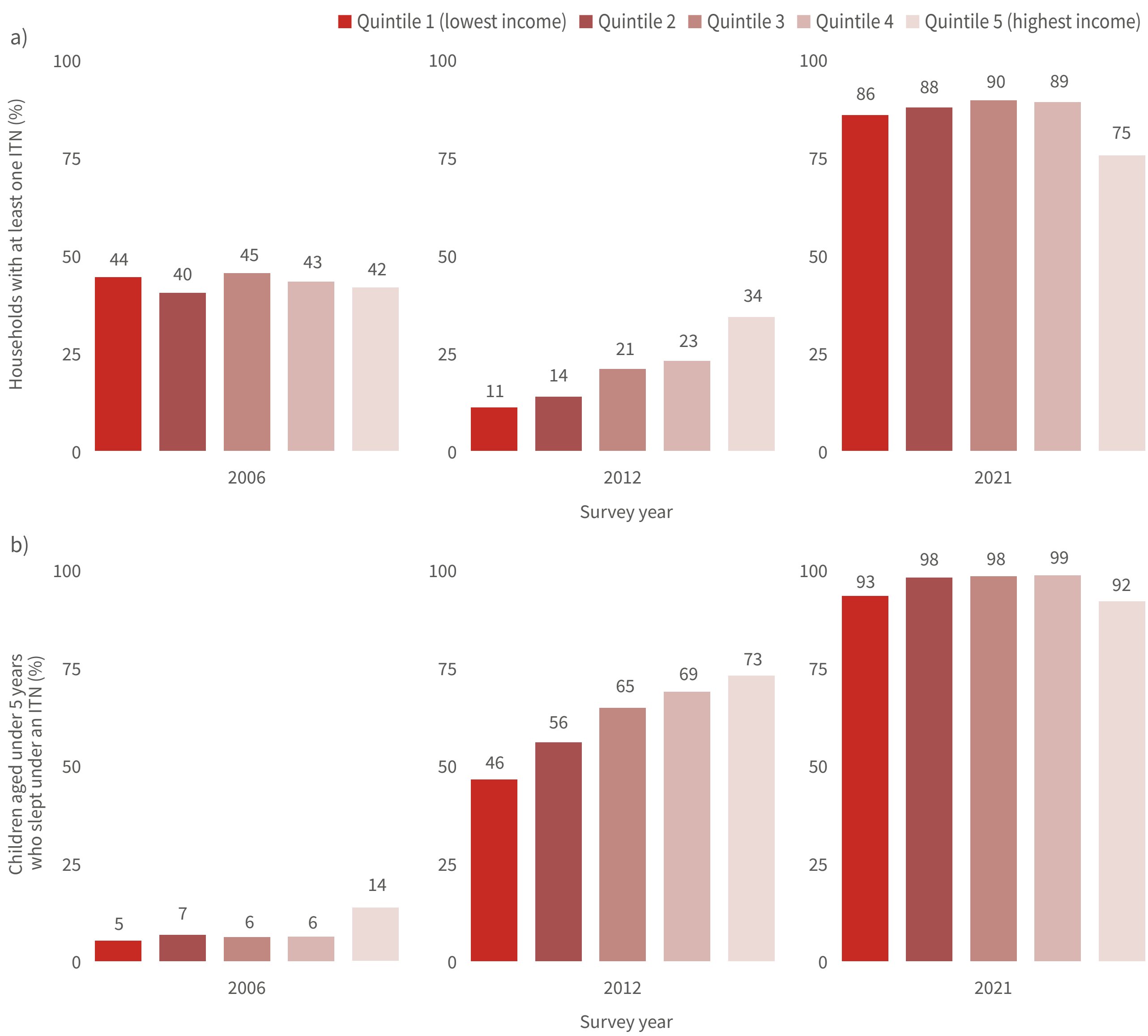
Fig. 9.3. Proportion of the population with out-of-pocket health spending exceeding 10% of household budget, impoverishing health spending at the relative poverty line, or both, by per capita consumption quintile across 92 countries (2015–2019)[a] *Source: WHO and World Bank.*



Q: quintile; WHO: World Health Organization.
* Significantly higher than other quintiles at 95% level.
[a] The horizontal line for each quintile indicates the median of values across countries.

Reducing inequities in ITN access and use is complex and highly context specific, as different countries and regions face unique challenges that require tailored responses to address the needs of each population. The Niger provides a positive example of substantial progress towards equitable ITN ownership and use. Targeted campaigns for free ITN distribution prioritized groups in situations of greatest poverty, children aged under 5 years and women of reproductive age. By focusing on high-risk groups, the Niger has achieved high levels of ITN access and use across all socioeconomic quintiles, including those in the lowest income group (*144*) (**Fig. 9.4**).

Fig. 9.4. ITN a) ownership and b) use, by economic status, the Niger, 2006–2021 *Source: Health Inequality Data Repository.*



ITN: insecticide-treated mosquito net.

9.3 Gender and malaria

Gender refers to the socially and culturally constructed norms, roles and relations assigned to girls, boys, men and women, based on sex (*145*, *146*). These norms, roles and relations can increase or reduce vulnerability to malaria exposure, as well as access to malaria prevention or treatment.

Harmful gender norms and relations often lead to economic, educational and informational inequities, particularly for women. These gaps can limit women's capacity to make informed health decisions for themselves and their children, leading to greater vulnerability to malaria. Harmful gender norms also affect men.

Gender is hierarchical and results in inequities. These hierarchies typically favour men, who are often granted more authority, privilege, status, decision-making power and control over resources. Gender hierarchy intersects with other social, economic and biological factors – such as ethnicity, socioeconomic status, disability, age, geographical location, climate disruption and sexual orientation – to create unique experiences of privilege, discrimination and inequality. This intersectionality makes women, men, boys and girls differentially vulnerable to diseases (*147*).

9.3.1 Women and adolescent girls

Adolescent girls (defined by WHO as those aged between 10 and 19 years), especially those who are pregnant, face compounded biological and social vulnerabilities to malaria. Gender and age-related barriers, along with stigmatization and misconceptions about malaria, limit their access to prevention and treatment services. In 2016, malaria was a major cause of death among adolescent girls aged 10–14 years (*148*). Many of the challenges faced by adolescent girls are also faced by women, contributing to their risk of malaria infection and creating barriers to accessing prevention and treatment.

Gender-based roles – reflected in divisions of labour and social expectations – influence disease exposure risk in malaria endemic regions. For example, domestic work is often normalized to be undertaken by women and girls and is frequently performed outdoors, in the early morning and evening, when mosquitoes are active, contributing to their elevated risk of malaria (*149*).

Gender discrimination also leads to barriers such as low levels of education, restricted financial resources and a lack of influence in household decision-making among women, further impeding their ability to access malaria prevention and treatment (*150-152*). In many malaria endemic countries, married women and adolescent girls require permission to access health services (*143*) due to harmful social and patriarchal norms (*153*, *154*). Data from the HIDR link this requirement for permission with factors such as wealth, education and place of residence, revealing that women from low-income households often experience delays in access to, or denial of, health care services.

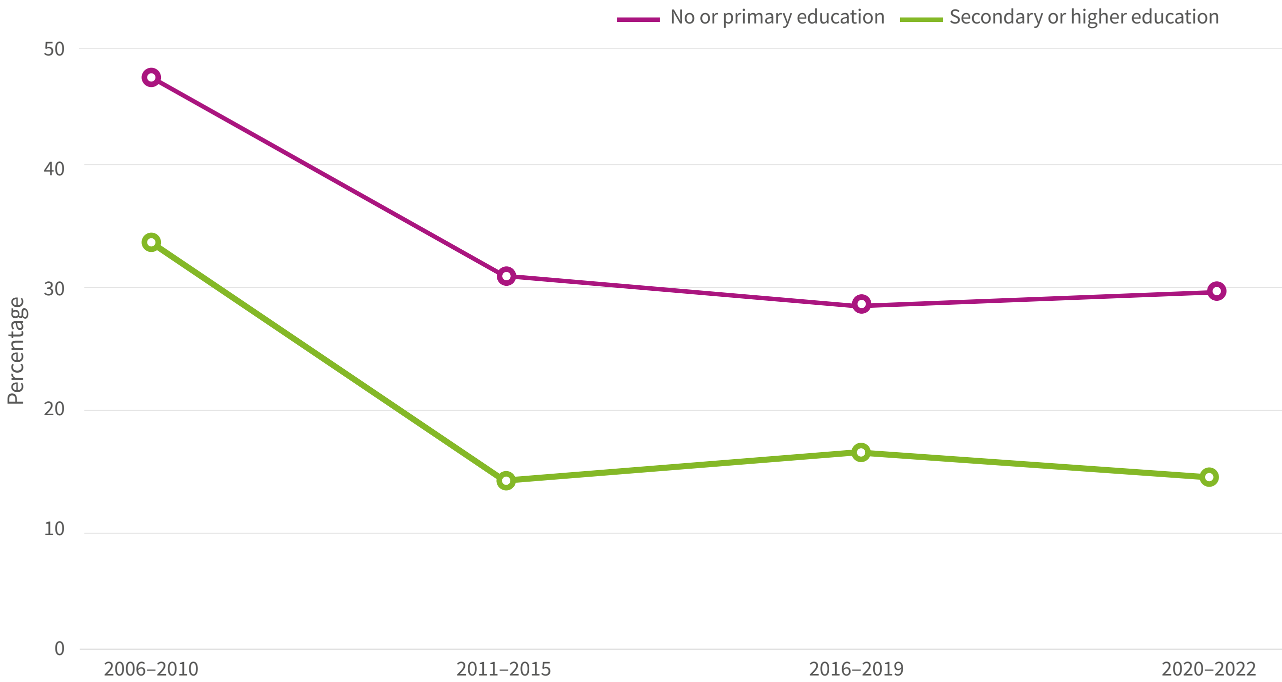
Creating enabling environments for empowerment, such as equitable access to education and health knowledge, enables women and girls to make informed health decisions. Coupled with shifting gender norms to strengthen their decision-making autonomy, these factors increase their likelihood of accessing malaria treatment and, when pregnant, being able to use the appropriate prevention measures. Consistent evidence has shown a connection between individual health knowledge, health behaviours and health outcomes, demonstrating that an understanding of malaria's causes, signs and symptoms, mode of transmission and prevention leads to the improved use of prevention measures and health-seeking behaviours (*155–157*). Pregnant women and adolescent girls who attained higher education are more likely to have completed three or more doses of IPTp-SP and to use an ITN, compared with those who have little formal education (*152*, *154*, *158*, *159*). In the United Republic of Tanzania, women and girls who are pregnant for the first time, particularly adolescents, often delay booking ANC visits due to limited knowledge (*160*).

Malaria vulnerability is also influenced by the sex of the household head, reflecting the broader impact of harmful gender norms on the economic and social empowerment of women and girls (*161*). Households with a female head, especially in rural and low-income areas, tend to have fewer resources, limiting their access to malaria prevention tools like ITNs, adequate housing and health services (*140*). However, evidence on whether households with a female head are more likely to adopt malaria preventive measures is mixed, highlighting the complex interplay of factors relevant for programme design (*162*).

Gender norms that associate domestic and caregiving roles with women and girls disproportionately burden them with personal health challenges, as well as having implications for the care they provide for their families (*145*). Limited educational attainment, a lack of control over resources and restricted participation in household decision-making can hinder the ability of a woman to protect both herself and her child from infection and prevent her from accessing prompt diagnosis and treatment.

Data illustrate how a mother's education level affects not only her own malaria risk, but also that of her child (**Fig. 9.5**). Analysis of the current MIS data for 19 sub-Saharan African countries shows that children aged under 5 years whose mothers have no education or only primary education consistently face a higher malaria prevalence, compared with those whose mothers have secondary or higher education. Despite an overall decline in malaria prevalence from 2006 to 2022, inequities associated with maternal education level endure (**Fig 9.5**).

Fig. 9.5. Malaria prevalence in children aged under 5 years, by maternal education, in 19 sub-Saharan countries *Source: Malaria indicator survey.*



9.3.2 Men and boys

Men and boys are also in situations of vulnerability to malaria due to harmful gender norms, roles and relations. Studies and articles from Cambodia, Ethiopia, Guyana, Brazil, Colombia and the Bolivarian Republic of Venezuela reveal that traditionally masculine occupations, such as farming, forestry, military service and mining, expose men to higher malaria risks due to the environments in which their tasks are performed. Men and boys in farming communities may sleep in the fields during planting and harvesting periods, often without adequate protection from mosquitoes (*163–169*).

Men and boys in the Pan American Health Organization (PAHO) region are at higher risk of malaria than women and girls, particularly in the mining sector. Between 2018 and 2023, men and boys consistently accounted for more malaria cases and deaths (**Fig. 9.6**), with men aged 50 years and above comprising the majority of recent fatalities.

Greater risk-taking behaviours by men and boys may contribute to lower use of ITNs and delays in seeking treatment and care, further influencing malaria outcomes. Gender norms affect uptake of preventive behaviours and access to health services, underscoring the need for targeted interventions (*170–173*) (**Box 9.1**).

Fig. 9.6. Total reported malaria a) cases and b) deaths, by sex, in the PAHO region, 2018–2023 *Source: NMP country-reported data.*

NMP: national malaria programme; PAHO: Pan American Health Organization.

Box 9.1. Voices on the ground

The following quotes, collected through informant interviews during the Malaria Matchbox sessions, capture the experiences and perspectives of men. Because of prevalent gender roles and inequalities, men are often perceived to be the decision-makers in households and influential figures within communities, so men play a pivotal role in the acceptance and implementation of health interventions. These insights reveal the challenges men face in accessing health care, the misconceptions they may hold regarding intervention use and their care seeking behavior.

"The priority of families and households might be to look for food for the day, getting back tired and at times sleeping hungry; hanging up the net, or listening to malaria prevention messages, who would think about the net?"
Male respondent, Malawi

"We very rarely see the health staff on our site, and we only go to them if we're very ill."
Trucker, Senegal

"If I have to spend all my savings at the health centre, when I can treat myself and my family more cheaply with plants or with a healer to whom I can even pay in kind and in instalments, why go to the nurse? Sometimes you go and they don't receive you properly, or they leave you all day when you've got your field to tend to. The other problem often observed is that you go and there's no medicine."
Male focus group respondent, aged 20–34, Benin

"We're aware that malaria is a dangerous disease, but we often have trouble finding the time to go for treatment. We only go to the health facilities when we're really unable to work. What's more, we buy our own mosquito nets because we have a lot of mosquitoes at the different stations, but these nets deteriorate very quickly because of our frequent travels."
Trucker, Senegal

"Girls are being favoured most times if they both go to hospital."
Male respondent, Malawi

"Sleeping under a mosquito net is like being in a coffin and suffocating."
Male respondent, Benin

"Overnight, when we have been locked up and if one of us is sick, we have to shout that there is a patient and sometimes the warden can't hear us."
Male prisoner, Malawi

9.4 Persons with disabilities and malaria

As defined by the UN Convention on the Rights of Persons with Disabilities, persons with disabilities include those "who have long-term physical, mental, intellectual, or sensory impairments which, in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others" (*128*). Globally, an estimated 1.3 billion people live with disabilities, with nearly 80% residing in LMIC (*174*). Many of them face challenges in accessing health services, experience poorer disease-specific outcomes and have a shortened life expectancy.

Persons with disabilities are more likely to experience certain social determinants and biological risk factors associated with poorer malaria outcomes, such as poverty, substandard living conditions, lower maternal education levels and limited health care access (*175*). They often face discrimination in many aspects of their lives, which is intricately linked to poorer health and limited participation in society (*174*). In Malawi, the Malaria Matchbox, an equity assessment tool, revealed that persons with disabilities experience discrimination and stigma in health care settings, often deterring them from seeking necessary care, and that providers often lack the necessary understanding of issues related to disability, resulting in substandard care.

Although there has been high-level recognition that persons with disabilities are disproportionately left behind, several challenges persist within health systems and need to be addressed. Children with disabilities are at greater risk, as they often lack access to prevention measures (*176*). For example, children with disabilities are less likely to be vaccinated compared with their peers without disabilities (*176*). This will be an important consideration during the rollout of malaria vaccines in Africa. Financial hardship and limited access to distribution points can also prevent persons with disabilities from receiving an ITN.

A global scoping review found that persons with disabilities frequently encounter multiple obstacles in accessing health care facilities. Key issues include inaccessible physical infrastructure, such as consultation rooms, toilets, ramps, routes and parking areas. These physical barriers are compounded by sensory distractions in busy clinical environments that pose significant challenges for those with communication and psychosocial difficulties. Procedural hurdles, such as inflexible appointment schedules, long waits for appointments and rushed consultations, further limit their ability to obtain necessary medical care. Inadequate information about health services and inaccessible communication methods may exacerbate these barriers (*177*). An integrative review found that health care providers frequently lacked both awareness and specific skills to effectively care for and communicate with persons with disabilities (*178*).

9.5 Indigenous Peoples and malaria

Indigenous Peoples comprise more than 6% of the global population, with about 477 million individuals living in about 90 countries. A majority of the world's Indigenous Peoples live in the Asia and Pacific region (70.5%), followed by Africa (16.3%), Latin America and the Caribbean (11.5%), North America (1.6%) and Europe and Central Asia (0.1%) (*179*).

Indigenous Peoples often embrace a holistic view of health and are custodians of traditional knowledge (*180*). Despite this holistic view, they tend to experience higher rates of illness and disability, greater difficulty in accessing health services and considerably shorter life expectancies compared with other citizens in their countries.

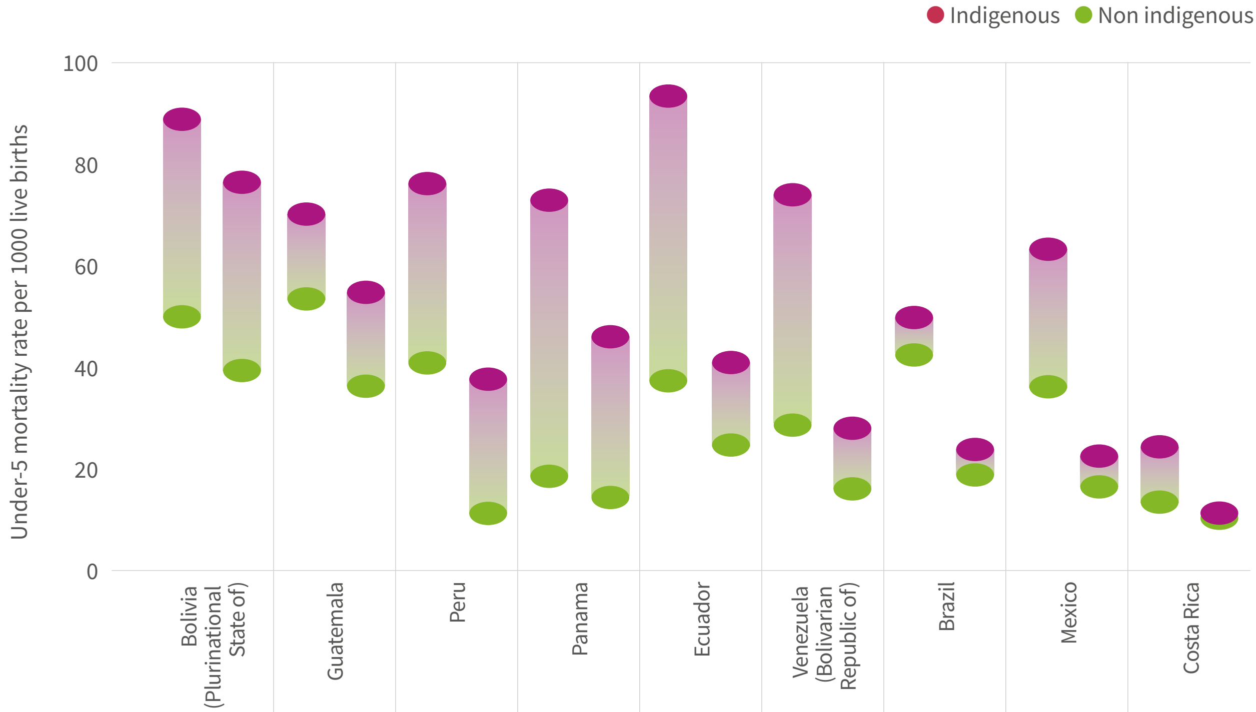
Health inequities among Indigenous Peoples are starkly apparent across the globe. Data from nine countries in the PAHO region show that, in 2010, the under-5 mortality rate was between 31% and 220% higher among Indigenous children compared with their non-Indigenous counterparts (**Fig. 9.7**) (*181*).

This wider context of situations of vulnerability and health inequity places Indigenous Peoples at greater risk of malaria. In 2023, Indigenous Peoples accounted for 31% of all malaria cases and 41% of all malaria-related deaths in the PAHO region (**Fig. 9.8**). Similarly, in the Philippines, Indigenous Peoples face an elevated risk of malaria due to limited health care access, geographical isolation and socioeconomic barriers (*182*).

Poverty and external pressures, such as mining and border conflicts, further compound the exposure of Indigenous Peoples to malaria (*183*). For example, illegal gold mining in northern Brazil has degraded the environment and facilitated the spread of malaria through infected miners, posing a severe health threat to the Yanomami children (*184–186*).

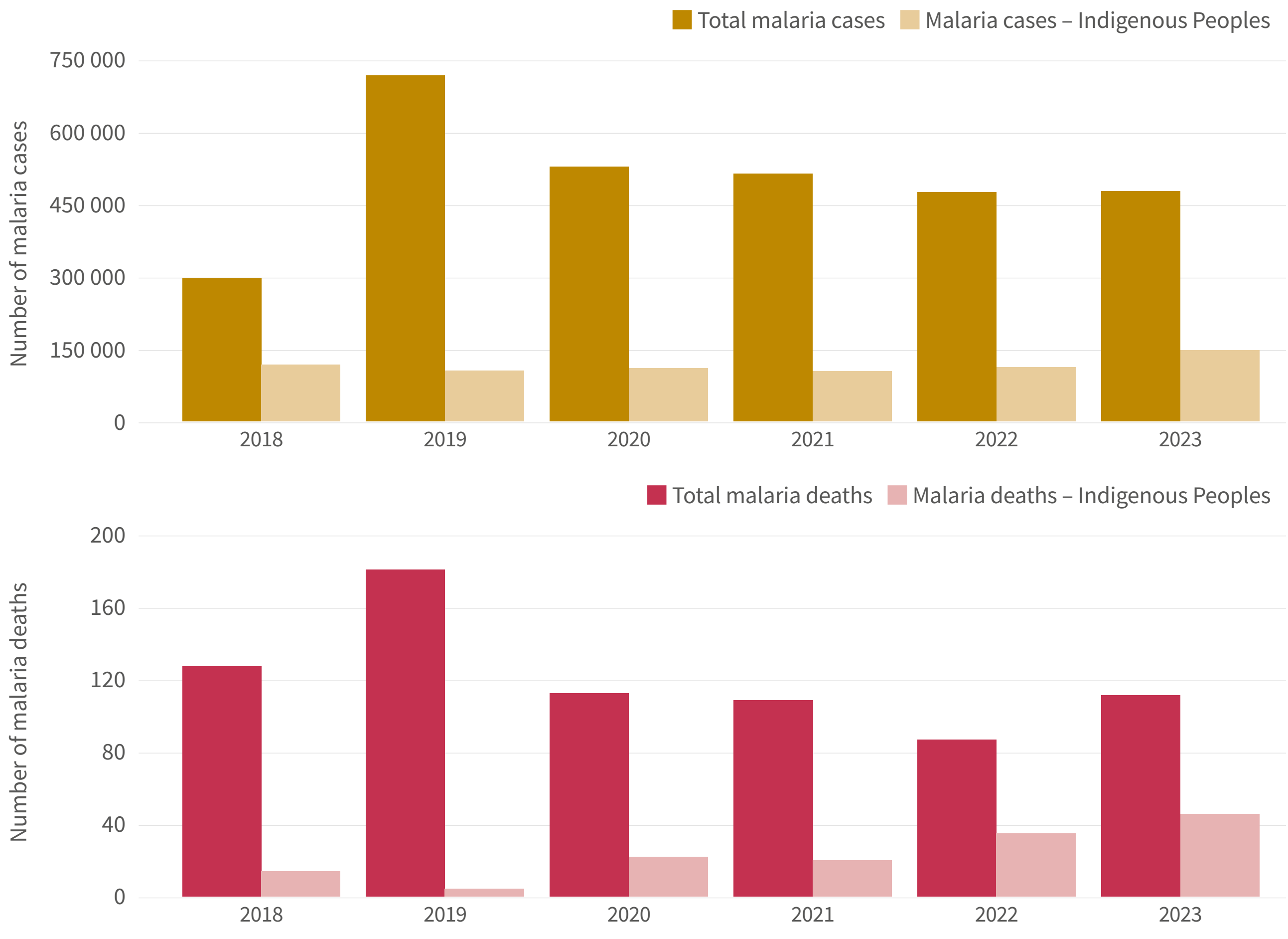
Studies from Kenya reveal that the Indigenous Endorois and Turkana communities face significant obstacles in accessing quality health care and education, often needing to travel long distances – an even greater challenge during the rainy season (*187*). This affects both their risk of disease and their access to care. Literature scoping highlights similar challenges across continents. In the Americas, particularly in Brazil, the Bolivarian Republic of Venezuela, Colombia and Peru (*188–190*), Indigenous Peoples frequently reside in remote, forested areas where malaria transmission is high. Limited access to health care facilities, compounded by

Fig. 9.7. Under-5 mortality rate in Indigenous and non-Indigenous communities of the PAHO region, 2000 and 2010 *Source: Strategy and plan of action on ethnicity and health 2019–2025.*



PAHO: Pan American Health Organization.

Fig. 9.8. Total reported malaria a) cases and b) deaths among Indigenous Peoples in the PAHO region, 2018–2023 *Source: NMP Country-reported data.*



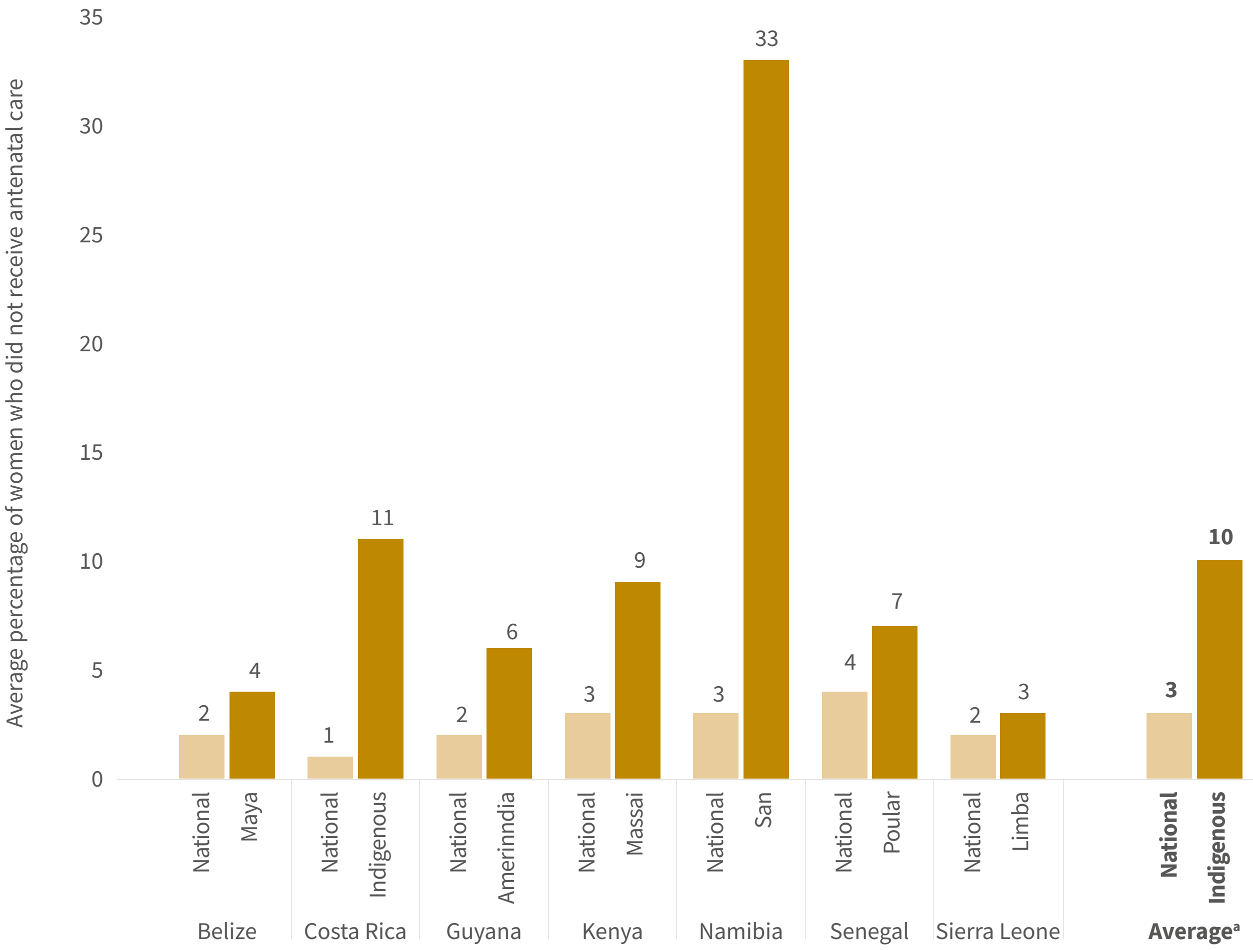
NMP: national malaria programme; PAHO: Pan American Health Organization.

logistical issues such as distance from health centres, lack of transportation and language barriers, can severely delay timely malaria diagnosis and treatment.

Additionally, an institutional lack of appreciation and understanding of the health beliefs and practices of Indigenous Peoples can lead to discrimination and stigmatization by non-Indigenous populations, even within health systems (*191*). Differences between traditional health practices and national malaria control strategies further reduce Indigenous Peoples' engagement in malaria prevention efforts, exacerbating their health challenges.

Globally, Indigenous women and adolescent girls experience challenges accessing heath care, including ANC (**Fig. 9.9**) (*192*). Indigenous women often miss out on malaria preventive treatments, further jeopardizing their own health and that of their children. Additionally, harmful gender norms and intrahousehold interactions have been identified as obstacles to the use of prenatal and childbirth services in rural Guyana, particularly for married Indigenous women who are excluded from decision-making inside the home (*192*).

Fig. 9.9. Inequities in antenatal care visits among Indigenous women compared with the general population
Source: UNICEF factsheet.



[a] Average across all 16 countries with data combined.

9.6 Migrant populations and malaria

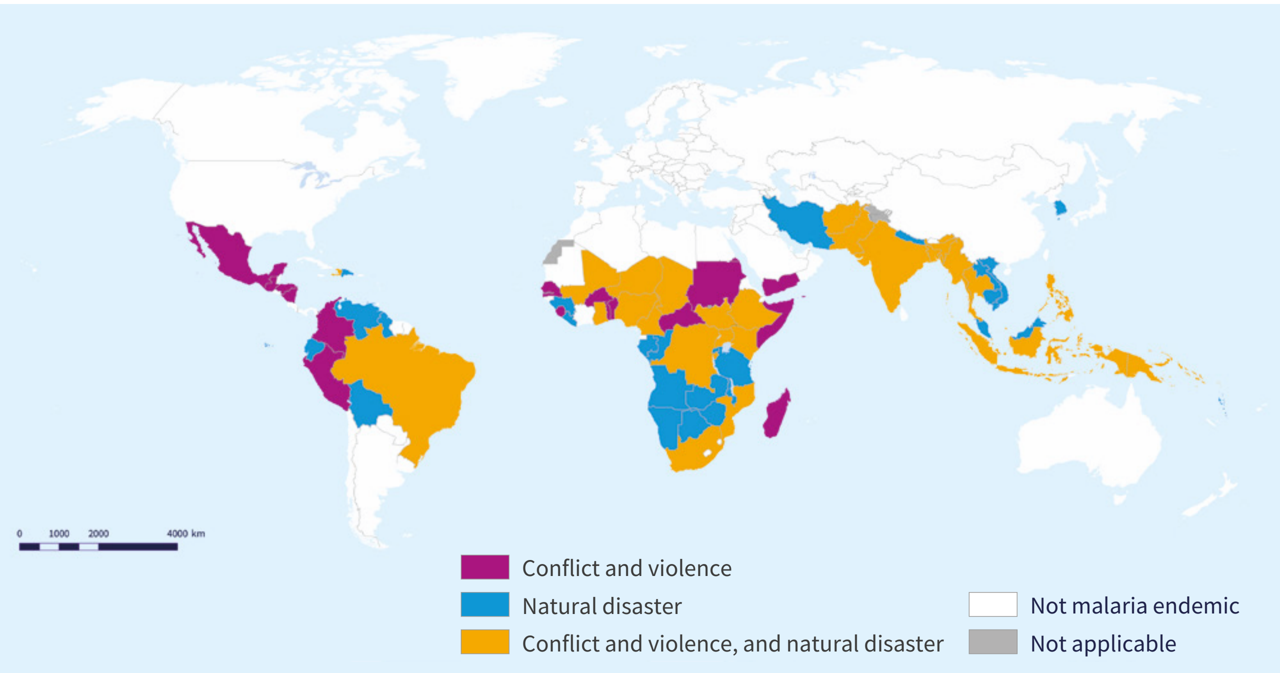
People may choose to migrate for various reasons, including economic opportunities, educational advancement or an improved standard of living. Others may be forced to leave their homes or places of residence due to persecution, natural disasters, conflict, violence or climate change.

Currently, about one in eight people worldwide is a refugee or migrant (*193*). The number of international migrants has grown significantly, reaching an estimated 281 million in 2020 (*194*). About 123 million people have been forcibly displaced, either within their own country or to another country (*195*).

For various structural reasons, people on the move have unique health and health care needs that, when unmet, can have serious consequences for both them and society as a whole. Without consideration of the billion refugees and migrants worldwide, health and well-being for all cannot be achieved by 2030.

Humanitarian crises often occur in settings where there is malaria transmission (**Fig. 9.10**). The circumstances under which refugees and migrants leave their place of origin can increase their vulnerability to malaria, as they may face poor living conditions, restricted health care access, environmental exposure and economic instability. For example, in Khartoum and the Darfur region of the Sudan, as of February 2024, about 65% of the population lacked access to health care, and 70–80% of health facilities were non-functional because of the conflict (*196*).

Fig. 9.10. Countries that experienced humanitarian crisis in 2023 *Source: Internal Displacement Monitoring Centre.*



Although many countries hosting refugees have policies allowing access to health and social protection services, this access may be limited, entail prohibitive out-of-pocket expenditure or involve additional barriers, such as distance to facilities and discrimination by providers (*197*). Refugees also face challenges of uncertain legal status, discrimination, cultural and linguistic barriers, administrative and financial obstacles, limited knowledge of health entitlements and low health literacy. Further, the complexity and duration of the asylum process, along with practices of detention and dispersal, can significantly affect health outcomes for refugees (*198*). In some contexts, IDPs may be worse off than refugees because they lack the formal legal protections afforded to refugees.

Displacement and migration are critical when considering the control of malaria. There are a range of scenarios, based on the movement of people across different transmission settings, that need to be considered. Displacement and migration from high to low transmission or non-endemic areas might pose a risk of onward transmission in some receptive settings and present challenges for diagnosis and treatment, particularly in refugee transit and reception centres or in labour migration contexts. Conversely, refugees and migrants moving from non-endemic areas to regions with high malaria transmission face an elevated risk of developing severe forms of malaria, particularly if their destination is poorly equipped to manage the disease. Government policies may not always recognize malaria as an occupational health concern, potentially excluding migrant workers from malaria prevention and treatment services provided under host country labour laws (*197*).

9.7 High-level response to malaria

9.7.1 Primary health care as an equitable response to malaria

Achieving the global malaria targets will require solutions to overcome the vulnerabilities and barriers that prevent specific groups of people from living free of malaria and ensure that quality health services and malaria interventions are available, accessible and acceptable for all.

By adopting human rights based and gender responsive approaches, countries commit to building accountable health systems oriented to PHC and to addressing underlying determinants of health for all. This approach will result in better policies and programmes, leading to fairer and more inclusive services that are designed around people's needs, including those left behind.

The Astana Declaration (*199*) reaffirms the commitment to the right to health and recognizes PHC as the most inclusive, effective and efficient approach to improving physical and mental health, as well as social well-being. Incorporating the right to health into legal frameworks and adopting a PHC approach in the WHO Region of the Americas contributed to reductions in malaria incidence and other communicable and noncommunicable diseases (*200*).

In March 2024, ministers of health of the HBHI countries in Africa committed to integrating malaria services into PHC, as part of a concerted action to end malaria deaths. In signing the Yaoundé Declaration (*201*), they vowed to address the root causes of malaria, recognizing the gender-related and financial barriers people face in accessing quality health services, as well as the challenges of inadequate domestic funding and humanitarian crises, including conflicts, natural disasters, migration and climate change. Ministers also committed to bolstering domestic resources for the malaria response and bridging financial gaps to ensure adequate coverage of malaria interventions. They appealed to international partners to scale up and provide predictable financial assistance that is aligned with national malaria goals – a central tenet of the Lusaka Agenda, which calls for efficient, complementary and sustainable funding in support of impactful, country-level priorities (*202*).

The malaria response stands to benefit from PHC as a whole-of-society approach to health that will:

- meet people's health needs through comprehensive and integrated health services with an emphasis on primary care and essential public health functions;
- systematically address the broader determinants of health; and
- empower individuals, families and communities.

9.7.2 Meeting people's health needs through comprehensive and integrated health services

Health facilities, goods, information and services must be available, accessible, acceptable and of good quality for everyone. This will require addressing discrimination, gender inequalities and barriers to effective coverage.

PHC offers affordable, good-quality, gender responsive and culturally appropriate health care and financial protection to all, including at-risk populations and those living in remote areas and humanitarian settings (*203*). It improves equity and access, health care performance, accountability and health outcomes (*204*).

PHC can reduce malaria morbidity and mortality by expanding geographical access through outreach services, establishing health centres close to communities and increasing the number of community health workers (*205*). Community health workers can play a vital role in reaching populations that are underserved, that face discrimination or exclusion or are in situations of vulnerability. For example, where inequities in ANC services and reach exist, community delivery of IPTp can complement existing deployment in ANC clinics (*6*).

Involving community health workers is a key feature of effective PHC-oriented service delivery, as it improves acceptance of health services (*206*). As a trusted bridge between the health system and communities, community health workers bring valuable insights of the community, helping to identify underserved populations, the barriers they face and the programme improvements needed to overcome these challenges. The role of community health workers can be especially impactful when they are part of a community and sensitive to local beliefs and cultural values. Community health workers in India, comprising mainly women, are reaching remote populations and significantly driving down malaria cases and deaths (*207*). They provide a supportive environment for female patients who may face social and cultural barriers to accessing services from male providers (*205*).

9.7.3 Systematically addressing the broader determinants of health

The Yaoundé Declaration calls for multisectoral action in the fight against malaria, with the aim of ensuring that all at-risk populations, including populations living in hard-to-reach areas and humanitarian settings, consistently receive the appropriate tools (*201*). By addressing the root causes of disease, PHC can better serve the needs of populations in situations of vulnerability, with poverty reduction at the heart of this approach.

Many sectors have a role to play – contributing, for example, to advancing knowledge and decision-making, empowering women through education and improving housing. A whole-of-society, whole-of-government response is needed to address social determinants and health inequities by identifying and promoting intersectoral action as an integral and vital component of the national health planning process (*208*). The COVID-19 response provides a good example of a broad response to a disease that had far-reaching social and economic consequences.

Addressing the underlying determinants of disease, including for malaria, also contributes to cost savings by preventing illness and promoting well-being, thereby reducing the need for individual care, lowering the cost of managing severe disease and easing the burden on health systems (*209*).

A crucial next step in malaria programming is the adoption of gender-transformative strategies. Effectively tackling the root causes of malaria will involve challenging harmful gender norms, power imbalances, stereotypes, and discriminatory laws, policies and practices that increase vulnerability. Educational attainment, increased knowledge about malaria, income generation and control over household resources are proven levers in reducing vulnerability to malaria and increasing access to treatment for women and children (*210*). Enabling women's decision-making power and leadership not only supports malaria prevention but also reinforces broader health and well-being outcomes. Achieving gender equality is an essential goal in its own right, but its role in realizing the GTS targets is an indispensable factor for malaria programming initiatives.

Gender-transformative approaches provide a "double dividend" (*211*), improving malaria outcomes while addressing gender inequalities that are perpetuated by the impact of the disease. This calls for sustained investment in education, leadership opportunities and economic empowerment for women and girls (*212*), along with the meaningful engagement of men to shift harmful gender norms (including in the health sector) and to build resilience against malaria and foster more equitable societies.

9.7.4 Empowering individuals, families and communities in the malaria response

Participation is a cross-cutting human rights principle that affects the quality and effectiveness of health policies and programmes and is vital for addressing many of the structural barriers to equitable access to health and its determinants (*213*). The right to health encompasses the active, informed participation of individuals and communities in the decisions that affect their health. As actors and agents of change, participation of individuals and communities strengthens ownership and helps ensure that policies and programmes are responsive to everyone's needs. This principle applies to all stages of malaria programme design, implementation and monitoring and aligns closely with broader efforts focused on the engagement and empowerment of communities to improve health outcomes.

PHC places great emphasis on social participation as a means of achieving outcomes through inclusive, transparent and responsive decision-making. A special focus on reaching those populations in situations of vulnerability and marginalization is needed. This requires creating a variety of safe spaces where power imbalances are addressed, enabling meaningful contributions from all individuals, including men, women, girls and boys, in all their diversity.

People with lived experience are a valuable asset in the malaria response, bringing experiential knowledge that can guide policy and programme implementation. When well informed, they can help increase the uptake and effective use of interventions. Local communities can share their insights on community needs, provide local data and information, mobilize the community and ensure accountability. The National Union of Disabled Women in Côte d'Ivoire is one example of an association that has been committed for many years to the inclusion of women with disabilities in preventive health care services, including for malaria. With the support and backing of religious and community leaders, as well as health authorities in the region, the association conducts field visits to rural areas to raise awareness of the specific health care needs of this population group.

Accountability mechanisms can help countries advance towards the GTS goals and identify challenges when progress falters. They are necessary to assess compliance with human rights standards and gender responsiveness in policy design, implementation, monitoring and review (*214*). Engaging diverse actors, collecting and using disaggregated data, and employing new accountability tools can support malaria control efforts. National accountability mechanisms include courts, human rights institutions, parliamentary oversight and administrative tools, such as policy reviews and impact assessments, alongside community-based models, such as citizen assemblies.

Community-led monitoring (CLM) is an independent programme run by service users to assess the availability and quality of services and identify underserved populations. The data feed into broader monitoring systems and can be shared with decision-makers, such as the providers of care and, where relevant, malaria programmes (*215–217*). CLM has made an impact in Nigeria, where it led to facility renovations, health worker deployments, improved supply of malaria products and reduced gender biases in health service provision. In Thailand, CLM is used to expand access to testing and treatment for target populations at the community level and to enhance active case detection in border areas, increasing service coverage and accessibility for those living in remote areas and at migrant shelters or sites (*215*).

Parliamentarians have an important role in representing communities and their causes, building trust, ensuring government transparency and accountability for responsive and equitable health systems, and implementing global commitments. In March 2024, African parliamentarians from high-burden countries formed the Coalition of Parliamentarians for Ending Malaria in Africa (COPEMA) to follow up on the commitments made in the Yaoundé Declaration. The platform will promote legislation, policies and reforms to combat malaria at country level and mobilize national resources and actions for malaria (*218*).

9.7.5 Equitable malaria benefits from science, innovation and technology

Investments in R&D in recent years have led to a portfolio of interventions that prevent and treat malaria. Advances in science and technology have helped to respond to biological threats, such as drug and insecticide resistance, while partnerships continue to ensure a healthy pipeline of products for the future (*219–221*). For example, success in developing the RTS,S malaria vaccine paved the way for other vaccines and innovative prevention strategies.

Research into the development of medicines, diagnostics and prevention technologies should be guided by a thorough understanding of the social, economic, cultural, political and policy factors that determine equitable access and appropriate use of the products within target communities. Research, including clinical trials, should consider sex and gender (*222*).

Equity should be a guiding principle of innovation and product discovery. End users of the products – including women, the underserved and marginalized – should be engaged in the design of new tools, the assessment of technologies and R&D investments (*223*). Alongside a commitment to include voices of women in all their diversity, marginalized communities and individuals, and frontline workers, strong partnerships with the research community in malaria endemic countries are essential for effective implementation. The co-creation of new medicines and other interventions with different end users, frontline workers, scientists in endemic countries and local leaders (including women) will help ensure the benefits are realized and shared.

9.7.6 Improved use of data in efficient and equitable malaria programming

Data are essential to improve access to high-quality services, address inequalities and inequities, and improve health outcomes. Data are also used to set priorities according to the needs of diverse groups in different contexts, select the most appropriate package of services, identify optimal delivery approaches and monitor closing of equity gaps (including those that are driven by gender inequalities). This process will benefit from the inclusion of a gender lens and of populations who are marginalized or discriminated against, whose needs should be equitably considered in interventions and who may require specific services. As countries work to reorient their health systems around PHC principles, new mechanisms for monitoring PHC performance, including with respect to accountability for equity and gender equality, can accelerate progress towards universal health coverage (*224*), with important implications for malaria programming.

Local data and contextual information are being used to determine the appropriate mixes of malaria interventions and strategies for optimum impact on transmission and burden of disease for a given area. The process needs to extend beyond the "what" and "where" to also consider the "who" and "how", to assess wider impacts on broader goals related to gender equality and human rights.

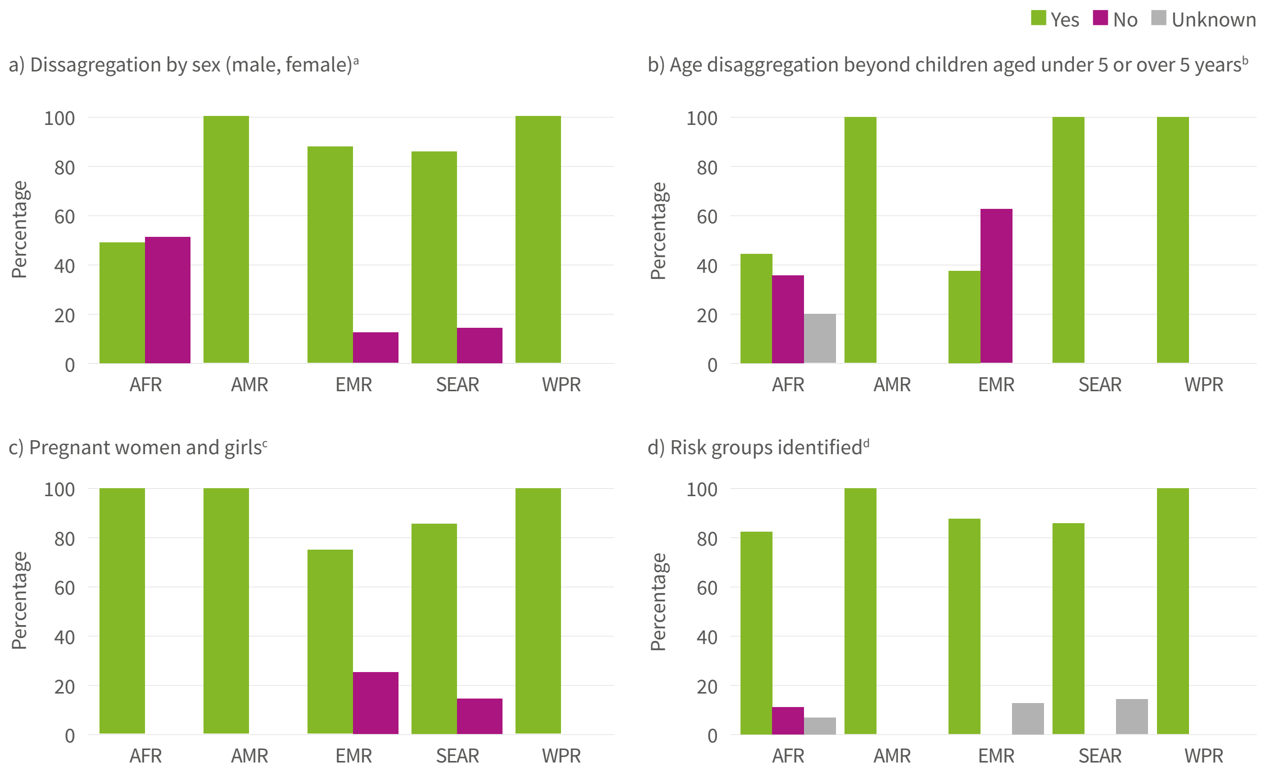
9.7.7 Data disaggregation

The 2030 Agenda for Sustainable Development emphasizes the principle of "leave no one behind", with Target 17.18 specifically calling for the disaggregation of data (*225*). This global commitment reflects the need for standardized approaches to data disaggregation to enhance the analysis, interpretation and comparison of health data across different indicators. The granularity of data collection is crucial for understanding and addressing health inequities. Disaggregated data – data broken down by age and sex, as well as other social stratifiers, such as economic status, ethnicity and geographical location – can reveal inequalities that may be hidden within aggregated data (*222*).

There is growing recognition of the need for disaggregated health data to identify, monitor and address inequities across diseases. Numerous research publications and studies have highlighted this deficit, particularly in tracking health inequities among populations in situations of vulnerability and at-risk populations. Despite advances in understanding the risk of malaria and its impacts, a significant gap persists in the availability of comprehensive disaggregated data. Although malaria data are collected widely, they are often aggregated in ways that obscure specific insights related to sex and gender, and high-risk groups, including migrant communities, marginalized ethnic groups and persons with disabilities.

A scoping exercise conducted through the world malaria report process assessed the availability of disaggregated malaria data at the country level, beyond the conventional breakdown of children aged under 5 years, children aged 5 years and over, and pregnant women and girls. Findings to date indicate that currently available disaggregated data lack the detail needed to adequately understand the demographics of malaria burden. However, countries moving towards elimination, and particularly the entire PAHO region, have shown progress in collecting granular disaggregated data. There is an urgent need to strengthen health systems to enhance disaggregated data collection and analysis; this will help ensure that health inequities and gender inequalities are fully addressed, and interventions are differentiated according to need and targeted effectively, reaching those most left behind. **Fig. 9.11** illustrates the level at which data can be disaggregated.

Fig. 9.11. Level of data disaggregation by a) sex, b) age, c) pregnancy and d) risk groups, by WHO region, 2023
Source: Country-reported data.



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.

[a] The Democratic People's Republic of Korea and Somalia indicated that data could not be disaggregated by sex.

[b] The following countries were categorized as "unknown", as no information was provided; however, data from these countries are still available with a breakdown of children aged under or over 5 years: Central African Republic, Equatorial Guinea, Ethiopia, Guinea, Guinea-Bissau, Liberia, Madagascar, Nigeria and South Sudan (AFR).

[c] The following countries did not indicate if data can be disaggregated for pregnant women and girls and were categorized as "unknown": Afghanistan and the Sudan (EMR), and the Democratic People's Republic of Korea (SEAR).

[d] The following countries and areas did not indicate if they have malaria risk groups identified and were categorized as "unknown": the Comoros, Côte d'Ivoire, Guinea, Mayotte, Nigeria and Sao Tome and Principe (AFR), and Pakistan (EMR).

This chapter has highlighted how malaria disproportionately affects certain groups, with wider societal inequalities and other social and environmental factors further compounding the burden. For example, marginalized communities, such as Indigenous Peoples, migrants and people living in hard-to-reach areas, often face significant barriers to accessing health services, including for malaria. Without disaggregated data, their specific needs go unaddressed. Similarly, sex and age data disaggregation can reveal different vulnerabilities related to both biological and gender inequalities, such as the heightened risks for pregnant women and girls or young adults who are exposed to malaria in occupational settings. Persons with disabilities are often invisible in the data that are collected, with no available information on malaria incidence or health outcomes for this group. Without disaggregated data, policies and interventions will continue to tailor programmes without adequate consideration of groups that disproportionately face certain risks, vulnerability or discrimination.

In addition to disaggregated data, more research and analysis are needed to identify and address health inequities and barriers to access, such as:

- Who is being missed? How are they being missed? Why are they being missed?
- What principles and approaches can be employed to leave no one behind?
- How can affected communities and individuals be engaged as protagonists in this process?
- How should efforts to leave no one behind be monitored and evaluated?

Assessment tools, such as the Malaria Matchbox, the Innov8 approach and the Health Equity Assessment Toolkit (HEAT) (*226–228*), can be used to identify target populations, pinpoint barriers and guide the actions needed to overcome these barriers. The Malaria Matchbox, for example, has identified populations most at risk and those missing out on malaria interventions, facilitating the integration of human rights and gender considerations into national strategies, policies and programme implementation.

A gender analysis includes a situational assessment of systemic barriers and the way in which gender inequalities and other factors, such as biological factors related to sex characteristics, place of residence, race, ethnicity, occupation, religion, level of education and socioeconomic status (*229*), affect risks and access to services. A gender-focused barrier assessment in Cameroon and Kenya, for example, revealed key obstacles to accessing and adhering to malaria prevention services among pregnant women and girls, emanating from the existence of harmful gender norms within service provision (*230, 231*). It was found that many women who were able to access care felt their concerns were not taken seriously by health providers, affecting their experience and trust in the services. There is also a handbook for conducting an adolescent health services barriers assessment, with a focus on identifying barriers faced by disadvantaged adolescents (*229*).

Barrier assessments should be complemented by implementation research to understand the contextual factors driving inequities and to identify how programmes can respond effectively. For example, while global data on displacement and access to health are scarce, displacement is clearly a key determinant of health and well-being (*198*). Strengthening evidence to inform policy and practice in this area is an urgent global public health priority (*232*).

Efforts like these underscore that achieving GTS targets will require not only knowing where malaria is but also who it affects and the barriers they face. Currently, there are insufficient data disaggregated by age, gender and other factors related to risk and vulnerability to malaria. While disaggregated data are essential for identifying inequities and targeting interventions effectively, incorporating qualitative data provides critical context, capturing social determinants and cultural dynamics that quantitative data alone cannot reveal, thereby ensuring inclusive health programs. Strengthening data systems and capacity is essential for monitoring inequalities in malaria. Improved data disaggregation and gathering of qualitative data will empower countries to better identify and address inequities, enabling targeted interventions that reduce malaria's impact on those most vulnerable to the disease and its consequences.

10 Conclusion

This year's world malaria report presents the latest updates on the progress against malaria, globally and regionally, covering the period 2000–2023 for most indicators. This chapter summarizes key findings and messages that have emerged from this report.

10.1 Trends in malaria burden

Globally, in 2023, the **number of malaria cases was estimated at 263 million**, with an incidence of 60.4 cases per 1000 population at risk, and the **number of deaths was estimated at 597 000**, with a mortality rate of 13.7 per 100 000. The WHO African Region continues to carry the heaviest burden of the disease, accounting for 94% and 95% of estimated malaria cases and deaths worldwide, respectively, in 2023. This was followed by the WHO Eastern Mediterranean Region, accounting for 4% and 3% of estimated malaria cases and deaths, respectively. The top five countries carrying the heaviest estimated burden of malaria cases were Nigeria (26%), the Democratic Republic of the Congo (13%), Uganda (5%), Ethiopia (4%) and Mozambique (4%).

This year's report highlights some encouraging trends in global malaria control. Between 2000 and 2023, an estimated 2.2 billion malaria cases and 12.7 million malaria deaths were averted worldwide, with 1.7 billion cases and 12 million deaths prevented in the WHO African Region alone. In 2023 alone, more than 177 million cases and more than 1 million deaths were averted globally. The number of estimated deaths globally has decreased by 4% since 2020, with the mortality rate declining from 14.9 to 13.7 deaths per 100 000 population. Progress has also been notable in countries that carry a low burden of disease. The number of countries reporting fewer than 10 000 malaria cases rose from 28 in 2000 to 47 in 2023, while those with fewer than 10 cases increased from four to 25 over the same period.

In 2023, four countries were certified malaria free, including Cabo Verde in December 2023 (the third country in the WHO African Region to be certified), and, more recently, Egypt in October 2024. In the WHO African Region, Rwanda and Liberia are examples of countries that demonstrated impressive reductions in malaria cases, with a 44% decrease in Liberia since 2017 and an 85% decrease in Rwanda since 2019. Over the period 2019–2023, countries in the GMS showed a decrease of more than 85% in the number of estimated cases: Cambodia (–95%), the Lao People's Democratic Republic (–89%) and Viet Nam (–89%). In the WHO South-East Asia Region, India exited the HBHI group officially in 2024 due to significant progress in reducing malaria incidence and mortality, with the number of estimated malaria cases in India decreasing from 6.4 million in 2017 to 2 million cases in 2023 (a 69% reduction).

Despite these positive developments, malaria remains a serious global health problem, and progress has slowed. In 2023, there was an increase of 11 million cases compared with 2022, and an increase of 37 million compared with 2015. Between 2015 and 2023, malaria case incidence, which accounts for population growth, increased from 58 to 60.4 cases per 1000 population at risk. The WHO Eastern Mediterranean Region experienced a sharp increase in case incidence of 63% between 2022 and 2023, to 17.9 cases per 1000 population at risk. Despite some progress, in 2023, the 11 HBHI countries (excluding India, and including the Sudan) still accounted for the majority of the malaria burden, with 66% of global malaria cases and 68% of deaths. The global tally of malaria deaths remained high at 597 000 in 2023, compared with 578 000 in 2015. In view of these trends, progress towards the 2030 targets of the GTS remains substantially off track. The GTS called for ambitious reductions in case incidence and mortality rates of at least 75% by 2025 and 90% by 2030, compared with 2015 baseline levels. The 5% reduction in case incidence and 16% decline in mortality rate in the WHO African Region since 2015 represent real progress, but the 2023 rates for both indicators persisted at more than twice the target levels set by the GTS. The WHO South-East Asia Region met the GTS 2020 milestones for both mortality and morbidity and remains on track to meet the GTS 2025 and 2030 targets.

10.2 State of malaria interventions

This report highlights advances in the delivery and utilization of core WHO-recommended malaria control tools, such as ITNs, IRS, antimalarial medicines, RDTs and, most recently, vaccines, which together are crucial for reducing malaria transmission and mortality. These tools not only support malaria elimination efforts but also contribute to broader public health improvements and economic growth in affected regions. Trends in malaria cases and deaths will be closely linked to the coverage and effectiveness of these interventions; for instance, expanded access to diagnostic testing may result in more cases being detected, while sustained higher coverage of ITNs, IRS and vaccines in at-risk places will lower malaria morbidity and mortality.

ITNs remain the primary vector control tool in most malaria endemic countries. In 2023, about 226 million ITNs were delivered by manufacturers to these countries, with 86% of them reaching sub-Saharan Africa. There was limited change in ITN access and use between 2015 and 2021, with around 68% of households owning at least one ITN and 46% of the population using an ITN between those years; these indicators rose to 73% and 52%, respectively, in 2023. ITN usage among children aged under 5 years and pregnant women and girls also continued to increase; an estimated 59% of young children and pregnant women and girls in sub-Saharan Africa slept under an ITN in 2023, up from 55% in 2022 and only 3% in 2000. **Progress has also been made with the deployment of nets that will be more effective in areas where mosquitoes are resistant to conventional insecticides** (*233–236*). On the other hand, for IRS, another vector control tool, the percentage of the at-risk population protected globally declined from 5.3% in 2010 to 1.6% in 2023.

IPTp is used to prevent malaria among pregnant women and girls living in areas of moderate to high malaria transmission in Africa, given their high risk of severe outcomes (*237*). WHO recommends at least three doses of IPTp for pregnant women and girls in malaria endemic areas, starting as early as possible in the second trimester; doses are administered at least 1 month apart and are typically delivered during ANC visits. To date, 34 African countries have adopted IPTp. **In 2023, the proportion of pregnant women and girls attending ANC at least once increased to 80%, and more pregnant women and girls at risk of malaria benefited from three doses of the preventive therapy** in 2023, compared with previous years (estimated at 44% in 2023 versus 34% in 2021).

SMC has proven to be highly effective in protecting young children from malaria (*7*). **Increasing numbers of eligible children are benefiting from the intervention**, with the average number of children treated per cycle of SMC in 19 countries in sub-Saharan Africa rising from about 170 000 in 2012 to 49 million in 2022 and 53 million in 2023. Two countries, Côte d'Ivoire and Madagascar, introduced this intervention for the first time in 2023.

Routine case management includes confirmatory diagnosis using RDTs and microscopy, enabling health care providers to quickly distinguish between malarial and non-malarial fevers. This guides appropriate treatment with ACTs, the most effective treatment for malaria. Globally, 4.4 billion RDTs for malaria were sold by manufacturers between 2010 and 2023, with more than 82% of sales being in sub-Saharan African countries. Between 2010 and 2023, manufacturers delivered about 4.5 billion treatment courses of ACTs globally. NMPs distributed 345 million RDTs and 235 million ACTs in 2023, mostly in sub-Saharan Africa. **This report shows improvements in routine case management for children aged under 5 years, especially in sub-Saharan Africa.** Across 26 sub-Saharan African countries, the proportion of febrile children for whom care was sought for a fever and who received a diagnosis with a finger or heel prick increased from a median of 30% in studies conducted between 2005 and 2011 to 48% in more recent surveys (2017–2023), while ACT use among children who sought care and who were treated with an antimalarial drug increased from 38% at baseline to 71% in the latest surveys.

Lastly, WHO now recommends **malaria vaccines** for preventing *P. falciparum* malaria in children living in malaria endemic areas, with priority given to regions with moderate-to-high transmission. Two vaccines, RTS,S and R21, are recommended. **Between 2019 and 2023, about 2 million children in Ghana, Kenya and Malawi received a malaria vaccine**, which has been shown to reduce severe malaria cases and lower all-cause mortality among age-eligible children. During that period, an average of 63–75% of children received three doses of the malaria vaccine in targeted areas of the countries. As of early December 2024, 17 countries had introduced WHO-recommended malaria vaccines through routine childhood immunization, and additional countries have expressed plans to introduce the malaria vaccine with support from Gavi and WHO next year.

10.3 Risks to progress

Despite progress in increasing coverage and use of WHO-recommended malaria interventions, **too many people are still not being reached with the quality care and interventions they need to prevent, detect and treat the disease.** For example, although the percentage of pregnant women and girls attending an ANC clinic at least once has reached the target of 80%, and the coverage of IPTp1, IPTp2 and IPTp3 in 2023 was the highest ever recorded, coverage for receiving the three doses (67%, 55% and 44%, respectively) still remains well below the target of 80%. In 2023, the estimated percentage of the at-risk population in sub-Saharan African countries sleeping under an ITN was 52% for the whole population, and 59% for children aged under 5 years and pregnant women and girls. Improving surveillance systems for monitoring and evaluating the coverage and impact of interventions can help identify pockets of at-risk populations that are not being reached, enabling more effective allocation of resources to these areas.

Even if high coverage with interventions can be achieved, **biological threats remain an obstacle to progress.** There have now been *pfhrp2* gene deletions reported in 41 malaria endemic countries, of which Burkina Faso, Chad, Togo and Indonesia are reported here for the first time. While prevalence of *pfhrp2/3* gene deletions remains low in most countries, it exceeds 15% in Brazil, Djibouti, Eritrea, Nicaragua and Peru. Artemisinin partial resistance and the threat of resistance to ACT partner drugs remain a global concern. The potential impact of high levels of artemisinin partial resistance and partner drug resistance on malaria morbidity was estimated in a mathematical model. In a scenario of high artemisinin partial resistance and partner drug resistance, the model predicted an estimated additional 78 million malaria cases in sub-Saharan Africa over a 5-year period, compared with a scenario of no resistance (*238*). In Africa, artemisinin partial resistance has been confirmed in Eritrea, Rwanda, the United Republic of Tanzania and Uganda. In Ethiopia and the Sudan, and most recently in Namibia and Zambia, artemisinin partial resistance is suspected. In South America, piperaquine resistance has now emerged in countries within the Guiana Shield, undermining the efficacy of DHA-PPQ. These findings underscore the need for close monitoring of the therapeutic efficacy of recommended ACTs and the presence of *Pfkelch13* mutations, to ensure that the recommended ACTs remain effective. Insecticide resistance also complicates malaria control, with resistance detected across multiple insecticide classes, especially pyrethroids, emphasizing the need for diversified insecticide use in ITNs. Additionally, the spread of *An. stephensi*, a potent malaria vector, to new regions in Africa and beyond poses challenges for urban malaria control, due to its adaptability to human-made water sources.

In addition to the emergence and spread of biological threats, **humanitarian emergencies, such as conflicts, violence and natural disasters, create conditions that can increase malaria transmission risks in endemic regions by displacing populations, modifying ecological habitats and disrupting health care services.** In 2023, the total number of IDPs and refugees was 80 million in malaria endemic countries, of whom about 70% were internally displaced due to conflict or natural disasters. Displaced people and refugees often lack access to malaria prevention and treatment, leading to higher exposure and transmission rates. Populations in situations of vulnerability, especially women, children and marginalized communities, are disproportionately affected, often residing in camps or temporary shelters without adequate malaria control resources. In Ethiopia, estimated malaria cases increased by 3.6 times from 2019 to 2023, amid numerous challenges. These included suboptimal implementation of malaria prevention measures in conflict-affected areas, disruption of basic health services, the emergence of a new malaria vector, *An. stephensi*, vector resistance to insecticides and the impacts of climate change (*239*). In 2023, Ethiopia accounted for about 7% of IDPs globally due to disasters and conflict. Since 2019, in Myanmar, estimated cases have increased by more than 10 times to 847 000 in 2023. This increase is thought to be due to the political and social instability in Myanmar that has weakened the country's focus on malaria prevention and control. This has also affected neighbouring Thailand, where cases have increased along the border in recent years. Public health responses focus on integrating malaria prevention into humanitarian aid, providing resources like ITNs and diagnostics, strengthening health systems and ensuring that displaced populations are educated about malaria prevention and treatment access. However, such situations demonstrate how fragile gains can be and highlight the need to sustain efforts to prevent resurgence. Programmatic weakening – whether due to funding shortages, poor execution, conflicts, natural disasters, cessation of interventions or lack of community engagement – can lead to a dramatic increase in disease incidence (*240*).

Environmental and climatic factors play a significant role in hindering progress towards a malaria free world. An estimated 3.3–3.6 billion people live in areas vulnerable to climate change, particularly in Africa, Asia, Central and South America, and small island states (*241*). Climate-related extreme events, such as cyclones, heavy rains and flooding, create ideal breeding conditions for *Anopheles* mosquitoes, while also disrupting infrastructure, limiting access to health care, increasing food insecurity and malnutrition, and complicating the delivery of malaria interventions. These factors compound malaria transmission risk and exacerbate disease severity and mortality, as seen in Pakistan after the 2021 floods. Over the next decade, climate impacts are expected to intensify, disproportionately affecting communities in situations of vulnerability who have historically contributed the least to climate change (*241*).

Finally, **financial resources remain suboptimal.** In 2023, global investment in malaria reached US$ 4 billion, falling significantly short of the estimated US$ 8.3 billion target in the GTS. The funding gap has widened over the past 5 years, increasing from US$ 2.6 billion in 2019 to US$ 4.3 billion in 2023. However, there are some positive trends in funding distribution. Malaria endemic countries have increased their share of domestic funding to 37% in 2023, up from 33% in 2021, while international funders contributed 63%. Additionally, malaria-related R&D funding saw a 9% increase in 2023 (an increase of US$ 60 million compared with 2022), primarily driven by contributions towards the clinical development of *P. falciparum* vaccines.

10.4 Opportunities and the path forward

Despite the rise in malaria cases and some unmet intervention targets, there are **reasons for optimism and a path to reversing these trends.**

Malaria mortality rates have declined in recent years, and coverage of vector control interventions continues to grow. Prioritizing expanded coverage for the populations in situations of greatest vulnerability, including women, children aged under 5 years, Indigenous communities and those in remote areas with limited health care access, is essential. As surveillance systems improve, it is increasingly feasible to identify underserved populations and target interventions to them. Effective tools are also available to address current challenges. For instance, PBO nets and dual active ingredient nets now make up a significant proportion of distributed nets and demonstrate increased efficacy, especially in regions facing insecticide resistance. Although there is no single "silver bullet" to reduce malaria morbidity and mortality, a combination of interventions, including ITNs, vaccines and SMC, can be effective, especially when tailored carefully to local epidemiological, demographic, environmental and socioeconomic contexts. Some preventive tools are still under development, but they may offer opportunities for more comprehensive malaria control if proven effective (*242*). Impactful malaria control also requires strong routine case management to detect and treat infected individuals.

Limited resources in recent years, along with a growing gap between available funding and resources needed to meet the GTS targets, are a barrier to achieving global malaria goals, but they have also catalysed an increased focus on ensuring constrained budgets are used carefully to achieve the greatest impact possible. **Programmes are increasingly directing the most effective tools to populations in situations of vulnerability and regions through subnational tailoring (SNT) of interventions, demonstrating a collective commitment to enhanced surveillance, a key pillar of the GTS** (*51*). Continuing to refine and expand these data-driven approaches will mean ensuring that interventions are adapted to local contexts, tools are delivered where they will have the greatest impact, and high effective coverage can be maintained in the specific places where it will matter most. SNT involves using local data and contextual information to identify tailored combinations of interventions and strategies that are likely to be the most impactful, given the local context of each area, aiming to maximize malaria transmission reductions and minimize disease burden within the constraints of available resources. SNT also facilitates the integration of new tools into existing intervention plans and can inform dynamic resource mobilization as additional funding becomes available. Since 2021, more than 30 countries have received analytical support from WHO and partners to help target resources for maximum impact (*243*). WHO is currently finalizing guidance to assist countries in strategically prioritizing malaria interventions and using data-driven decision-making to achieve the greatest possible outcomes.

Beyond malaria-specific interventions, a comprehensive approach is essential for the sustainability and effectiveness of these efforts in reducing disease burden. This involves countries adopting cross-cutting strategies that address broader health challenges, including strengthening PHC, and requires multisectoral collaboration, political commitment, local leadership and ownership, and the decentralization of resources and decision-making at the local level. **Effective malaria control also requires cross-cutting climate-responsive health strategies to mitigate the impacts of climate change,** which is increasingly affecting malaria transmission and disrupting health services, particularly as extreme weather events become more frequent in malaria endemic regions. A scoping review published by WHO and partners in May 2024 highlights the urgent need for more data on how climate change affects malaria and other neglected tropical diseases (*244*). Such data are crucial to inform strategies for climate adaptation and mitigation. To address this gap, WHO is developing a policy brief that will provide guidance on necessary actions and investments to tackle the intersection of climate change and malaria control.

Amid the current slowdown in progress, coordinated action between stakeholders is essential to regain momentum and achieve the targets of the GTS. This response should harness the recent commitments of the Yaoundé Declaration and integrate lessons learned from the HBHI approach, and led to the formulation of "the Big Push" framework, which is a collaborative, multi-stakeholder effort aimed at reinvigorating global malaria control by better aligning the support from global partners with the specific needs of affected countries. This initiative emphasizes the importance of united action to tackle the root causes of malaria, optimize resource allocation, simplify funding processes and accelerate the introduction of new tools. The Big Push has identified six priority actions over the next 5 years:

- Improve coordination between global, regional and country partners
- Uphold national leadership and accountability while advancing an inclusive, whole-of-society approach
- Strengthen data systems and enable data-driven decision-making
- Increase the accessibility, acceptability and quality for existing interventions
- Develop and prepare for the rapid introduction of new transformational tools
- Increase funding for malaria, building on a new narrative.

In 2024, WHO made significant strides in advancing two of these priority areas:

- Data-driven decision-making: WHO has been instrumental in helping countries leverage data to inform national planning, budgeting and prioritization, thus fostering stronger alignment with funding partners. In May 2024, WHO published guiding principles to support NMPs in selecting the most effective intervention mix in resource-limited settings (*2*). Additionally, WHO is developing a reference manual to help countries adapt global recommendations into evidence-informed, locally owned strategic plans.
- Rapid introduction of new tools: WHO has streamlined its guidelines and prequalification processes for new health products – such as pharmaceuticals, vaccines, diagnostics and vector control tools. A new 12-month parallel WHO/GMP prequalification review process has been established across all WHO programmes, including the WHO/GMP, with piloting implementation slated for January 2025.

The Big Push framework underscores the importance of strengthening PHC and engaging communities and the private sector. The RBM Partnership to End Malaria will monitor the implementation of this initiative, set to begin in April 2025.

Successfully reducing malaria and its impacts will require an intersectional approach that emphasizes gender equality, human rights and health equity. Overlapping global crises, such as climate change and humanitarian emergencies, are not only complicating malaria responses but also reversing advancements in gender equality, widening health inequities, undermining health and human rights and jeopardizing the achievement of the SDG targets. A variety of factors – biological, environmental and socioeconomic – increase vulnerability to malaria and limit access to preventive and treatment services for certain groups (*118*). PHC provides an opportunity to address these vulnerabilities and improve access to malaria services for those most in need by:

- identifying and addressing multiple and intersecting forms of discrimination;
- tackling the underlying determinants of health;
- ensuring timely access to appropriate malaria interventions and health care services; and
- enabling the active participation of communities in all health-related decision-making at the local, national and international levels.

Malaria responses must be guided by robust data. Despite advances in understanding malaria's risks and impacts, a critical gap persists in the availability of comprehensive disaggregated data and information to identify who is missing out and the barriers they face. Closing this gap can help equitably reduce malaria's burden on those who are most vulnerable.

References

1. Global Malaria Programme operational strategy 2024–2030. Geneva: World Health Organization; 2024 (https://iris.who.int/handle/10665/376518).

2. Guiding principles for prioritizing malaria interventions in resource-constrained country contexts to achieve maximum impact. Geneva: World Health Organization; 2024 (https://doi.org/10.2471/B09044).

3. Surveillance and control of *Anopheles stephensi*: country experiences. Geneva: World Health Organization; 2024 (https://www.who.int/publications/i/item/9789240094420).

4. Operational manual on indoor residual spraying: control of vectors of malaria, *Aedes*-borne diseases, Chagas disease, leishmaniases and lymphatic filariasis. Geneva: World Health Organization; 2023 (https://www.who.int/publications/i/item/9789240083998).

5. WHO publishes recommendations on two new types of insecticide-treated nets [news release]. World Health Organization; 14 March 2023 (https://www.who.int/news/item/14-03-2023-who-publishes-recommendations-on-two-new-types-of-insecticide-treated-nets).

6. Community deployment of intermittent preventive treatment of malaria in pregnancy with sulfadoxine-pyrimethamine a field guide. Geneva: World Health Organization; 2023 (https://www.who.int/publications/i/item/9789240086272).

7. Seasonal malaria chemoprevention with sulfadoxine–pyrimethamine plus amodiaquine in children: a field guide, second edition. Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/368123).

8. WHO prequalifies a second malaria vaccine, a significant milestone in prevention of the disease [news release]. World Health Organization; 21 December 2023 (https://www.who.int/news/item/21-12-2023-who-prequalifies-a-second-malaria-vaccine-a-significant-milestone-in-prevention-of-the-disease).

9. Response plan to *pfhrp2* gene deletions, second edition. Geneva: World Health Organization; 2024 (https://iris.who.int/handle/10665/379469).

10. Master protocol for surveillance of *pfhrp2/3* deletions and biobanking to support future research, second edition. Geneva: World Health Organization; 2024 (https://iris.who.int/handle/10665/379470).

11. WHO guidelines for malaria, 30 November 2024. Geneva: World Health Organization; 2024 (https://iris.who.int/handle/10665/379635).

12. Multiple first-line therapies as part of the response to antimalarial drug resistance: an implementation guide. Geneva: World Health Organization; 2024 (https://iris.who.int/handle/10665/379576).

13. Recht J, Clark R, González R, Dellicour S. Safety of artemisinin and non-artemisinin antimalarials in the first trimester of pregnancy: review of evidence. Geneva: World Health Organization; 2024 (https://www.who.int/publications/i/item/9789240069404).

14. Pre-referral treatment with rectal artesunate of children with suspected severe malaria: a field guide. Geneva: World Health Organization; 2023 (https://www.who.int/publications/i/item/9789240082953).

15. Towards a malaria free world: elimination of malaria and prevention of re-establishment in Sri Lanka. Geneva: World Health Organization; 2023 (https://www.who.int/publications/i/item/9789240087026).

16. Towards a malaria free world: elimination of malaria in Uzbekistan. Geneva: World Health Organization; 2023 (https://www.who.int/publications/i/item/9789240086197).

17. Towards a malaria free world: elimination of malaria in Kyrgyzstan. Geneva: World Health Organization; 2023 (https://www.who.int/publications/i/item/9789240080836).

18. New nets prevent 13 million malaria cases in sub-Saharan Africa [news release]. Innovative Vector Control Consortium; 17 April 2024 (https://www.ivcc.com/new-nets-prevent-13-million-malaria-cases-in-sub-saharan-africa/).

19. World population prospects 2023 [website]. New York City: United Nations; 2023 (https://population.un.org/wpp/).

20. Villavicencio F, Perin J, Eilerts-Spinelli H, Yeung D, Prieto-Merino D, Hug L et al. Global, regional, and national causes of death in children and adolescents younger than 20 years: an open data portal with estimates for 2000–21. Lancet Glob Health. 2024;12:e16-e7 (https://doi.org/10.1016/S2214-109X(23)00496-5).

21. Causes of death: rate in under 5 years [website]. IGME: United Nations Inter-agency Group for Child Mortality Estimation; 2024 (https://childmortality.org/causes-of-death/data).

22. Most recent stillbirth, child and adolescent mortality estimates [website]. IGME: United Nations Inter-agency Group for Child Mortality Estimation; 2024 (https://childmortality.org/).

23. Sharrow D, Hug L, Liu Y, Lindt N, Nie W, You D. Levels & trends in child mortality report 2023: estimates developed by the United Nations Inter-agency Group for Child Mortality Estimation. New York: United Nations Children's Fund; 2024 (https://childmortality.org/wp-content/uploads/2024/03/UNIGME-2023-Child-Mortality-Report.pdf).

24. Global pulse survey on continuity of essential health services during the COVID-19 pandemic [website]. Geneva: World Health Organization; 2023 (https://www.who.int/teams/integrated-health-services/health-services-performance-assessment/monitoring-health-services/global-pulse-survey-on-continuity-of-essential-health-services-during-the-covid-19-pandemic).

25. Malaria on the rise in Madagascar as climate change leaves healthcare out of reach [news release]. Médecins Sans Frontières; 25 April 2024 (https://www.msf.org/malaria-rise-healthcare-out-reach-madagascar).

26. Historic resolution calls for action to improve the health of Indigenous Peoples [news release]. World Health Organization; 29 May 2023 (https://www.who.int/news/item/29-05-2023-historic-resolution-calls-for-action-to-improve-the-health-of-indigenous-peoples).

27. Disease outbreak news: malaria – Pakistan [news release]. World Health Organization; 17 October 2022 (https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON413).

28. Paracha MB, Aftab FN, Heyns AM. Pakistan: devastating floods have widened spatial disparities [blog]. In: World Bank Blogs; 6 November 2023 (https://blogs.worldbank.org/en/transport/pakistan-devastating-floods-have-widened-spatial-disparities).

29. Myanmar public health situation analysis (PHSA). Geneva: World Health Organization; 2022 (https://www.who.int/myanmar/publications/myanmar-public-health-situation-analysis-(phsa)).

30. Mekong malaria elimination programme: epidemiology summary, volume 20, October–December 2022. Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/366565).

31. Guyatt HL, Snow RW. Malaria in pregnancy as an indirect cause of infant mortality in sub-Saharan Africa. Trans R Soc Trop Med Hyg. 2001;95:569-76 (https://doi.org/10.1016/S0035-9203(01)90082-3).

32. Guyatt HL, Snow RW. Impact of malaria during pregnancy on low birth weight in sub-Saharan Africa. Clin Microbiol Rev. 2004;17:760-9 (https://doi.org/10.1128/CMR.17.4.760-769.2004).

33. Walker PG, ter Kuile FO, Garske T, Menendez C, Ghani AC. Estimated risk of placental infection and low birthweight attributable to *Plasmodium falciparum* malaria in Africa in 2010: a modelling study. Lancet Glob Health. 2014;2:e460-7 (https://doi.org/10.1016/S2214-109X(14)70256-6).

34. Preventing malaria in pregnancy in remote African communities [news release]. World Health Organization; 1 April 2019 (https://www.who.int/news-room/feature-stories/detail/preventing-malaria-in-pregnancy-in-remote-african-communities).

35. Global technical strategy for malaria 2016–2030. Geneva: World Health Organization; 2015 (https://iris.who.int/handle/10665/176712).

36. Preparing for certification of malaria elimination, second edition. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364535).

37. WHO certifies Cabo Verde as malaria-free, marking a historic milestone in the fight against malaria [news release]. World Health Organization; 12 January 2024 (https://www.who.int/news/item/12-01-2024-who-certifies-cabo-verde-as-malaria free--marking-a-historic-milestone-in-the-fight-against-malaria).

38. Egypt is certified malaria-free by WHO [news release]. World Health Organization; 20 October 2024 (https://www.who.int/news/item/20-10-2024-egypt-is-certified-malaria-free-by-who).

39. Cabo Verde certified as malaria-free. Wkly Epidemiol Rec. 2024;99(36):479-80. (https://iris.who.int/bitstream/handle/10665/378715/WER9936-479-480.pdf) (in English, French).

40. Q&A on malaria-free certification of Egypt [news release]. World Health Organization; 20 October 2024 (https://www.who.int/news-room/feature-stories/detail/q-a-on-malaria-free-certification-of-egypt).

41. Community engagement is key to malaria elimination in Cambodia [news release]. World Health Organization; 24 April 2023 (https://www.who.int/westernpacific/news-room/feature-stories/item/community-engagement-is-key-to-malaria-elimination-in-cambodia).

42. Voice, agency, empowerment - handbook on social participation for universal health coverage. Geneva: World Health Organization; 2021 (https://www.who.int/publications/i/item/9789240027794).

43. Strategy for Malaria Elimination in the Greater Mekong Subregion: 2015–2030. Geneva: World Health Organization; 2015 (https://iris.who.int/handle/10665/208203).

44. Whittaker M, Smith C. Reimagining malaria: five reasons to strengthen community engagement in the lead up to malaria elimination. Malar J. 2015;14:410 (https://doi.org/10.1186/s12936-015-0931-9).

45. Malaria control in humanitarian emergencies: an inter-agency field handbook, second edition. Geneva: World Health Organization; 2013 (https://iris.who.int/handle/10665/90556).

46. Kondrashin AV, Sharipov AS, Kadamov DS, Karimov SS, Gasimov E, Baranova AM et al. Elimination of *Plasmodium falciparum* malaria in Tajikistan. Malar J. 2017;16:226 (https://doi.org/10.1186/s12936-017-1861-5).

47. UNICEF in emergencies [website]. United Nations Children's Fund; 2021 (https://www.unicef.org/emergencies).

48. 2024 Global report on internal displacement. Geneva: Internal Displacement Monitoring Centre; 2024 (https://api.internal-displacement.org/sites/default/files/publications/documents/IDMC-GRID-2024-Global-Report-on-Internal-Displacement.pdf).

49. Guidance note on malaria programmes in refugee operations. Geneva: United Nations High Commissioner for Refugees; 2022 (https://www.unhcr.org/sites/default/files/legacy-pdf/53ba5cca9.pdf).

50. Goal 3: Ensure healthy lives and promote well-being for all at all ages [website]. New York: United Nations, Department of Economic and Social Affairs; 2023 (https://sdgs.un.org/goals/goal3).

51. Global technical strategy for malaria 2016–2030, 2021 update. Geneva: World Health Organization; 2021 (https://iris.who.int/handle/10665/342995).

52. G-FINDER data portal: tracking funding for global health R&D [website]. Sydney: Impact Global Health (formerly Policy Cures Research); 2023 (https://gfinderdata.impactglobalhealth.org/).

53. Statistics on international development: final UK ODA spend 2023. United Kingdom: Foreign, Commonwealth & Development Office; 2024 (https://www.gov.uk/government/statistics/statistics-on-international-development-final-uk-oda-spend-2023).

54. OECD Data explorer: CRS: Creditor reporting system (flows) [cloud replica] [website]. Paris: Organisation for Economic Co-operation and Development; 2024 (https://data-explorer.oecd.org/vis?df[ds]=DisseminateFinalBoost&df[id]=DSD_CRS%40DF_CRS&df[ag]=OECD.DCD.FSD&dq=DAC..1000.100._T._T.D.Q._T..&lom=LASTNPERIODS&lo=5&to[TIME_PERIOD]=false).

55. Health Financing and Economics: Choosing interventions that are cost-effective (WHO-CHOICE) [website]. Geneva: World Health Organization; 2023 (https://www.who.int/teams/health-financing-and-economics/economic-analysis).

56. World Bank country and lending groups [website]. Washington, DC: World Bank; 2024 (https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups).

57. World economic situation and prospects 2024. New York: United Nations, Department of Economic and Social Affairs; 2024 (https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/WESP_2024_Web.pdf).

58. Real GDP growth [website]. Washington, DC: International Monetary Fund; 2021 (https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/OEMDC/ADVEC/WEOWORLD).

59. Rannan-Eliya RP. Financing malaria. PLOS Glob Public Health. 2022;2:e0000609 (https://doi.org/10.1371/journal.pgph.0000609).

60. The global malaria action plan for a malaria-free world. Roll Back Malaria Partnership; 2008 (https://www.afro.who.int/sites/default/files/2017-06/Gmapfull.pdf).

61. Galactionova K, Smith TA, de Savigny D, Penny MA. State of inequality in malaria intervention coverage in sub-Saharan African countries. BMC Med. 2017;15:185 (https://doi.org/10.1186/s12916-017-0948-8).

62. Malaria [website]. United Nations Children's Fund; 2024 (https://data.unicef.org/topic/child-health/malaria/).

63. Malaria Atlas Project [website]. 2023 (https://malariaatlas.org).

64. Bertozzi-Villa A, Bever CA, Koenker H, Weiss DJ, Vargas-Ruiz C, Nandi AK et al. Maps and metrics of insecticide-treated net access, use, and nets-per-capita in Africa from 2000-2020. Nat Commun. 2021;12:3589 (https://doi.org/10.1038/s41467-021-23707-7).

65. Milligan P, Fogelson A, on behalf of the MVPE investigators. Statistical report, malaria vaccine pilot evaluation (MVPE), analysis of data to month 46. Geneva: World Health Organization; 2024 (https://www.who.int/publications/m/item/statistical-report--malaria-vaccine-pilot-evaluation-(mvpe)--analysis-of-data-to-month-46).

66. Gamboa D, Ho MF, Bendezu J, Torres K, Chiodini PL, Barnwell JW et al. A large proportion of *P. falciparum* isolates in the Amazon region of Peru lack *pfhrp2* and *pfhrp3*: implications for malaria rapid diagnostic tests. PLoS One. 2010;5:e8091 (https://doi.org/10.1371/journal.pone.0008091).

67. Berhane A, Anderson K, Mihreteab S, Gresty K, Rogier E, Mohamed S et al. Major threat to malaria control programs by *Plasmodium falciparum* lacking histidine-rich protein 2, Eritrea. Emerg Infect Dis. 2018;24:462-70 (https://doi.org/10.3201/eid2403.171723).

68. False-negative RDT results and *P. falciparum* histidine-rich protein 2/3 gene deletions. Geneva: World Health Organization; 2019 (https://iris.who.int/handle/10665/258972).

69. Malaria Threats Map [website]. Geneva: World Health Organization; 2024 (https://apps.who.int/malaria/maps/threats/).

70. Surveillance template protocol for *pfhrp2*/*pfhrp3* gene deletions. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/331196).

71. Molina-de la Fuente I, Tahita MC, Berenger K, Ta Tang TH, Garcia L, Gonzalez V et al. Malaria diagnosis challenges and *pfhrp2* and *pfhrp3* gene deletions using pregnant women as sentinel population in Nanoro region, Burkina Faso. Pathog Glob Health. 2024;118:481-91 (https://doi.org/10.1080/20477724.2024.2388489).

72. Issa MS, Warsame M, Mahamat MHT, Saleh IDM, Boulotigam K, Djimrassengar H et al. Therapeutic efficacy of artesunate–amodiaquine and artemether–lumefantrine for the treatment of uncomplicated falciparum malaria in Chad: clinical and genetic surveillance. Malar J. 2023;22:240 (https://doi.org/10.1186/s12936-023-04644-w).

73. Dorkenoo AM, Warsame M, Ataba E, Hemou M, Yakpa K, Sossou E et al. Efficacy of artemether–lumefantrine and dihydroartemisinin–piperaquine and prevalence of molecular markers of anti-malarial drug resistance in children in Togo in 2021. Malar J. 2024;23:92 (https://doi.org/10.1186/s12936-024-04922-1).

74. MalariaGen, Ahouidi A, Ali M, Almagro-Garcia J, Amambua-Ngwa A, Amaratunga C et al. An open dataset of *Plasmodium falciparum* genome variation in 7,000 worldwide samples. Wellcome Open Res. 2021;6:42 (https://doi.org/10.12688/wellcomeopenres.16168.2).

75. Strategy to respond to antimalarial drug resistance in Africa. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364531).

76. Methods for surveillance of antimalarial drug efficacy. Geneva: World Health Organization; 2009 (https://iris.who.int/handle/10665/44048).

77. Informal consultation on methodology to distinguish reinfection from recrudescence in high malaria transmission areas: report of a virtual meeting, 17–18 May 2021. Geneva: World Health Organization; 2021 (https://iris.who.int/handle/10665/348385).

78. Report on antimalarial drug efficacy, resistance and response: 10 years of surveillance (2010–2019). Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/336692).

79. Gansane A, Moriarty LF, Menard D, Yerbanga I, Ouedraogo E, Sondo P et al. Anti-malarial efficacy and resistance monitoring of artemether-lumefantrine and dihydroartemisinin-piperaquine shows inadequate efficacy in children in Burkina Faso, 2017–2018. Malar J 2021;20:48 (https://doi.org/10.1186/s12936-021-03585-6).

80. Plucinski MM, Dimbu PR, Macaia AP, Ferreira CM, Samutondo C, Quivinja J et al. Efficacy of artemether–lumefantrine, artesunate–amodiaquine, and dihydroartemisinin–piperaquine for treatment of uncomplicated *Plasmodium falciparum* malaria in Angola, 2015. Malar J. 2017;16:62 (https://doi.org/10.1186/s12936-017-1712-4).

81. Dimbu PR, Horth R, Candido ALM, Ferreira CM, Caquece F, Garcia LEA et al. Continued low efficacy of artemether-lumefantrine in Angola in 2019. Antimicrob Agents Chemother. 2021;65:e01949-20 (https://doi.org/10.1128/AAC.01949-20).

82. Dimbu PR, Labuda S, Ferreira CM, Caquece F, Andre K, Pembele G et al. Therapeutic response to four artemisinin-based combination therapies in Angola, 2021. Antimicrob Agents Chemother. 2024;68:e0152523 (https://doi.org/10.1128/aac.01525-23).

83. Westercamp N, Owidhi M, Otieno K, Chebore W, Buff AM, Desai M et al. Efficacy of artemether-lumefantrine and dihydroartemisinin-piperaquine for the treatment of uncomplicated *Plasmodium falciparum* malaria among children in western Kenya, 2016 to 2017. Antimicrob Agents Chemother. 2022;66:e00207-22 (https://doi.org/10.1128/aac.00207-22).

84. Moriarty LF, Nkoli PM, Likwela JL, Mulopo PM, Sompwe EM, Rika JM et al. Therapeutic efficacy of artemisinin-based combination therapies in Democratic Republic of the Congo and investigation of molecular markers of antimalarial resistance. Am J Trop Med Hyg. 2021;105:1067-75 (http://dx.doi.org/10.4269/ajtmh.21-0214).

85. Ebong C, Sserwanga A, Namuganga JF, Kapisi J, Mpimbaza A, Gonahasa S et al. Efficacy and safety of artemether-lumefantrine and dihydroartemisinin-piperaquine for the treatment of uncomplicated *Plasmodium falciparum* malaria and prevalence of molecular markers associated with artemisinin and partner drug resistance in Uganda. Malar J. 2021;20:484 (http://dx.doi.org/10.21203/rs.3.rs-738188/v1).

86. Yeka A, Wallender E, Mulebeke R, Kibuuka A, Kigozi R, Bosco A et al. Comparative efficacy of artemether–lumefantrine and dihydroartemisinin–piperaquine for the treatment of uncomplicated malaria in Ugandan children. J Infect Dis. 2019;219:1112-20 (http://dx.doi.org/10.1093/infdis/jiy637).

87. Rasmussen C, Ringwald P. Is there evidence of anti-malarial multidrug resistance in Burkina Faso? Malar J. 2021;20:320 (https://doi.org/10.1186/s12936-021-03845-5).

88. Global database on antimalarial drug efficacy and resistance. Geneva: World Health Organization; 2024 (https://www.who.int/teams/global-malaria-programme/case-management/drug-efficacy-and-resistance/antimalarial-drug-efficacy-database).

89. Mihreteab S, Platon L, Berhane A, Stokes BH, Warsame M, Campagne P et al. Increasing prevalence of artemisinin-resistant HRP2-negative malaria in Eritrea. N Engl J Med. 2023;389:1191-202 (https://doi.org/10.1056/NEJMoa2210956).

90. Uwimana A, Legrand E, Stokes BH, Ndikumana J-LM, Warsame M, Umulisa N et al. Emergence and clonal expansion of in vitro artemisinin-resistant *Plasmodium falciparum kelch13* R561H mutant parasites in Rwanda. Nat Med. 2020;26:1602-8 (http://dx.doi.org/10.1038/s41591-020-1005-2).

91. Asua V, Conrad MD, Aydemir O, Duvalsaint M, Legac J, Duarte E et al. Changing prevalence of potential mediators of aminoquinoline, antifolate, and artemisinin resistance across Uganda. J Infect Dis. 2021;223:985-94 (http://dx.doi.org/10.1093/infdis/jiaa687).

92. Ishengoma DS, Mandara CI, Bakari C, Fola AA, Madebe RA, Seth MD et al. Evidence of artemisinin partial resistance in northwestern Tanzania: clinical and molecular markers of resistance. Lancet Infect Dis. 2024;24:1225-33 (https://doi.org/10.1016/S1473-3099(24)00362-1).

93. Straimer J, Gandhi P, Renner KC, Schmitt EK. High prevalence of *P. falciparum* K13 mutations in Rwanda is associated with slow parasite clearance after treatment with artemether–lumefantrine. J Infect Dis. 2022;225:1411-4 (http://dx.doi.org/10.1093/infdis/jiab352).

94. Uwimana A, Umulisa N, Venkatesan M, Svigel SS, Zhou Z, Munyaneza T et al. Association of *Plasmodium falciparum kelch13* R561H genotypes with delayed parasite clearance in Rwanda: an open-label, single-arm, multicentre, therapeutic efficacy study. Lancet Infect Dis. 2021;21:1120-8 (http://dx.doi.org/10.1016/s1473-3099(21)00142-0).

95. Conrad MD, Asua V, Garg S, Giesbrecht D, Niare K, Smith S et al. Evolution of partial resistance to artemisinins in malaria parasites in Uganda. N Engl J Med. 2023;389:722-32 (https://doi.org/10.1056/NEJMoa2211803).

96. Fola AA, Feleke SM, Mohammed H, Brhane BG, Hennelly CM, Assefa A et al. *Plasmodium falciparum* resistant to artemisinin and diagnostics have emerged in Ethiopia. Nat Microbiol. 2023;8:1911-9 (https://doi.org/10.1038/s41564-023-01461-4).

97. Itoh M, Rachid Viana GM, Negreiros do Valle S, Macedo de Oliveira A, Marchesini P, Lucchi N et al. Efficacy of artemether–lumefantrine for uncomplicated *Plasmodium falciparum* malaria in Cruzeiro do Sul, Brazil, 2016. Am J Trop Med Hyg. 2018;98:88-94 (http://dx.doi.org/10.4269/ajtmh.17-0623).

98. Olivera MJ, Guerra AP, Cortes LJ, Horth RZ, Padilla J, Novoa J et al. Artemether–lumefantrine efficacy for the treatment of uncomplicated *Plasmodium falciparum* malaria in Choco, Colombia after 8 years as first-line treatment. Am J Trop Med Hyg. 2020;102:1056-63 (http://dx.doi.org/10.4269/ajtmh.19-0954).

99. Florimond C, de Laval F, Early AM, Sauthier S, Lazrek Y, Pelleau S et al. Impact of piperaquine resistance in *Plasmodium falciparum* on malaria treatment effectiveness in The Guianas: a descriptive epidemiological study. Lancet Infect Dis. 2024;24:161-71 (https://doi.org/10.1016/S1473-3099(23)00502-9).

100. Mathieu LC, Cox H, Early AM, Mok S, Lazrek Y, Paquet J-C et al. Local emergence in Amazonia of *Plasmodium falciparum k13* C580Y mutants associated with in vitro artemisinin resistance. eLife. 2020;9:e51015 (http://dx.doi.org/10.7554/elife.51015.sa2).

101. Warsame M, Hassan AM, Barrette A, Jibril AM, Elmi HH, Arale AM et al. Treatment of uncomplicated malaria with artesunate plus sulfadoxine–pyrimethamine is failing in Somalia: evidence from therapeutic efficacy studies and *Pfdhfr* and *Pfdhps* mutant alleles. Trop Med Int Health. 2015;20:510-7 (http://dx.doi.org/10.1111/tmi.12458).

102. Adeel AA, Elnour FAA, Elmardi KA, Abd-Elmajid MB, Elhelo MM, Ali MS et al. High efficacy of artemether-lumefantrine and declining efficacy of artesunate + sulfadoxine-pyrimethamine against *Plasmodium falciparum* in Sudan (2010–2015): evidence from in vivo and molecular marker studies. Malar J. 2016;15:285 (http://dx.doi.org/10.1186/s12936-016-1339-x).

103. Adam M, Nahzat S, Kakar Q, Assada M, Witkowski B, Tag Eldin Elshafie A et al. Antimalarial drug efficacy and resistance in malaria endemic countries in HANMAT-PIAM_net countries of the Eastern Mediterranean Region 2016–2020: clinical and genetic studies. Trop Med Int Health. 2023;28:817-29 (https://doi.org/10.1111/tmi.13929).

104. Das S, Kar A, Manna S, Mandal S, Mandal S, Das S et al. Artemisinin combination therapy fails even in the absence of *Plasmodium falciparum kelch13* gene polymorphism in Central India. Sci Rep. 2021;11:9946 (http://dx.doi.org/10.1038/s41598-021-89295-0).

105. Sudathip P, Saejeng A, Khantikul N, Thongrad T, Kitchakarn S, Sugaram R et al. Progress and challenges of integrated drug efficacy surveillance for uncomplicated malaria in Thailand. Malar J. 2021;20:261 (https://doi.org/10.1186/s12936-021-03791-2).

106. Peto TJ, Tripura R, Callery JJ, Lek D, Nghia HDT, Nguon C et al. Triple therapy with artemether–lumefantrine plus amodiaquine versus artemether–lumefantrine alone for artemisinin-resistant, uncomplicated falciparum malaria: an open-label, randomised, multicentre trial. Lancet Infect Dis. 2022;22:867-78 (https://doi.org/10.1016/S1473-3099(21)00692-7).

107. Mairet-Khedim M, Leang R, Marmai C, Khim N, Kim S, Ke S et al. Clinical and in vitro resistance of *Plasmodium falciparum* to artesunate–amodiaquine in Cambodia. Clin Infect Dis. 2021;73:406-13 (https://doi.org/10.1093/cid/ciaa628).

108. Miotto O, Sekihara M, Tachibana S-I, Yamauchi M, Pearson RD, Amato R et al. Emergence of artemisinin-resistant *Plasmodium falciparum* with *kelch13* C580Y mutations on the island of New Guinea. PLoS Pathog. 2020;16:e1009133 (http://dx.doi.org/10.1371/journal.ppat.1009133).

109. Manh ND, Thanh NV, Quang HH, Van NTT, San NN, Phong NC et al. Pyronaridine-artesunate (Pyramax) for treatment of artemisinin- and piperaquine-resistant *Plasmodium falciparum* in the Central Highlands of Vietnam. Antimicrob Agents Chemother. 2021;65:e0027621 (https://doi.org/10.1128/AAC.00276-21).

110. Manual for monitoring insecticide resistance in mosquito vectors and selecting appropriate interventions. Geneva: World Health Organization; 2022 (https://www.who.int/publications/i/item/9789240051089).

111. WHO global database on insecticide resistance in malaria vectors [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/global-malaria-programme/prevention/vector-control/global-database-on-insecticide-resistance-in-malaria-vectors).

112. Faulde MK, Rueda LM, Khaireh BA. First record of the Asian malaria vector *Anopheles stephensi* and its possible role in the resurgence of malaria in Djibouti, Horn of Africa. Acta Trop. 2014;139:39-43 (https://doi.org/10.1016/j.actatropica.2014.06.016).

113. Vector alert: *Anopheles stephensi* invasion and spread in Africa and Sri Lanka. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/365710).

114. Open spatial demographic data and research [website]. WorldPop; 2024 (https://www.worldpop.org/).

115. The comprehensive multisectoral action framework: malaria and sustainable development. New York: United Nations Development Programme; 2022 (https://www.undp.org/publications/comprehensive-multisectoral-action-framework-malaria-and-sustainable-development).

116. World malaria report 2023. Geneva: World Health Organization; 2023 (https://www.who.int/publications/i/item/9789240086173).

117. Spoljaric M. Gender equality and war: "No humanity, dignity, peace until international humanitarian law is upheld for all genders" [news release]. International Committee of the Red Cross; 3 March 2023 (https://www.icrc.org/en/document/women-conflict-and-international-humanitarian-law).

118. State of inequality: HIV, tuberculosis and malaria. Geneva: World Health Organization; 2021 (https://iris.who.int/handle/10665/350198).

119. Gallup JL, Sachs JD. The economic burden of malaria. Am J Trop Med Hyg. 2001;64(1 Suppl):85-96 (https://doi.org/10.4269/ajtmh.2001.64.85).

120. Transforming our world: the 2030 agenda for sustainable development (A/RES/70/1). New York: United Nations Department of Economic and Social Affairs; 2015 (https://sdgs.un.org/2030agenda).

121. Constitution of the World Health Organization. New York: International Health Conference; 1946 (https://apps.who.int/gb/bd/pdf_files/BD_49th-en.pdf#page=6).

122. Universal declaration of human rights (article 25). Paris: United Nations General Assembly; 1948 (https://www.un.org/en/about-us/universal-declaration-of-human-rights).

123. International convention on the elimination of all forms of racial discrimination (article 5(e) iv). New York: United Nations General Assembly; 1965 (https://www.ohchr.org/en/instruments-mechanisms/instruments/international-convention-elimination-all-forms-racial).

124. International covenant on economic, social and cultural rights (article 12). New York: United Nations General Assembly; 1966 (https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-economic-social-and-cultural-rights).

125. International convention on the elimination of all forms of discrimination against women (articles 11(1)(f), 12 and 14(2)(b)). New York: United Nations General Assembly; 1979 (https://www.ohchr.org/en/instruments-mechanisms/instruments/convention-elimination-all-forms-discrimination-against-women).

126. Convention on the rights of the child (article 24). New York: United Nations General Assembly; 1989 (https://www.ohchr.org/en/instruments-mechanisms/instruments/convention-rights-child).

127. International convention on the protection of the rights of all migrant workers and members of their families (articles 28, 43(e) and 45(c)). New York: United Nations General Assembly; 1990 (https://www.ohchr.org/en/instruments-mechanisms/instruments/international-convention-protection-rights-all-migrant-workers).

128. Convention on the rights of persons with disabilities. New York: United Nations General Assembly; 2006 (https://www.ohchr.org/en/instruments-mechanisms/instruments/convention-rights-persons-disabilities).

129. The African charter on human and peoples' rights. Addis Ababa: African Union; 1981 (https://au.int/en/treaties/african-charter-human-and-peoples-rights).

130. General comment no. 14 (2000): The right to the highest attainable standard of health (article 12 of the International covenant on economic, social and cultural rights). Geneva: United Nations Committee on Economic, Social and Cultural Rights; 2000 (https://digitallibrary.un.org/record/425041?ln=en&v=pdf).

131. Social determinants of health [website]. Geneva: World Health Organization; 2024 (https://www.who.int/health-topics/social-determinants-of-health).

132. Poverty, the right to food and social protection [website]. Geneva: United Nations Office of the High Commissioner for Human Rights; 2024 (https://www.ohchr.org/en/topic/poverty-right-food-and-social-protection).

133. World Health Organization, World Bank. Tracking universal health coverage: 2023 global monitoring report. Washington, DC: World Bank; 2023 (http://hdl.handle.net/10986/40348).

134. Billions left behind on the path to universal health coverage [news release]. World Health Organization; 18 September 2023 (https://www.who.int/news/item/18-09-2023-billions-left-behind-on-the-path-to-universal-health-coverage).

135. Acceleration towards the Sustainable Development Goal targets for maternal health and child mortality: report by the Director-General. Geneva: World Health Organization; 2023 (https://apps.who.int/gb/ebwha/pdf_files/EB154/B154_12-en.pdf).

136. Kruk ME, Gage AD, Arsenault C, Jordan K, Leslie HH, Roder-DeWan S et al. High-quality health systems in the Sustainable Development Goals era: time for a revolution. Lancet Glob Health. 2018;6:e1196-e252 (https://doi.org/10.1016/s2214-109x(18)30386-3).

137. Availability, accessibility, acceptability and quality framework: a tool to identify potential barriers to accessing services in humanitarian settings. New York: United Nations Children's Fund; 2019 (https://gbvguidelines.org/wp/wp-content/uploads/2019/11/AAAQ-framework-Nov-2019-WEB.pdf).

138. Global framework for the response to malaria in urban areas. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/363899).

139. Teklehaimanot A, Mejia P. Malaria and poverty. Ann N Y Acad Sci. 2008;1136:32-7 (https://doi.org/10.1196/annals.1425.037).

140. Eboh A, Adebayo AO. Addressing malaria incidence in Africa through health care expenditure and access to basic sanitation services. Discover Health Systems. 2023;2:37 (https://doi.org/10.1007/s44250-023-00052-8).

141. Mshamu S, Meta J, Sanga C, Day N, Mukaka M, Adhikari B et al. Care seeking for childhood illnesses in rural Mtwara, south-east Tanzania: a mixed methods study. Trans R Soc Trop Med Hyg. 2024;118:465-73 (https://doi.org/10.1093/trstmh/trae022).

142. Peters DH, Garg A, Bloom G, Walker DG, Brieger WR, Rahman MH. Poverty and access to health care in developing countries. Ann N Y Acad Sci. 2008;1136:161-71 (https://doi.org/10.1196/annals.1425.011).

143. Seidu AA, Darteh EKM, Agbaglo E, Dadzie LK, Ahinkorah BO, Ameyaw EK et al. Barriers to accessing healthcare among women in Ghana: a multilevel modelling. BMC Public Health. 2020;20:1916 (https://doi.org/10.1186/s12889-020-10017-8).

144. ITN distributions in Niger [website]. Washington, DC: Breakthrough Action and Research; 2021 (https://breakthroughactionandresearch.org/resources/itn-use-and-access-report/niger/).

145. Gender mainstreaming for health managers: a practical approach. Geneva: World Health Organization; 2011 (https://iris.who.int/handle/10665/44516).

146. Sommerfeld J, Kroeger A. Determinants and equity implications of ITN use in sub-Saharan Africa: a review of the literature. Int J Equity Health. 2015;14:1-20.

147. Routen A, Lekas HM, Harrison J, Khunti K. Intersectionality in health equity research. BMJ. 2023;383:2953 (https://doi.org/10.1136/bmj.p2953).

148. "Protecting adolescent girls against malaria" at the Women and Girls Summit Africa 2020 [website]. Medicines for Malaria Venture; 2020 (https://www.mmv.org/newsroom/events/protecting-adolescent-girls-against-malaria-women-and-girls-summit-africa-2020).

149. Quaresima V, Agbenyega T, Oppong B, Awunyo J, Adu Adomah P, Enty E et al. Are malaria risk factors based on gender? A mixed-methods survey in an urban setting in Ghana. Trop Med Infect Dis. 2021;6:161 (https://doi.org/10.3390/tropicalmed6030161).

150. Terefe B, Habtie A, Chekole B. Insecticide-treated net utilization and associated factors among pregnant women in East Africa: evidence from the recent national demographic and health surveys, 2011–2022. Malar J. 2023;22:349 (https://doi.org/10.1186/s12936-023-04779-w).

151. Amoah A, Asamoah MK. Child survival: the role of a mother's education. Heliyon. 2022;8:e11403 (https://doi.org/10.1016/j.heliyon.2022.e11403).

152. Das A, Sundari Ravindran TK. Community knowledge on malaria among febrile patients in an endemic district of Orissa, India. J Vector Borne Dis. 2011;48:46-51 (https://www.ncbi.nlm.nih.gov/pubmed/21406737).

153. Odwe G, Matanda DJ, Zulu T, Kizito S, Okoth O, Kangwana B. Women's empowerment and uptake of sulfadoxine–pyrimethamine for intermittent preventive treatment of malaria during pregnancy: results from a cross-sectional baseline survey in the Lake endemic region, Kenya. Malar J. 2023;22:241 (https://doi.org/10.1186/s12936-023-04679-z).

154. Sabin LL, Rizal A, Brooks MI, Singh MP, Tuchman J, Wylie BJ et al. Attitudes, knowledge, and practices regarding malaria prevention and treatment among pregnant women in Eastern India. Am J Trop Med Hyg. 2010;82:1010-6 (https://doi.org/10.4269/ajtmh.2010.09-0339).

155. Prevention and control of malaria epidemics: tutor's guide. Geneva: World Health Organization; 2003 (https://web.archive.org/web/20200701162342/https://www.who.int/malaria/publications/atoz/epidemics_tg.pdf).

156. Friis K, Vind BD, Simmons RK, Maindal HT. The relationship between health literacy and health behaviour in people with diabetes: a Danish population-based study. J Diabetes Res. 2016;2016:7823130 (https://doi.org/10.1155/2016/7823130).

157. Pell C, Straus L, Andrew EV, Menaca A, Pool R. Social and cultural factors affecting uptake of interventions for malaria in pregnancy in Africa: a systematic review of the qualitative research. PLoS One. 2011;6:e22452 (https://doi.org/10.1371/journal.pone.0022452).

158. Enyi EO, Ikegbunam MN, Iroha IR, Udeagbala NT, Esimone CO. Effects of formal education on malaria knowledge among people attending Federal Medical Centre, Owerri, Imo State, Nigeria. GSC Biological and Pharmaceutical Sciences. 2023;25:053-60 (https://doi.org/10.30574/gscbps.2023.25.3.0514).

159. Andegiorgish AK, Goitom S, Mesfun K, Hagos M, Tesfaldet M, Habte E et al. Community knowledge and practice of malaria prevention in Ghindae, Eritrea, a Cross-sectional study. Afr Health Sci. 2023;23:241-54 (https://doi.org/10.4314/ahs.v23i1.26).

160. Lalloo DG, Olukoya P, Olliaro P. Malaria in adolescence: burden of disease, consequences, and opportunities for intervention. Lancet Infect Dis. 2006;6:780-93 (https://doi.org/10.1016/s1473-3099(06)70655-7).

161. Nkumama IN, O'Meara WP, Osier FHA. Changes in malaria epidemiology in Africa and new challenges for elimination. Trends Parasitol. 2017;33:128-40 (https://doi.org/10.1016/j.pt.2016.11.006).

162. Klu D, Agordoh PD. Sex of household head and other household determinants of childhood anaemia among households in Ghana: regression analysis of the 2019 Malaria Indicator Survey. J Health Popul Nutr. 2022;41:46 (https://doi.org/10.1186/s41043-022-00327-5).

163. Cambodia malaria operational plan FY 2022. United States President's Malaria Initiative (PMI); 2021 (https://www.pmi.gov/wp-content/uploads/2022/01/FY-2022-Cambodia-MOP.pdf).

164. Agegnehu F, Shimeka A, Berihun F, Tamir M. Determinants of malaria infection in Dembia district, Northwest Ethiopia: a case-control study. BMC Public Health. 2018;18:480 (https://doi.org/10.1186/s12889-018-5370-4).

165. Olapeju B, Adams C, Hunter G, Wilson S, Simpson J, Mitchum L et al. Malaria prevention and care seeking among gold miners in Guyana. PLoS One. 2020;15:e0244454 (https://doi.org/10.1371/journal.pone.0244454).

166. Tafesse T, Tolera C, Amenu D. A retrospective analysis of malaria trends in Leka Dulecha Health Center over the last ten years (2013–2022), Western Oromia, East Wollega Zone. Biomed Res Int. 2023;2023:6635249 (https://doi.org/10.1155/2023/6635249).

167. Action Lab for Planetary Health. Gold mining in Brazil's Amazon rainforest is a major contributor to malaria outbreaks [research brief]. Palo Alto: Stanford Center for Innovation in Global Health; 2021 (https://globalhealth.stanford.edu/wp-content/uploads/2023/05/Gold-to-Malaria_-Research-Brief_v10-1.pdf).

168. Castellanos A, Chaparro-Narvaez P, Morales-Plaza CD, Alzate A, Padilla J, Arevalo M et al. Malaria in gold-mining areas in Colombia. Mem Inst Oswaldo Cruz. 2016;111:59-66 (https://doi.org/10.1590/0074-02760150382).

169. Grillet ME, Moreno JE, Hernandez-Villena JV, Vincenti-Gonzalez MF, Noya O, Tami A et al. Malaria in southern Venezuela: the hottest hotspot in Latin America. PLoS Negl Trop Dis. 2021;15:e0008211 (https://doi.org/10.1371/journal.pntd.0008211).

170. Katz E, Hartley A. Gender equality toolbox, gender and malaria evidence review. Bill & Melinda Gates Foundation; 2020 (https://www.gatesgenderequalitytoolbox.org/malaria/).

171. Vlassoff C. Gender differences in determinants and consequences of health and illness. J Health Popul Nutr. 2007;25:47-61 (https://www.ncbi.nlm.nih.gov/pubmed/17615903).

172. Allotey P, Gyapong M, UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases. The gender agenda in the control of tropical diseases: a review of current evidence. Geneva: World Health Organization; 2005 (https://iris.who.int/handle/10665/69067).

173. Diiro GM, Affognon HD, Muriithi BW, Wanja SK, Mbogo C, Mutero C. The role of gender on malaria preventive behaviour among rural households in Kenya. Malar J. 2016;15:14 (https://doi.org/10.1186/s12936-015-1039-y).

174. Global report on health equity for persons with disabilities. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/364834).

175. World Health Organization, World Bank. World report on disability 2011. Geneva: World Health Organization; 2011 (https://iris.who.int/handle/10665/44575).

176. Seen, counted, included: using data to shed light on the well-being of children with disabilities. New York: United Nations Children's Fund; 2022 (https://data.unicef.org/resources/children-with-disabilities-report-2021/).

177. Greaux M, Moro MF, Kamenov K, Russell AM, Barrett D, Cieza A. Health equity for persons with disabilities: a global scoping review on barriers and interventions in healthcare services. Int J Equity Health. 2023;22:236 (https://doi.org/10.1186/s12939-023-02035-w).

178. Doherty AJ, Atherton H, Boland P, Hastings R, Hives L, Hood K et al. Barriers and facilitators to primary health care for people with intellectual disabilities and/or autism: an integrative review. BJGP Open. 2020;4:bjgpopen20X101030 (https://doi.org/10.3399/bjgpopen20x101030).

179. Frequently asked questions on the health and rights of Indigenous Peoples [website]. World Health Organization; 2024 (https://www.who.int/initiatives/global-plan-of-action-for-health-of-indigenous-peoples/frequently-asked-questions-on-the-health-and-rights-of-indigenous-peoples).

180. United Nations declaration on the rights of indigenous peoples. New York: United Nations General Assembly; 2007 (https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf).

181. Strategy and plan of action on ethnicity and health 2019-2025. Washington, DC: Pan American Health Organization; 2019 (https://iris.paho.org/bitstream/handle/10665.2/51744/PAHOEGC19002_eng.pdf).

182. Dela Rosa, J.G.L., Ornos, E.D.B., Sianoya, A.C., Tantengco, O.A.G. and Guinaran, R.C. Social determinants of health inequities in Indigenous Children in the Philippines. J Paediatr Child Health. 2022;58:1493-1494 (https://doi.org/10.1111/jpc.16103).

183. Hall G, Gandolfo A. Poverty and exclusion among Indigenous Peoples: the global evidence [blog]. In: World Bank Blogs; 9 August 2016 (https://blogs.worldbank.org/en/voices/poverty-and-exclusion-among-indigenous-peoples-global-evidence).

184. Wetzler EA, Marchesini P, Villegas L, Canavati S. Changing transmission dynamics among migrant, indigenous and mining populations in a malaria hotspot in Northern Brazil: 2016 to 2020. Malar J. 2022;21:127 (https://doi.org/10.1186/s12936-022-04141-6).

185. Amaral PST, Garcia KKS, Suarez-Mutis MC, Coelho RR, Galardo AK, Murta F et al. Malaria in areas under mining activity in the Amazon: a review. Rev Soc Bras Med Trop. 2024;57:e002002024 (https://doi.org/10.1590/0037-8682-0551-2023).

186. Gonzaga D. The Yanomami People are facing a humanitarian crisis in Brazil [news release]. Greenpeace; 1 February 2023 (https://www.greenpeace.org/international/story/58033/yanomami-indigenous-brazil-mining-health-crisis-malnutrition-malaria/).

187. Kenya's minority and indigenous communities missing out on education and healthcare access [news release]. Minority Rights Group; 6 May 2021 (https://minorityrights.org/kenyas-minority-and-indigenous-communities-missing-out-on-education-and-healthcare-access/).

188. Gianella C, Ugarte-Gil C, Caro G, Aylas R, Castro C, Lema C. TB in vulnerable populations: the case of an indigenous community in the Peruvian Amazon. Health Hum Rights. 2016;18:55-68 (https://www.ncbi.nlm.nih.gov/pubmed/27780999).

189. Brierley CK, Suarez N, Arora G, Graham D. Healthcare access and health beliefs of the indigenous peoples in remote Amazonian Peru. Am J Trop Med Hyg. 2014;90:180-3 (https://doi.org/10.4269/ajtmh.13-0547).

190. Houghton N, Bascolo E, Cohen RR, Cruz Vilcarromero NL, Rodriguez Gonzalez H, Albrecht D et al. Identifying access barriers faced by rural and dispersed communities to better address their needs: implications and lessons learned for rural proofing for health in the Americas and beyond. Rural Remote Health. 2023;23:7822 (https://doi.org/10.22605/rrh7822).

191. Sandes LFF, Freitas DA, de Souza M, Leite KBS. Atencion primaria en salud a indigenas de America del Sur: revision integrativa de la bibliografia [Primary health care for South-American indigenous peoples: an integrative review of the literature]. Rev Panam Salud Publica. 2018;42:e163. (https://doi.org/10.26633/rpsp.2018.163) (in Portuguese).

192. Indigenous women's maternal health and maternal mortality. United Nations Population Fund; 2018 (https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/04/factsheet_print_Mar27.pdf).

193. Refugee and migrant health [website]. World Health Organization; 2022 (https://www.who.int/news-room/fact-sheets/detail/refugee-and-migrant-health).

194. Data and research [website]. Geneva: International Organization for Migration; 2024 (https://www.iom.int/data-and-research).

195. Refugee data finder [website]. Geneva: United Nations High Commissioner for Refugees; 2024 (https://www.unhcr.org/refugee-statistics).

196. Sudan: One year of conflict - key facts and figures (15 April 2024) [website]. United Nations Office for the Coordination of Humanitarian Affairs; 2024 (https://www.unocha.org/publications/report/sudan/sudan-one-year-conflict-key-facts-and-figures-15-april-2024).

197. World report on the health of refugees and migrants. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/360404).

198. Essential knowledge - health and migration [website]. Geneva: World Health Organization; 2024 (https://www.who.int/tools/refugee-and-migrant-health-toolkit/essential-knowledge-health-and-migration).

199. Declaration of Astana: Global Conference on Primary Health Care: Astana, Kazakhstan, 25 and 26 October 2018. Geneva: World Health Organization; 2019 (https://iris.who.int/handle/10665/328123).

200. Almeida G, Artaza O, Donoso N, Fabrega R. Atencao primaria a saude na Regiao das Americas 40 anos apos a Declaracao de Alma-Ata [Primary health care in the Region of the Americas 40 years after the Alma-Ata Declaration]. Rev Panam Salud Publica. 2018;42:e104. (https://doi.org/10.26633/rpsp.2018.104) (in Spanish).

201. Declaration for accelerated malaria mortality reduction in Africa: commitment that "No one shall die from malaria". Yaoundé: Ministers of Health of High Burden High Impact (HBHI) countries in Africa; 2024 (https://cdn.who.int/media/docs/default-source/malaria/mpac-documentation/malaria-conference-declaration-final.pdf).

202. The Lusaka Agenda: conclusions of the future of global health initiatives process. Future of Global Health Initiatives; 2023 (https://futureofghis.org/final-outputs/lusaka-agenda/).

203. World Health Organization, United Nations Children's Fund. A vision for primary health care in the 21st century: towards universal health coverage and the Sustainable Development Goals. Geneva: World Health Organization; 2018 (https://iris.who.int/handle/10665/328065).

204. Peiris D, Naledi T, Guaraci Jantsch A. The PHC approach: rationale for orienting health systems (Chapter 4). In: Rajan D, Rouleau K, Winkelmann J, Kringos D et al., editors. Implementing the primary health care approach: a primer. Geneva: World Health Organization; 2024:77-98 (https://iris.who.int/handle/10665/376777).

205. World Health Organization, United Nations Children's Fund. Operational framework for primary health care: transforming vision into action. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/337641).

206. Winkelmann J, Cavalcante de Oliveria AP, Maier CB, Ray S, Dussault G. Health and care workforce (Chapter 8). In: Rajan D, Rouleau K, Winkelmann J, Kringos D et al., editors. Implementing the primary health care approach: a primer. Geneva: World Health Organization; 2024:187-216 (https://iris.who.int/handle/10665/376777).

207. With large case reductions, India moves closer to zero malaria by 2030 [news release]. World Health Organization; 25 April 2021 (https://www.who.int/india/news/feature-stories/detail/with-large-case-reductions-india-moves-closer-to-zero-malaria-by-2030).

208. Amri M, Chatur A, O'Campo P. Intersectoral and multisectoral approaches to health policy: an umbrella review protocol. Health Res Policy Syst. 2022;20:21 (https://doi.org/10.1186/s12961-022-00826-1).

209. Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health: final report of the Commission on Social Determinants of Health. Geneva: World Health Organization; 2008 (https://iris.who.int/handle/10665/43943).

210. Willis DW, Hamon N. Potential impact of eradicating malaria on gender inequality within agricultural households in sub-Saharan Africa. Gates Open Res. 2020;4:114 (https://doi.org/10.12688/gatesopenres.13154.1).

211. Malaria No More, RBM Partnership to End Malaria. Achieving a double dividend: the case for investing in a gendered approach to the fight against malaria. Geneva: RBM Partnership to End Malaria; 2021 (https://endmalaria.org/related-material/achieving-double-dividend-malaria-and-gender-investment-case).

212. Gender: a critical missing lens in the malaria fight: an interim learning paper. Washington, DC: Malaria No More; 2020 (https://www.malarianomore.org/wp-content/uploads/2020/11/MNM-Malaria-Gender-Learning-Paper_with-Appendices-FINAL.pdf).

213. Potts H. Participation and the right to the highest attainable standard of health. Colchester, UK: Human Rights Centre; 2008 (https://repository.essex.ac.uk/9714/1/participation-right-highest-attainable-standard-health.pdf).

214. Accountability as a driver of health equity. Copenhagen: World Health Organization Regional Office for Europe; 2019 (https://iris.who.int/handle/10665/312282).

215. A global exchange on the role of community-led monitoring (CLM) in malaria programming: meeting report, June 1-2, 2023, Cape Town, South Africa. Geneva: Global Fund to Fight AIDS, Tuberculosis and Malaria; 2023 (https://www.theglobalfund.org/media/13438/crg_2023-community-led-monitoring-malaria-meeting_report_en.pdf).

216. Sorcher R, Bobadilla N, Penagunda R, Capaculan and Hagmang Community Leaders. What is community-led monitoring & why is it important? [blog]. In: The Outreach Blog: From the Field; August 2022 (https://outreach-international.org/blog/community-led-monitoring-and-evaluation/).

217. Establishing community-led monitoring of HIV services: principles and process. Geneva: Joint United Nations Programme on HIV/AIDS; 2021 (https://www.unaids.org/sites/default/files/media_asset/establishing-community-led-monitoring-hiv-services_en.pdf).

218. Coalition of Parliamentarians for Ending Malaria in Africa. A parliamentary initiative for the elimination of malaria in Africa. Yaoundé: Impact Sante Afrique; 2024 (https://impactsante.org/wp-content/uploads/2024/09/Introduction-Of-COPEMA.pdf).

219. Global plan for insecticide resistance management in malaria vectors: executive summary. Geneva: World Health Organization; 2012 (https://iris.who.int/handle/10665/78095).

220. malERA Refresh Consultative Panel on Insecticide and Drug Resistance. malERA: an updated research agenda for insecticide and drug resistance in malaria elimination and eradication. PLoS Med. 2017;14:e1002450 (https://doi.org/10.1371/journal.pmed.1002450).

221. Mao W, Cooke R, Silimperi D, Urli Hodges E, Ortiz E, Udayakumar K. Scaling malaria interventions: bottlenecks to malaria elimination. BMJ Glob Health. 2023;8:e013378 (https://doi.org/10.1136/bmjgh-2023-013378).

222. Sex and gender equity in research (SAGER) guidelines. European Association of Science Editors; 2016 (https://ease.org.uk/communities/gender-policy-committee/the-sager-guidelines/).

223. Community engagement: a health promotion guide for universal health coverage in the hands of the people. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/334379).

224. World Health Organization, United Nations Children's Fund. Primary health care measurement framework and indicators: monitoring health systems through a primary health care lens. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/352205).

225. SDG indicators: metadata repository. Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development [website]. New York: United Nations, Department of Economic and Social Affairs; 2024 (https://unstats.un.org/sdgs/metadata/?Goal=17&Target=17.18).

226. Malaria Matchbox Tool: an equity assessment tool to improve the effectiveness of malaria programs. Geneva: The Global Fund to Fight AIDS, Tuberculosis and Malaria and RBM Partnership to End Malaria; n.d. (https://endmalaria.org/sites/default/files/Malaria%20Matchbox%20Tool_en_web.pdf).

227. Innov8 approach for reviewing national health programmes to leave no one behind: technical handbook. Geneva: World Health Organization; 2016 (https://iris.who.int/handle/10665/250442).

228. Health equity assessment toolkit [website]. Geneva: World Health Organization; 2024 (https://www.who.int/data/inequality-monitor/assessment_toolkit).

229. Handbook for conducting an adolescent health services barriers assessment (AHSBA) with a focus on disadvantaged adolescents: knowing which adolescents are being left behind on the path to universal health coverage, and why. Geneva: World Health Organization; 2019 (https://iris.who.int/handle/10665/310990).

230. PMI Impact Malaria Cameroun: Analyse genre des déterminants de la prestation et de l'utilisation ses services de lutte contre le paludisme dans quatre communautés des régions du Nord et de l'Extrême Nord du Cameroun. United States President's Malaria Initiative (PMI); 2021 (https://assets.speakcdn.com/assets/2594/rapport_genre_et_paludisme_cameroun_final.pdf) (in French).

231. Impact Malaria Kenya: gender and barrier analysis report. United States President's Malaria Initiative (PMI); 2021 (https://assets.speakcdn.com/assets/2594/impact_malaria_kenya_gender_and_barrier_analysis_report_final.pdf).

232. Global research agenda on health, migration and displacement: strengthening research and translating research priorities into policy and practice. Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/373659).

233. Protopopoff N, Mosha JF, Messenger LA, Lukole E, Charlwood JD, Wright A et al. Effectiveness of piperonyl butoxide and pyrethroid-treated long-lasting insecticidal nets (LLINs) versus pyrethroid-only LLINs with and without indoor residual spray against malaria infection: third year results of a cluster, randomised controlled, two-by-two factorial design trial in Tanzania. Malar J. 2023;22:294 (https://doi.org/10.1186/s12936-023-04727-8).

234. Maiteki-Sebuguzi C, Gonahasa S, Kamya MR, Katureebe A, Bagala I, Lynd A et al. Effect of long-lasting insecticidal nets with and without piperonyl butoxide on malaria indicators in Uganda (LLINEUP): final results of a cluster-randomised trial embedded in a national distribution campaign. Lancet Infect Dis. 2023;23:247-58 (https://doi.org/10.1016/s1473-3099(22)00469-8).

235. Accrombessi M, Cook J, Dangbenon E, Sovi A, Yovogan B, Assongba L et al. Effectiveness of pyriproxyfen-pyrethroid and chlorfenapyr-pyrethroid long-lasting insecticidal nets (LLINs) compared with pyrethroid-only LLINs for malaria control in the third year post-distribution: a secondary analysis of a cluster-randomised controlled trial in Benin. Lancet Infect Dis. 2024;24:619-28 (https://doi.org/10.1016/s1473-3099(24)00002-1).

236. Mosha JF, Matowo NS, Kulkarni MA, Messenger LA, Lukole E, Mallya E et al. Effectiveness of long-lasting insecticidal nets with pyriproxyfen–pyrethroid, chlorfenapyr–pyrethroid, or piperonyl butoxide–pyrethroid versus pyrethroid only against malaria in Tanzania: final-year results of a four-arm, single-blind, cluster-randomised trial. Lancet Infect Dis. 2024;24:87-97 (https://doi.org/10.1016/s1473-3099(23)00420-6).

237. Intermittent preventive treatment of malaria in pregnancy using sulfadoxine-pyrimethamine (IPTp-SP): updated WHO policy recommendation. Geneva: World Health Organization; 2012 (https://iris.who.int/handle/10665/337990).

238. Slater HC, Griffin JT, Ghani AC, Okell LC. Assessing the potential impact of artemisinin and partner drug resistance in sub-Saharan Africa. Malar J. 2016;15:10 (https://doi.org/10.1186/s12936-015-1075-7).

239. Misikir M, Nolen S. Malaria is surging in Ethiopia, reversing a decade of progress against the disease. The New York Times; 25 October 2024 (https://www.nytimes.com/2024/10/25/health/malaria-ethiopia-deaths-cases.html).

240. Cohen JM, Smith DL, Cotter C, Ward A, Yamey G, Sabot OJ et al. Malaria resurgence: a systematic review and assessment of its causes. Malar J. 2012;11:122 (https://doi.org/10.1186/1475-2875-11-122).

241. IPCC, 2023: Summary for policymakers. In: Core Writing Team, Lee H, Romero J. Climate change 2023: synthesis report. Contribution of Working Groups I, II and III to the sixth assessment report of the Intergovernmental Panel on Climate Change. Geneva: IPCC; 2023 (https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf).

242. Mundel T. The quest for transformative tools to eradicate malaria. N Engl J Med. 2024;390:1620-1 (https://doi.org/10.1056/nejme2402430).

243. Strategic Information and Response Unit. Update on subnational tailoring of malaria interventions and strategies [background document]. Geneva: World Health Organization; 2024 (https://cdn.who.int/media/docs/default-source/malaria/mpac-documentation/mpag-march2024-session4-subnational-tailoring-of-interventions-rev.pdf).

244. Klepac P, Hsieh JL, Ducker CL, Assoum M, Booth M, Byrne I et al. Climate change, malaria and neglected tropical diseases: a scoping review. Trans R Soc Trop Med Hyg. 2024;118:561-79 (https://doi.org/10.1093/trstmh/trae026).

Annexes

Annex 1 – Data sources and methods

Fig. 2.1. Estimated number of malaria cases per country and area in 2023

See methods notes for **Table 2.1**.

Table 2.1. Global estimated malaria cases and deaths, 2000–2023

For each country or area, the number of malaria cases was estimated by one of the three methods described below.

Method 1

Method 1 was used for countries and areas outside the World Health Organization (WHO) African Region, and for low transmission countries and areas in the African Region as follows: Afghanistan, Bangladesh, the Bolivarian Republic of Venezuela, Botswana, Brazil, Cambodia, Colombia, the Dominican Republic (until 2020), Eritrea, Ethiopia, French Guiana (until 2020), the Gambia, Guatemala (until 2020), Guyana, Haiti, Honduras (until 2020), India, Indonesia, the Lao People's Democratic Republic, Madagascar, Mauritania, Myanmar, Namibia, Nepal (until 2020), Nicaragua, Pakistan, Panama (until 2020), Papua New Guinea, Peru, the Philippines, the Plurinational State of Bolivia, Rwanda, Senegal, Solomon Islands, Timor-Leste (until 2016), Vanuatu, Viet Nam (until 2020), Yemen and Zimbabwe.

Estimates were made by adjusting the number of reported malaria cases for completeness of reporting, the likelihood that presumed cases were parasite positive, and the extent of health service use. The procedure, which is described in the *World malaria report 2008* (*1*), combines national data annually reported by national malaria programmes (NMPs) (i.e. reported cases, reporting completeness and test positivity rates) with data obtained from nationally representative household surveys on health service use among children aged under 5 years, which was assumed to be representative of the service use in all ages. Briefly:

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

where:

a is malaria cases confirmed in the public sector

c is presumed cases (not tested but treated as malaria)

d is reporting completeness

e is test positivity rate (malaria positive fraction) = a/b, where b is suspected cases tested

f is the fraction seeking treatment in the private sector

g is the fraction seeking treatment in the public sector

Factor to adjust for those not seeking treatment: $(1 - g - f)$

Cases in the public sector: $(a + (c \times e))/d$

Cases in the private sector: $(a + (c \times e))/d \times f/g$

To estimate the uncertainty around the number of cases, the test positivity rate was assumed to have a normal distribution centred on the test positivity rate value and standard deviation – defined as $0.244 \times e0.5547$ and truncated to be in the range 0, 1. Reporting completeness (d) was assumed to have one of three distributions, depending on the value reported by the NMP. If the value was reported as a range greater than 80%, the distribution was assumed to be triangular, with limits of 0.8 and 1.0, and the peak at 0.95. If the reporting completeness was reported as a value and was more than 80%, a beta distribution was assumed, with a mean value of the reported value (maximum of 95%) and confidence intervals (CIs) of 5% around the mean value. If the value or range was more than 50% but less than or equal to 80%, the distribution was assumed to be rectangular, with limits of 0.5 and 0.8, and the peak at 0.8. Finally, if the value or range was less than or equal to 50%, the distribution was assumed to be triangular, with limits of 0 and 0.5, and the peak at 0.5 (*2*). The fraction of children brought for care in the public sector and in the private sector was assumed to have a beta distribution, with the mean value being the estimated value in the survey and the standard deviation being calculated from the range of the estimated 95% CIs. The fraction of children not brought for care was assumed to have a rectangular distribution, with the lower limit being 0 and the upper limit calculated as 1 minus the proportion that were brought for care in the public and private sectors. The three distributions (fraction seeking treatment in the public sector, fraction seeking treatment in the private sector only and fraction not seeking treatment) were constrained to add up to 1.

Sector-specific care seeking fractions were linearly interpolated between the years that had a survey and were extrapolated for the years before the first or after the last survey. The parameters used to propagate uncertainty around these fractions were also imputed in a similar way or, if there was no value for any year in the country or area, were imputed as a mixture of the distributions of the region for that year. CIs were obtained from 10 000 draws of the convoluted distributions. The data were analysed using R statistical software, using the *convdistr* R package to propagate uncertainty and manage distributions (*3*).

For India, the values were obtained at subnational level using the same methodology. An additional adjustment was applied in several states in India between 2020 and 2022, to control for the reductions in reported testing rates associated with disruptions in health services related to the COVID-19 pandemic. The states with reductions in testing rates below those expected (defined as a change in testing rates of more than 10% observed between 2018 and 2019) in 2020 were Bihar, Chandigarh, Chhattisgarh, Dadra and Nagar Haveli, Delhi, Goa, Jharkhand, Karnataka, Puducherry, Punjab, Uttar Pradesh, Uttarakhand and West Bengal. In 2021, the states with reductions in testing rates were Assam, Chandigarh, Chhattisgarh, Daman and Diu, Delhi, Goa, Himachal Pradesh, Karnataka, Kerala, Manipur, Puducherry, Punjab, Uttar Pradesh, Uttarakhand and West Bengal. In 2022, cases were corrected for the states of Assam, Bihar, Chandigarh, Chhattisgarh, Delhi, Gujarat, Himachal Pradesh, Manipur, Puducherry, Punjab, Sikkim and West Bengal. In these states, the excess number of indigenous cases expected in the absence of diagnostic disruptions was calculated by estimating the number of additional tests that would have been conducted if testing rates were similar to those observed in 2019, then applying the test positivity ratio observed in 2019 (or in 2020 for Delhi and Jharkhand, or in 2021 and 2022 for Delhi and Puducherry) to this number. The malaria burden in countries outside the WHO

African Region was affected by the COVID-19 pandemic in different ways. In several countries, the movement disruptions led to transmission reductions; in other cases, testing rates remained unchanged. This made it challenging to apply a single source of data for correction to all countries, considering also that it was difficult to relate the reported data to the essential health services (EHS) response. No adjustment for private sector treatment seeking was made for the following countries and areas because they report cases from the private and public sector together: Bangladesh, the Bolivarian Republic of Venezuela, Botswana, Brazil, Colombia, the Dominican Republic, French Guiana, Guatemala, Guyana, Haiti, Honduras, Indonesia (since 2017), Myanmar (since 2013), Nepal (since 2019), Nicaragua, Panama, Peru, the Plurinational State of Bolivia and Rwanda. For Senegal and Yemen, reported cases from last year were used, adjusting for the changes in population at risk values, and then these data were used to estimate the number of cases.

Method 2

Method 2 was used for high transmission countries in the WHO African Region and for countries in the Eastern Mediterranean Region in which the quality of surveillance data did not permit a robust estimate from the number of reported cases. These countries were Angola, Benin, Burkina Faso, Burundi, Cameroon, the Central African Republic, Chad, the Congo, Côte d'Ivoire, the Democratic Republic of the Congo, Equatorial Guinea, Gabon, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Malawi, Mali, Mozambique, the Niger, Nigeria, Sierra Leone, Somalia, South Sudan, the Sudan, Togo, Uganda, the United Republic of Tanzania and Zambia. 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 almost 60 000 survey records were assembled within a spatiotemporal Bayesian geostatistical model, together with environmental and sociodemographic covariates, and data distribution on interventions such as insecticide-treated mosquito nets (ITNs), antimalarial drugs and indoor residual spraying (IRS) (*4*) that are updated yearly to review the model. The geospatial model enabled predictions of *Plasmodium falciparum* prevalence in children aged 2–10 years, at a resolution of 5×5 km^2, throughout all malaria endemic WHO African Region countries for each year from 2000 to 2020. Second, an ensemble model was developed to predict malaria incidence as a function of parasite prevalence (*5*). The model was then applied to the estimated parasite prevalence, to obtain estimates of the malaria case incidence at 5×5 km^2 resolution for each year from 2000 to 2021.[1] 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 (*6*).

Between 2020 and 2022, additional cases estimated using this method were added to account for the disruptions in malaria prevention, diagnostic and treatment services as a result of the COVID-19 pandemic and other events that occurred during this period. Disruption information was reported per country and was obtained from the national pulse surveys on continuity of EHS during the COVID-19 pandemic conducted by WHO (first round in May–July 2020, second in January–March 2021 and third in November–December 2021) (*7-9*), and extended into 2022. The medium, minimum and maximum (with a limit of 50%) values of the ranges provided by countries to define disruptions were used to quantify the percentage of malaria service disruptions. This information was integrated into the estimates by applying an approach previously used for assessing the impacts of interventions on malaria burden through the creation of counterfactual burden estimates for scenarios with varying levels of intervention coverage. It was assumed that COVID-19-related disruptions to health care manifested themselves as reduced treatment seeking for malaria and thus reduced effective treatment with an antimalarial drug. The counterfactual estimates were then aligned, per country, with the estimates from the pulse surveys to produce a set of COVID-19-adjusted estimates for 2020, 2021 and 2022. For countries for which the estimates with the updated spatiotemporal model were considerably different from previous estimates without addition of new data or evidence that explained the drastic changes estimated by the model (Burkina Faso, Gabon, Guinea, Mali, the Niger, Nigeria, Somalia, the Sudan and Uganda), the case series published in the *World malaria report 2023* (*10*) were used until 2022, adjusting for the changes in population-at-risk values. The values for 2023 were estimated by applying the change rate between the cases estimated using the spatiotemporal model of incidence between 2022 and 2023 and adjusting for population changes between these 2 years.

Method 3

For most of the elimination countries and countries at the stage of prevention of reintroduction, the number of indigenous and introduced cases registered by NMPs are reported without further adjustments (*6*). The countries in this category were Algeria, Argentina, Armenia, Azerbaijan, Belize, Bhutan, Cabo Verde, China, the Comoros, Costa Rica, the Democratic People's Republic of Korea, Djibouti, the Dominican Republic (since 2021), Ecuador, Egypt, El Salvador, Eswatini, French Guiana (since 2021), Georgia, Guatemala (since 2021), Honduras (since 2021), Iraq, the Islamic Republic of Iran, Kazakhstan, Kyrgyzstan, Malaysia, Mexico, Morocco, Nepal (since 2021), Oman, Panama (since 2021), Paraguay, the Republic of Korea, Sao Tome and Principe, Saudi Arabia, South Africa, Sri Lanka, Suriname, the Syrian Arab Republic, Tajikistan, Thailand, Timor-Leste (since 2017), Türkiye, Turkmenistan, the United Arab Emirates, Uzbekistan and Viet Nam (since 2021).

Country-specific adjustments

For some years, information for certain countries was not available or could not be used because it was of poor quality. For countries in this situation, the number of cases was imputed from other years when the quality of the data was better (adjusting for population growth), as follows: for Afghanistan, values for 2000–2001 were imputed from 2002–2003; and for Bangladesh, values for 2001–2005 were imputed from

[1] See the Malaria Atlas Project website for methods on the development of maps (*6*).

Annex 1 – Data sources and methods

2006–2008. For Ethiopia, values for 2000–2019 were taken from a mixed distribution between values from Method 1 and Method 2 (50% from each method). For the Gambia, values for 2000–2010 were imputed from 2011–2013; for Haiti, values for 2000–2005, 2009 and 2010 were imputed from 2006–2008; for Indonesia, values for 2000–2003 and 2007–2009 were imputed from 2004–2006; and for Mauritania, values for 2000–2010 were imputed from a mixture of Method 1 and Method 2, starting with 100% values from Method 2 for 2001–2002, with that percentage decreasing to 10% of Method 1 in 2010. For Myanmar, values for 2000–2005 were imputed from 2007–2009; and for Namibia, values for 2000 were imputed from 2001–2003 and values for 2012 were imputed from 2011 and 2013. For Pakistan, values for 2000 were imputed from 2001–2003; and for Papua New Guinea, values for 2012 were imputed from 2009–2011. For Rwanda, values for 2000–2006 were imputed from a mixture of Method 1 and Method 2, starting with 100% values from Method 2 in 2000, with that percentage decreasing to 10% in 2006. For Senegal, values for 2000–2006 were imputed from a mixture of Method 1 and Method 2, with 90% of Method 2 in 2000, decreasing to 10% of Method 2 in 2006. For Thailand, values for 2000 were imputed from 2001–2003; for Timor-Leste, values for 2000–2001 were imputed from 2002–2004; and for Zimbabwe, values for 2000–2006 were imputed from 2007–2009.

Estimation of *P. vivax* cases

The number of malaria cases caused by *P. vivax* in each country was estimated by multiplying the country's reported proportion of *P. vivax* cases (computed as 1 − *P. falciparum* plus other species) 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* cases was assumed to have a beta distribution and was estimated from the proportion of *P. falciparum* cases reported by NMPs.

Population at risk

To transform malaria cases into incidence, an estimate of population at risk was used. The proportion of the population at high, low or no risk of malaria was provided by NMPs. Population at risk was estimated as the population at risk in high endemic areas and half of the population at risk in low endemic areas. This proportion was applied to the latest United Nations (UN) population estimates available (2024, an update from the estimates used for the world malaria reports for 2020 and 2021), to compute the number of people at risk of malaria. The proportion was sustained over time from 2000 to 2023 to ensure comparability of incidence estimates across years in the same cohort of countries that had been endemic since 2000. The population at risk at the regional and global level was aggregated; it included the population of all endemic countries since 2000, even though some of them achieved elimination during this time.

a) Global estimated malaria deaths

The number of malaria deaths was estimated using methods from Category 1, 2 or 3, as outlined below.

Category 1 method

The Category 1 method was used for low transmission countries and areas, both within and outside the WHO African Region: Afghanistan, Bangladesh, the Bolivarian Republic of Venezuela, Cambodia, the Comoros, Djibouti, Eritrea, Ethiopia, French Guiana (until 2020), Guatemala (until 2020), Guyana, Haiti, Honduras (until 2020), India, Indonesia, the Lao People's Democratic Republic, Madagascar, Mauritania (since 2016), Myanmar, Nepal (until 2020), Pakistan, Papua New Guinea, Peru, the Philippines, the Plurinational State of Bolivia, Solomon Islands, Senegal (since 2008), Somalia, the Sudan, Timor-Leste, Vanuatu (until 2012), Viet Nam (until 2017), Yemen and Zimbabwe.

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 (*11-14*) and rates from unpublished data from Indonesia, 2004–2009.[1] The proportion of deaths followed a rectangular distribution of between 0.01% and 0.40% – the minimum and maximum values available that were reported. 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 of 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:

$$\text{Proportion of deaths}_{\text{under 5}} = -0.2288 \times \text{Mortality}_{\text{overall}}^{2} + 0.823 \times \text{Mortality}_{\text{overall}} + 0.2239$$

where $\text{Mortality}_{\text{overall}}$ is the number of estimated all-age deaths over the estimated population at risk per 1000 (see **Annex 4-F** for national estimates of population at risk).

Category 2 method

The Category 2 method was used for countries in the WHO African Region with a high proportion of deaths due to malaria: Angola, Benin, Burkina Faso, Burundi, Cameroon, the Central African Republic, Chad, the Congo, Côte d'Ivoire, the Democratic Republic of the Congo, Equatorial Guinea, Gabon, the Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Malawi, Mali, Mauritania (until 2015), Mozambique, the Niger, Nigeria, Rwanda, Senegal (until 2007), Sierra Leone, South Sudan, Togo, Uganda, the United Republic of Tanzania and Zambia.

With this method, child malaria deaths were estimated using a new multinomial Bayesian least absolute shrinkage and selection operator (LASSO) model that was reviewed by the WHO Child and Adolescent Cause of Death Estimates (CA-CODE, formerly the Maternal and Child Health Epidemiology Estimation [MCEE]) Group in 2021, to produce updated estimates of cause of death (CoD) in children aged 1–59 months between 2000 and 2023 (*15*). Mortality estimates (and 95% CIs) were derived for eight causes of post-neonatal death (pneumonia, diarrhoea, malaria, tuberculosis, 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).

[1] Dr Ric Price, Menzies School of Health Research, Australia, personal communication, November 2014.

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 all-cause mortality envelope of 1–59 months (excluding HIV/AIDS and measles deaths) for corresponding years.

The number of malaria deaths among children aged under 5 years was calculated by applying the country-specific yearly malaria CoD fraction to the all-cause mortality envelope of 1–59 months estimated by the UN Inter-agency Group for Child Mortality Estimation (*16*). The same malaria CoD fractions observed in 2021 were used in 2022 and 2023. The CoD fraction obtained from Mali and Angola in 2021 was adjusted to mirror the corrections to the incidence estimates applied in last year's report by applying an inflation factor that compared the prevalence to incidence estimates published in the *World malaria report 2022* between 2015 and 2021. The same CoD fraction estimated for 2021 was used in 2023. It was considered 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 5 years and over, using the relationship between levels of malaria mortality in a series of age groups and the intensity of malaria transmission (*17*), and assuming a nonlinear association between under-5-years mortality and over-5-years mortality, as follows:

$$\text{Proportion of deaths}_{\text{over 5}} = -0.293 \times \text{Mortality}_{\text{under 5}}^{2} + 0.8918 \times \text{Mortality}_{\text{under 5}} + 0.2896$$

where $\text{Mortality}_{\text{under 5}}$ is the number of estimated deaths over the estimated population at risk per 1000 in 2006 (*17*).

Between 2020 and 2022, additional malaria deaths estimated using this method were included to account for the disruptions in malaria diagnostic and treatment services as a result of the COVID-19 pandemic. Country-specific mortality inflation ratios were calculated by comparing the malaria mortality estimates for 2020–2022, in the presence and absence of diagnosis and treatment disruptions from the Malaria Atlas Project's (MAP) malaria mortality estimates (results not presented in the report, but derived from the malaria incidence estimates), with both estimates accounting for disruptions to prevention interventions. Inflation ratios were then applied to the number of malaria deaths for 2020, 2021 and 2022 to estimate the number of deaths expected, considering the reported disruptions.

Category 3 method

For the Category 3 method, the number of indigenous malaria deaths registered by NMPs is reported without further adjustments. This category was used in the following countries: Algeria, Argentina, Armenia, Azerbaijan, Belize, Bhutan, Botswana, Brazil, Cabo Verde, China, Colombia, Costa Rica, the Democratic People's Republic of Korea, the Dominican Republic, Ecuador, Egypt, El Salvador, French Guiana (since 2021), Georgia, Guatemala (since 2021), Honduras (since 2021), Iraq, the Islamic Republic of Iran, Kazakhstan, Kyrgyzstan, Malaysia, Mexico, Morocco, Namibia, Nepal (since 2021), Nicaragua, Oman, Panama, Paraguay, the Republic of Korea, Sao Tome and Principe, Saudi Arabia, South Africa, Sri Lanka, Suriname, the Syrian Arab Republic, Tajikistan, Thailand, Türkiye, Turkmenistan, the United Arab Emirates, Uzbekistan, Vanuatu (since 2013) and Viet Nam (since 2021).

Fig. 2.2. Countries and areas with indigenous cases in 2000 and their status by 2023

Data on the number of indigenous cases (an indicator of whether countries or areas are endemic for malaria) were as reported to the WHO by NMPs. Countries and areas with 3 consecutive years of zero indigenous cases are considered to have eliminated malaria and are no longer considered to be endemic.

Fig. 2.3. Global trends in a) malaria case incidence (cases per 1000 population at risk) and b) mortality rate (deaths per 100 000 population at risk), 2000–2023; and c) distribution of malaria cases and d) deaths, by country, 2023

See methods notes for **Table 2.1**.

Table 2.2. Estimated malaria cases and deaths in the WHO African Region, 2000–2023

See methods notes for **Table 2.1**.

Fig. 2.4. Trends in a) malaria case incidence (cases per 1000 population at risk) and b) mortality rate (deaths per 100 000 population at risk), 2000–2023; and c) malaria cases by country in the WHO African Region, 2023

See methods notes for **Table 2.1**.

Table 2.3. Estimated malaria cases and deaths in the WHO Region of the Americas, 2000–2023

See methods notes for **Table 2.1**.

Fig. 2.5. Trends in a) malaria case incidence (cases per 1000 population at risk) and b) mortality rate (deaths per 100 000 population at risk), 2000–2023; and c) malaria cases by country in the WHO Region of the Americas, 2023

See methods notes for **Table 2.1**.

Table 2.4. Estimated malaria cases and deaths in the WHO Eastern Mediterranean Region, 2000–2023

See methods notes for **Table 2.1**.

Fig. 2.6. Trends in a) malaria case incidence (cases per 1000 population at risk) and b) mortality rate (deaths per 100 000 population at risk), 2000–2023; and c) malaria cases by country in the WHO Eastern Mediterranean Region, 2023

See methods notes for **Table 2.1**.

Table 2.5. Estimated malaria cases and deaths in the WHO South-East Asia Region, 2000–2023

See methods notes for **Table 2.1**.

Fig. 2.7. Trends in a) malaria case incidence (cases per 1000 population at risk) and b) mortality rate (deaths per 100 000 population at risk), 2000–2023; and c) malaria cases by country in the WHO South-East Asia Region, 2023

See methods notes for **Table 2.1**.

Annex 1 – Data sources and methods

Table 2.6. Estimated malaria cases and deaths in the WHO Western Pacific Region, 2000–2023

See methods notes for **Table 2.1**.

Fig. 2.8. Trends in a) malaria case incidence (cases per 1000 population at risk) and b) mortality rate (deaths per 100 000 population at risk), 2000–2023; and c) malaria cases by country in the WHO Western Pacific Region, 2023

See methods notes for **Table 2.1**.

Fig. 2.9. Estimated malaria a) cases and b) deaths in the 11 current HBHI countries, 2000–2023

These estimates were for high burden to high impact (HBHI) countries. See methods notes for **Table 2.1**.

Fig. 2.10. Cumulative number of a) malaria cases and b) malaria deaths averted, globally and by WHO region, 2000–2023

See methods notes for **Table 2.1** for information on estimation of cases and deaths. Estimated cases and deaths averted over the period 2000–2023 were computed by comparing current estimates for each year since 2000 with the malaria case incidence and mortality rates from 2000, assuming they remained constant throughout the same period, and adjusting for population growth.

Fig. 2.11. Percentage of a) malaria cases and b) malaria deaths averted, by WHO region, 2000–2023

See methods notes for **Table 2.1** for information on estimation of cases and deaths. See notes for **Fig. 2.10** for methods used to estimate cases and deaths averted. The percentage of cases and deaths averted was estimated using overall global cases and deaths averted as the denominator, and regional cases and deaths averted as the numerator.

Fig. 2.12. Estimated prevalence of exposure to malaria infection during pregnancy, overall and by subregion in 2023, in moderate to high transmission countries in the WHO African Region

Estimates of malaria-exposed pregnancies and preventable malaria-attributable low birthweight (LBW) deliveries in the absence of pregnancy-specific malaria prevention (i.e. long-lasting insecticidal nets [LLINs], delivery based on intermittent preventive treatment of malaria in pregnancy [IPTp] or antenatal care [ANC]) were obtained using a model of the relationship between these outcomes, slide microscopy prevalence in the general population, and age- and gravidity-specific fertility patterns. This model was developed by fitting an established model of the relationship between malaria transmission and malaria infection by age (*18*) to patterns of infection in placental histology (*19*) and attributable LBW risk by gravidity, in the absence of IPTp or other effective chemoprevention (*20*). The model was run across a 0.2-degree (5 km^2) longitude/latitude grid for 100 realizations of the MAP (*6*) joint posterior estimated slide prevalence in children aged 2–10 years in 2021 (*21*). Country-specific, age-specific or gravidity-specific fertility rates, stratified by urban rural status, were obtained from the latest demographic and health surveys (DHS) and malaria indicator surveys (MIS), where such surveys had been carried out since 2014 and were available from the DHS programme website (*22*). Countries where surveys were not available were allocated fertility patterns from a survey undertaken in another country, matched on the basis of total fertility rate (*23*) and geography. Fertility patterns of individual women and girls within simulations at each grid-point were simulated based on the proportion of women and girls estimated to be living in urban or rural locations. Urban or rural attribution at a 1 km^2 scale was conducted based on WorldPop 1 km^2 population estimates from 2018 (*24*) and an urban/rural threshold of 386 people per km^2 (*25*); the estimates were then aggregated to the 0.2-degree (5 km^2) resolution of the MAP surfaces. This provided a risk of malaria infection and malaria-attributable LBW in the absence of prevention during pregnancy, along with a modelled per-capita pregnancy rate for each grid-point, which was aggregated to country level (using WorldPop population estimates) to provide a per-pregnancy risk of malaria infection and a per-live-birth estimate of malaria-attributable LBW in the absence of prevention. These were then multiplied by country-level estimates of pregnancies and malaria-attributable estimates of neonates with low birthweight in 2022 (**Fig. 2.13**).

Fig. 2.13. Estimated number of neonates with low birthweight due to exposure to malaria infection during pregnancy (without IPTp versus at estimated levels of IPTp coverage), overall and by subregion in 2023, in moderate to high transmission countries in sub-Saharan Africa

Methods for estimating malaria infection in pregnancy and malaria-attributable LBWs are described in Walker et al. (2014) (*20*) as referenced in the methods notes for **Figure 2.12**. Numbers of pregnancies were estimated from the latest UN population-estimated number of births and were adjusted for the rate of abortion, miscarriage and stillbirths (*26*, *27*). The underlying *P. falciparum* parasite prevalence estimates were from the *Pf*PR$_{2–10}$ estimates described in the notes for **Table 2.1**, using methods described in Bhatt et al. (2015) (*21*).

Fig. 2.14. Estimated number of neonates with low birthweight averted if current levels of IPTp coverage are maintained, and additional number averted if coverage of IPTp1 were optimized to match levels of coverage of ANC1 in 2023 while maintaining IPTp2 and IPTp3 at current levels, in moderate to high transmission countries in the WHO African Region

Efficacy of IPTp was modelled as a per sulfadoxine–pyrimethamine (SP) dose reduction in the attributable risk of LBW, fitted to data from trials of IPTp-SP efficacy before the implementation of the intervention as policy; thus, the results reflect the impact on drug-sensitive parasites, with the central estimate being based on an assumed malaria-attributable LBW fraction of 40% within these trials. The modelling produced estimates of 48.5%, 73.5% and 86.3% efficacy in preventing malaria-attributable LBW for women and girls receiving one, two or three doses of SP through IPTp, respectively. This analysis excluded South Sudan, owing to the lack of consistent IPTp data reporting through time.

Fig. 2.15. Estimated number of neonates with low birthweight averted if levels of IPTp3 coverage were optimized to match levels of coverage of ANC1 in 2023, in moderate to high transmission countries in the WHO African Region

See methods notes for **Fig. 2.13** and **Fig. 2.14**.

Fig. 2.16. Estimated number of neonates with low birthweight averted if levels of IPTp3 were optimized to achieve 90% coverage in 2023, in moderate to high transmission countries in the WHO African Region

See methods notes for **Fig. 2.13** and **Fig. 2.14**.

Fig. 3.1. Comparison of global progress in malaria a) case incidence and b) mortality rate, considering two scenarios: current trajectory maintained (blue) and GTS targets achieved (green)

The *Global technical strategy for malaria 2016–2030* (GTS) target is a 90% reduction of malaria incidence and mortality rate by 2030, with milestones of 40% and 75% reductions in both indicators for the years 2020 and 2025, respectively (*28*). A curve based on a quadratic fit is used for the malaria incidence GTS milestones. For projection of malaria incidence under current estimated trends, the same year-on-year linear trend observed in the previous 10 years (2014–2023) is forecast up to 2030. Predicted cases between 2023 and 2030 that are 20% higher than the maximum number of cases ever observed in the time series are capped at the maximum case value × 1.2 to avoid unreasonably high projections. Regions affected by the cap will experience a decrease in projected incidence starting from the year in which the cap is applied, due to population growth under a stable number of maximum projected cases. The distance between the target and the observed or projected incidence or mortality estimates is calculated using the following formula: 1 minus (GTS expected value for a given year/observed or projected value for the same year).

Fig. 3.2. Map of malaria endemic countries (including the territory of French Guiana) showing progress towards the GTS 2025 malaria case incidence milestone of at least 63% reduction from a 2015 baseline

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

The milestone of 63% represents the estimated expected reduction for 2023 that lies between the GTS targets of 2020 (40%) and 2025 (75%), based on a quadratic fit of the GTS targets.

Fig. 3.3. Map of malaria endemic countries (including the territory of French Guiana) showing progress towards the GTS 2025 malaria mortality rate milestone of at least 63% reduction from a 2015 baseline

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

Fig. 3.4. Comparison of progress in malaria a) case incidence and b) mortality rate in the WHO African Region considering two scenarios: current trajectory maintained (blue) and GTS targets achieved (green)

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

Fig. 3.5. Comparison of progress in malaria a) case incidence and b) mortality rate in the WHO Region of the Americas considering two scenarios: current trajectory maintained (blue) and GTS targets achieved (green)

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

Fig. 3.6. Comparison of progress in malaria a) case incidence and b) mortality rate in the WHO Eastern Mediterranean Region considering two scenarios: current trajectory maintained (blue) and GTS targets achieved (green)

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

Fig. 3.7. Comparison of progress in malaria a) case incidence and b) mortality rate in the WHO South-East Asia Region considering two scenarios: current trajectory maintained (blue) and GTS targets achieved (green)

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

Fig. 3.8. Comparison of progress in malaria a) case incidence and b) mortality rate in the WHO Western Pacific Region considering four scenarios with and without the inclusion of Papua New Guinea: current trajectory maintained (blue; light purple) and GTS targets achieved (green; dark purple)

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

Fig. 4.1. Number of countries that were malaria endemic in 2000 and had fewer than 10, 100, 1000 and 10 000 indigenous malaria cases, 2000–2023

The figure is based on the countries where malaria was endemic in 2000 that also had cases of malaria reported in 2000 (108 endemic countries, excluding Egypt, Kazakhstan and the United Arab Emirates, with zero reported cases in 2000). *P. knowlesi* cases were not included. The number of estimated cases was tabulated.

Fig. 4.2. Countries and areas that have been certified malaria free since 1960

Countries and areas displayed in green have been certified as malaria free (with the year of certification indicated).

Fig. 4.3. Countries and areas that form the E-2025 initiative

Countries and areas selected for the malaria eliminating countries for 2025 (E-2025) initiative in 2021. The selection was based on the following criteria: a set goal for malaria elimination by 2025 backed by a government-endorsed elimination plan; meeting a defined threshold of malaria case reductions in recent years; and meeting pre-defined malaria programme requirements.

Fig. 4.4. Total number of indigenous malaria cases in E-2025, by country and area, 2010–2023

Data were derived from NMP reports. Total indigenous malaria cases are based on confirmed malaria cases reported as indigenous by all countries and one area under the E-2025 initiative between 2010 and 2023. For countries where not all cases are classified, total confirmed cases minus imported and introduced cases were used. For years where no case classification was carried out, all confirmed cases were considered to be indigenous. Unclassified cases were reclassified as indigenous and added to reported indigenous cases. *P. knowlesi* cases were excluded from countries reporting this species (Cambodia, Indonesia, Malaysia, the Philippines and Thailand).

Table 4.1. Number of indigenous malaria cases in E-2025 countries and areas, 2010–2023

See methods notes for **Fig. 4.4**.

Fig. 4.5. Total indigenous malaria and *P. falciparum* cases in the GMS, 2015–2023

Data on the Greater Mekong subregion (GMS) were derived from the WHO database. Total indigenous malaria cases and indigenous *P. falciparum* cases are based on confirmed cases reported as indigenous per country where 100% of malaria cases are investigated and classified. Where not all cases are classified, total confirmed minus imported and introduced cases, and total *P. falciparum* minus imported and introduced *P. falciparum* cases were used to calculate indigenous malaria cases and indigenous *P. falciparum* cases, respectively. Where cases are not classified, all confirmed cases are assumed to be indigenous. The methodology used can vary by year for the same country. *P. knowlesi* cases were excluded from total indigenous cases.

Fig. 4.6. Total indigenous malaria and *P. falciparum* cases in the GMS, by country, 2012–2023

Countries in the GMS are shown starting from the one reporting the highest number of total indigenous malaria cases in 2012 to the lowest. Data were derived from the WHO database. See methods notes for **Fig. 4.5**.

Fig. 4.7. Regional map of malaria incidence in the GMS, by area, 2015–2023

Data were derived from NMP reports to the GMS Malaria Elimination Database. Malaria incidence was calculated by total confirmed cases (rapid diagnostic test [RDT] + microscopy positive) / 1000 population. For Viet Nam, data are shown at provincial level; for all other countries, data are shown at district level.

Fig. 4.8. Number of total *P. knowlesi*, indigenous *P. knowlesi* and total malaria cases in Cambodia, Indonesia, Malaysia and Thailand, 2013–2023

Data were derived from NMP reports. Total indigenous malaria cases are based on confirmed malaria cases reported as indigenous, indigenous *P. knowlesi* and total *P. knowlesi*.

Fig. 4.9. Number of annual indigenous malaria cases between 2013 and 2023 in E-2025 countries that recently reported zero cases

Countries are shown from the highest number of indigenous malaria cases in any year between 2013 and 2023 to the lowest. Orange bars represent substantial increases in cases/outbreaks with regards to the previous year of the time series. Only countries and areas that have reported zero indigenous cases and have not been certified malaria free during this period are displayed. The data on the Islamic Republic of Iran reflects locally acquired cases, which include indigenous and introduced, as currently the country cannot distinguish between the two. See methods notes for **Fig. 4.4**.

Fig. 5.1. Summary of IDPs and refugees due to humanitarian emergencies, 2023

The infographic provides a summary of humanitarian emergencies in 2023, covering internal displacement due to conflict and natural disaster, as well as refugee data.

Data on internally displaced persons (IDPs) comes from estimates from the Internal Displacement Monitoring Centre (IDMC) and is divided into type (conflict or disaster) and further subdivided by countries and areas and IDP population. Country data is disaggregated by malaria endemic countries, non-endemic countries, and HBHI countries and associated IDP population in respective country categories.

Refugee data, sourced from the United Nations High Commissioner for Refugees (UNHCR), is based on refugees' countries of origin and includes those under UNHCR's mandate and people classified as "others in need of protection". This data is disaggregated by IDP population by malaria endemic, non-endemic and HBHI countries.

Fig. 5.2. Comparison of displaced persons in endemic and non-endemic countries, 2019–2023

This figure presents data from 2019 to 2023, displaying displaced persons (IDPs and refugees) due to conflict and natural disaster in malaria endemic and non-endemic countries. Refugee figures are based on calculations by the UNHCR. See notes for **Fig. 5.1**.

Fig. 5.3. Proportions of a) IDPs due to humanitarian emergencies in malaria endemic countries and b) refugees from malaria endemic countries, 2023

a) This figure presents the 10 malaria endemic countries with the highest numbers of IDPs due to humanitarian emergencies in 2023. Data are sourced from the IDMC and reflect estimated number of people displaced resulting from both conflict and disaster. The selection of the top 10 countries highlights those most affected by people that are internally displaced within malaria endemic countries.

b) This figure shows the proportion of refugees originating from malaria endemic countries as of 2023. The data, provided by the UNHCR, include individuals under UNHCR's mandate and others in need of protection. This proportion illustrates the refugees from endemic countries.

Fig. 5.4. Proportions of a) IDPs due to conflict and violence in HBHI countries, b) IDPs due to natural disaster in HBHI countries and c) refugees in HBHI countries based on country of origin, 2023

a) This figure displays the proportion of IDPs in HBHI countries resulting from conflict and violence. Data are sourced from the IDMC and reflect the estimated number of IDPs in HBHI countries affected by conflict and violence displacement in 2023.

b) This figure illustrates the proportion of IDPs in HBHI countries internally displaced due to natural disasters. The data, obtained from IDMC, capture the estimated population displaced by disasters within HBHI countries in 2023.

c) This figure shows the proportion of refugees originating from HBHI countries in 2023. Data are based on the UNHCR database and include individuals under UNHCR's mandate and those needing protection, categorized by their country of origin.

Fig. 6.1. GTS funding targets for 2025 and 2030 (current 2023 US$)

Fig. 6.1 reflects data from 2020–2023 for malaria control and elimination funding. It also shows projected targeted funding values from the GTS (*28*) for 2025 and the annual investments required for malaria research and development (R&D) from 2021 to 2030.

Total funding for malaria control and elimination over the period 2010–2023 was estimated using available data obtained from several sources. The methodology below describes the collection and analysis for all available public sector domestic funding and international funding for **Figs. 6.2–6.8**.

Table 6.1. Sources of data on funding for malaria

The table describes the main sources of funding as reported by donors and countries. An additional amount for patient care (based on estimated costs of patient care delivery services at public health facilities) is calculated for each country and added to domestic funding.

Fig. 6.2 and **Fig. 6.3** reflect data for the years 2010–2023 because country-specific unit cost estimates were not available until 2010 and data from the Organisation for Economic Co-operation and Development (OECD) use of the multilateral system were not available until 2011 (whereby 2010 estimates were derived from 2011 data). **Fig. 6.4**, **Fig. 6.5** and **Fig. 6.7** reflect data for 2000–2023, where available. **Fig. 6.6** reflects data for the years 2010–2023 because the trends in funding per person at risk before 2010 cannot be reliably interpreted, owing to significant data gaps in international and domestic funding in each WHO region. **Fig. 6.8** focuses on data from 2020–2023 and projections in 2025 and 2030. No imputation was conducted in the case of missing data for a specific funder; hence, the trends presented in the main texts should be interpreted carefully. Unless otherwise stated, funding for malaria control and elimination is presented in constant 2023 US$ throughout the text and figures.

Contributions from governments of endemic countries were 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. NMP contributions in the form of domestic expenditures, where available, were used from 2000 through 2023. When domestic government expenditure was unavailable, budgets were used. In cases where neither domestic expenditure nor budgets were available, estimates were conducted. These estimates were either based on an average from the country-reported data for the previous 2 years (i.e. 2021 and 2022), or the data reported in the previous year (i.e. 2022), based on the country's preference and representability of the truest funding estimate. Estimates were produced for the following countries missing 2023 data: Burkina Faso, Colombia, Djibouti, the Gambia, Guatemala, Honduras, Madagascar, Mexico, Namibia, Pakistan, and Sao Tome and Principe. There are also instances whereby countries, namely the Democratic People's Republic of Korea, requested for 2023 to remain blank. In other instances, countries reported funding in local currencies, such as Chad, the Niger and Zambia, which were converted into US$.

The number of reported malaria cases attending public health facilities was sourced from NMP reports and 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. Among the cases that were assumed to have been hospitalized, a 3-day average hospital stay was used. Costs of outpatient visits and inpatient bed-stays were estimated from the perspective of the public health care provider, using unit cost estimates from WHO-CHOosing Interventions that are Cost-Effective (WHO-CHOICE) (*29*). For each country, WHO-CHOICE 2010 unit cost estimates expressed in national currency were estimated for the period 2011–2023 using the gross domestic product (GDP) annual price deflator published by the World Bank in July 2024 (*30*) and converted in the base year 2010. Country-specific unit cost estimates were then converted from national currency to constant 2023 US$ for each year from the period 2010–2023. For each country, 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. The mean total cost of patient care service delivery was calculated from 1000 estimations.

International bilateral funding data were obtained from several sources. Data on planned funding from the government of the United States of America (USA) were sourced with the technical assistance of the KFF (formerly Kaiser Family Foundation) (*31*). Country-level funding data were available from the United States (US) Agency for International Development (USAID) for the period 2006–2023. Country-specific planned funding data from two agencies – the US Centers for Disease Control and Prevention (CDC) and the US Department of Defense (DoD) – were not available; therefore, data on total annual planned funding from each of these two agencies were used for the period 2001–2023. Global and regional funding that was not country specific was used for the period 2006–2023; although this funding may ultimately be used at the country level, this situation means that the country-specific totals are not available. Total annual planned funding from USAID was used for 2001–2005, until the introduction of country-specific funding from 2006 through 2023. The combination of country-level, global and regional funding, along with agency-supported funding, made up the total funding for the government of the USA. Total USA government funding in the report does not include funding for malaria research activities at the National Institutes of Health (NIH). Funding amounts from agencies in 2001 through 2018 are final; funding from 2019–2023 totals for

Annex 1 – Data sources and methods

CDC and DoD are preliminary estimates based on prior year amounts.

For the government of the United Kingdom of Great Britain and Northern Ireland (United Kingdom), data on funding for malaria control since 2017 have been sourced from the *Statistics on international development: final UK ODA spend 2023* (final UK aid spend) (*32*). Data from the final UK aid spend 2023 were used, with the technical assistance of the United Kingdom Foreign, Commonwealth and Development Office. The final UK aid spend data do not capture all spending from the United Kingdom that may affect malaria outcomes because the country supports malaria control and elimination through a broad range of interventions – for example, via support to overall health systems in malaria endemic countries, and through R&D – that are not included in these data. For the period 2007–2016, United Kingdom spending data were sourced from the OECD creditor reporting system (CRS) database on aid activity (*33*).

For all other donors, disbursement data were also obtained from the OECD CRS database on aid activity for the period 2002–2022. Disbursement data for 2023 were estimated using 2022 reported figures. All data were converted to constant 2023 US$. For years without data for a particular funder, no imputation was conducted; hence, trends presented in the figures in the main text should be interpreted carefully.

Fig. 6.2. Funding for malaria control and elimination, 2010–2023 (% of total funding), by source of funds (constant 2023 US$)

See methods notes for **Table 6.1** for sources of information on total funding for malaria control and elimination from governments of malaria endemic countries and on international funding flows.

Malaria-related annual funding from donors through multilateral agencies was estimated from data on:

i. donors' contributions published by the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) (*34*) from 2010 to 2023, and annual disbursements by the Global Fund to malaria endemic countries, as reported by the Global Fund; and
ii. donors' disbursements to malaria endemic countries published in the OECD CRS and in the OECD Development Assistance Committee (DAC) members' total use of the multilateral system from 2011 through 2022 (*33*). All funding flows were converted to constant 2023 US$.

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 that same year.

For (ii), contributions from donors to multilateral channels were estimated by calculating the proportion of the core contributions received by a multilateral agency each year by each donor, then multiplying that amount by the multilateral agency's estimated investment in malaria control in that same year. Contributions from 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. Annual estimated investments were summed to estimate the total amount each funder contributed to malaria control and elimination over the period 2010–2023, and the relative percentage of the total spending contributed by each funder was calculated for the period 2010–2023.

Fig. 6.2 excludes household spending on malaria prevention and treatment in malaria endemic countries.

The data sources, boundaries, accounting rules and estimation methods used in this report are different from those of the System of Health Accounts 2011 (SHA2011). The malaria expenditure data reported here are thus not comparable with the disease expenditure data, including for malaria, that are reported in WHO's Global Health Expenditure Database.

Fig. 6.3. Funding for malaria control and elimination, 2010–2023, by source of funds (constant 2023 US$)

See methods notes for **Table 6.1** for sources of information on total funding for malaria control and elimination from governments of malaria endemic countries and on international funding flows. See methods notes for **Fig. 6.2** for sources of information on malaria-related annual funding from donors through multilateral agencies.

Fig. 6.3 excludes household spending on malaria prevention and treatment in malaria endemic countries.

The data sources, boundaries, accounting rules and estimation methods used in this report are different from those of the System of Health Accounts 2011 (SHA2011). The malaria expenditure data reported here are thus not comparable with the disease expenditure data, including for malaria, that are reported in WHO's Global Health Expenditure Database.

Fig. 6.4. Funding for malaria control and elimination, 2000–2023, by channel (constant 2023 US$)

See methods notes for **Table 6.1** for sources of information on total funding for malaria control and elimination from governments of malaria endemic countries and on international funding flows. For years in which no data were available for a particular funder, no imputation was conducted; hence, trends presented in the main text figures should be interpreted carefully.

Fig. 6.4 excludes household spending on malaria prevention and treatment in malaria endemic countries.

The data sources, boundaries, accounting rules and estimation methods used in this report are different from those of the System of Health Accounts 2011 (SHA2011). The malaria expenditure data reported here are thus not comparable with the disease expenditure data, including for malaria, that are reported in WHO's Global Health Expenditure Database.

Fig. 6.5. Funding for malaria control and elimination, 2000–2023, by WHO or unspecified region (constant 2023 US$)

See methods notes for **Table 6.1** for sources of information on total funding for malaria control and elimination from governments of malaria endemic countries and on international funding flows. The "Unspecified" category in **Fig. 6.5** includes all funding data for which there was no geographical information on the recipient. For years in which no data were available for a particular funder, no imputation was conducted; hence, trends presented in the main text figures should be interpreted carefully.

The data sources, boundaries, accounting rules and estimation methods used in this report are different from those of the System of Health Accounts 2011 (SHA2011). The malaria expenditure data reported here are thus not comparable with the disease expenditure data, including for malaria, that are reported in WHO's Global Health Expenditure Database.

Fig. 6.6. Funding for malaria control and elimination per person at risk, 2010–2023, by WHO region (constant 2023 US$)

See methods notes for **Table 6.1** for sources of information on total funding for malaria control and elimination from governments of malaria endemic countries and on international funding flows.

Fig. 6.6 excludes household spending on malaria prevention and treatment in malaria endemic countries.

The data sources, boundaries, accounting rules and estimation methods used in this report are different from those of the System of Health Accounts 2011 (SHA2011). The malaria expenditure data reported here are thus not comparable with the disease expenditure data, including for malaria, that are reported in WHO's Global Health Expenditure Database.

Fig. 6.7. Funding for malaria control and elimination, 2000–2023, by World Bank 2024 income group and source of funding (constant 2023 US$)

See methods notes for **Table 6.1** for sources of information on total funding for malaria control and elimination from governments of malaria endemic countries and on international funding flows. Data on income group classification for 2024 were sourced from the World Bank (*35*). For years in which no data were available for a particular funder, no imputation was conducted; hence, trends presented in the main text figures should be interpreted carefully.

Fig. 6.7 excludes household spending on malaria prevention and treatment in malaria endemic countries.

The data sources, boundaries, accounting rules and estimation methods used in this report are different from those of the System of Health Accounts 2011 (SHA2011). The malaria expenditure data reported here are thus not comparable with the disease expenditure data, including for malaria, that are reported in WHO's Global Health Expenditure Database.

Fig. 6.8. Funding for malaria control and elimination per person at risk, globally, and the 2025 and 2030 targets (current US$)

See methods notes for **Table 6.1** for sources of information on total funding for malaria control and elimination from governments of malaria endemic countries and on international funding flows. WHO population projections for 2025 and 2030 were used to estimate future funding needs (see **Method 3**), with forecasts based on reported funding from 2020 to 2023. These projections were then compared to the targets outlined in the GTS, providing a basis for assessing the adequacy of future funding relative to the goals set for malaria control and elimination.

Fig. 6.8 excludes household spending on malaria prevention and treatment in malaria endemic countries.

The data sources, boundaries, accounting rules and estimation methods used in this report are different from those of the System of Health Accounts 2011 (SHA2011). The malaria expenditure data reported here are thus not comparable with the disease expenditure data, including for malaria, that are reported in WHO's Global Health Expenditure Database.

Fig. 6.9. Real GDP growth annual per cent change by World Bank income classification, 2023

Data on real GDP annual growth per cent change for 2022 were sourced directly from the International Monetary Fund data mapper. Data on income group classification for 2023 were sourced from the World Bank (*35*). This section outlines the global economic outcome from 2020 to 2022, which provides a limitation as it does not capture the differences across countries.

Fig. 6.10. Malaria R&D funding by product type, 2014–2023 (constant 2023 US$)

Data on funding for malaria-related R&D for 2014–2023 were sourced directly from Impact Global Health through the G-FINDER data portal (*36*).

Fig. 6.11. Top funders for malaria-related R&D, 2023 (constant 2023 US$)

See methods notes for **Fig. 6.8**.

Fig. 7.1. Number of ITNs delivered by manufacturers and distributed by NMPs, 2010–2023

Data on the number of ITNs delivered by manufacturers to countries were provided to WHO by Milliner Global Associates; these data were collected by the Alliance for Malaria Prevention Net Mapping Project. Data from NMP reports were used for the number of ITNs distributed within countries; these data include nets distributed through ANC clinics, the Expanded Programme on Immunization (EPI), mass campaigns and other distribution channels. Prior to 2023, where NMP reports on ITN distributions were unavailable, data were provided by the Global Fund. This applied to Botswana (2018, 2019), the Central African Republic (2020), Chad (2021, 2022), the Comoros (2019, 2022), Djibouti (2021), Eritrea (2020), Ethiopia (2021), Haiti (2020), India (2020, 2021), the Sudan (2019) and Yemen (2020). In 2023, ITN distribution data were unavailable from Angola, Botswana, Colombia, the Democratic People's Republic of Korea, French Guiana, Gabon, Guyana, Mayotte, the Niger, Peru, the Plurinational State of Bolivia, the Republic of Korea and South Africa. The analysis of NMP reports was limited to countries endemic for malaria in 2023.

Fig. 7.2. Indicators of a) population-level access to ITNs and b) population-level use of ITNs, sub-Saharan Africa, 2000–2023

Estimates of ITN coverage were derived from a model developed by MAP (*37*), using a two-stage process. First, a mechanism was designed for estimating net crop (i.e. the total number of ITNs in households in a country at a given 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). Second, empirical modelling was used to translate estimated net crops (i.e. total number of ITNs in a country) into resulting levels of coverage (e.g. access within households, use in all ages and use among children aged under 5 years).

Coverage estimates are made by country, then aggregated to continental level. Years with household surveys are most precise; between survey years, the estimates rely on modelled rates of loss of nets from households, which can be highly variable. The modelling does not currently account for seasonal variation in ITN use, nor does it differentiate by type of net.

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 40 countries in sub-Saharan Africa, from 2000 to 2023.

Countries for analysis

The main analysis covered 40 of the 46 malaria endemic countries or areas of sub-Saharan Africa. The island of Mayotte (for which no ITN delivery or distribution data were available) was excluded, as were the low transmission countries of Botswana, 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. (*38*), 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 through other distribution channels. To accommodate uncertainty in net distribution, the number of nets distributed in a given year was specified as a range, with all available country stock (i.e. the maximum number of nets that could be delivered) as the upper end of the range and the NMP-reported value (i.e. the assumed minimum distribution) as the lower end. The total household net crop comprised new nets reaching households plus older nets remaining from earlier times, with the duration of net retention by households governed by a loss function. However, rather than the loss function being fitted to a small external dataset – as per Flaxman et al. (*38*) – 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 LLINs. The fitted loss functions were compared with 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 to both estimate net crop and generate a histogram that summarizes the household net ownership pattern (i.e. the proportion of households with 0, 1, 2, etc. nets). In this way, the size of the net crop was linked to distribution patterns among households while accounting for household size, making it possible 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 numbers of both ITNs and people in each household were 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 × ITN access all ages + 0.0026, $R^2 = 0.773$). This relationship was applied to MAP’s country–year estimates of household access, to obtain ITN use among all ages. The same method was used to obtain the country–year estimates of ITN use in children aged under 5 years ($\text{ITN use}_{\text{children under 5}} = 0.9327 \times \text{ITN access}_{\text{children under 5}} + 0.0282$, $R^2 = 0.754$).

Fig. 7.3. Percentage of the population at risk protected by IRS, by WHO region, 2010–2023

The number of people protected by IRS was reported to WHO by NMPs. The total population of each country was taken from the 2023 revision of the *World population prospects* (*23*); the population at risk of malaria was calculated using the methods previously described for **Table 2.1**. For South Africa, the number of people protected by IRS exceeded the population at risk in 2014. For this reason, in South Africa, the reported population at risk in 2014 was used as the denominator in 2014. In 2023, only malaria endemic countries were included in the analysis of IRS. Data on IRS were not reported from the following 41 countries: Angola, Bangladesh, Benin, the Bolivarian Republic of Venezuela, Burkina Faso, Cambodia, Cameroon, the Central African Republic, Colombia, the Congo, Côte d’Ivoire, the Democratic People’s Republic of Korea, the Democratic Republic of the Congo, French Guiana, Gabon, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Liberia, Malawi, Mali, Mauritania, Mayotte, the Niger, Nigeria, Pakistan, Panama, Papua New Guinea, the Plurinational State of Bolivia, the Republic of Korea, Sao Tome and Principe, Senegal, Somalia, South Sudan, the Sudan, Suriname, Togo, Vanuatu and Yemen.

Fig. 7.4. Subnational areas where SMC was delivered, and number of treatment cycles per district, in implementing countries in sub-Saharan Africa, 2023

Data were provided by Medicines for Malaria Venture (MMV) and assembled through the SMC Alliance. Subnational data on the implementation of seasonal malaria chemoprevention (SMC) in Madagascar were not available.

Table 7.1. Average number of children treated with at least one dose of SMC, by year, in countries implementing SMC, 2012–2023

For all countries except Madagascar, data were collected by NMPs and shared with the London School of Hygiene & Tropical Medicine (LSHTM) and MMV. For Madagascar, the NMP provided data directly to WHO. The table shows the average number of children receiving SMC for each district, regardless of the number of cycles (the average is based on three, four or five cycles in a district where three, four or five cycles have been done, respectively). The sum of the district averages is used to obtain the average for each country.

Until and including the *World malaria report 2021* (*39*), the total number of children who received SMC at the country level was divided by four. The rationale for this approach was twofold. First, most countries performed four cycles in all districts up until 2021. Second, it was assumed that children receiving a fifth cycle had already received the first four cycles and were therefore de facto counted. The limitation of this approach was that it underestimated the average number of children covered by SMC in countries that performed fewer than four cycles.

Table 7.2. Number of treatment doses delivered, by year, in countries implementing SMC, 2012–2023

As for **Table 7.1**, data were collected by NMPs and shared with LSHTM and MMV, except for Madagascar, where the NMP sent data directly to WHO. The number of treatments delivered is the sum of all the children who received SMC at each cycle. Previously, in the *World malaria report 2021* (*39*), the number of treatments delivered was calculated by multiplying the average number of children treated by four. This assumed that each country conducted four cycles in each district, which is not the case.

Fig. 7.5. Percentage of pregnant women and girls attending an ANC clinic at least once and receiving IPTp, by number of SP doses, sub-Saharan Africa, 2010–2023

The total number of pregnant women and girls eligible for IPTp was calculated by adding total live births calculated from UN population data and spontaneous pregnancy loss (specifically, miscarriages and stillbirths) after the first trimester (*26*). Spontaneous pregnancy loss has previously been calculated by Dellicour et al. (*27*). Country-specific estimates of IPTp coverage were calculated as the ratio of pregnant women and girls receiving IPTp during ANC visits to the estimated number of pregnant women and girls eligible for IPTp in a given year. ANC attendance rates were derived in the same way, using the number of initial ANC clinic visits reported through routine information systems. Linear interpolation of information for national representative surveys was used to compute missing values. Due to missing data, the same first to third IPTp dose (IPTp1–IPTp3) and ANC coverage estimates observed in 2022 were assumed for 2023 for Liberia, and the same IPTp1 and IPTp2 coverages were assumed for Burkina Faso, Guinea, Madagascar, the Niger and South Sudan. Data from the latest household surveys were used to inform the IPTp and ANC coverage estimates in Nigeria, Mozambique and the United Republic of Tanzania.

Dose coverage was calculated for 33 of the 34 countries in the WHO African Region with an IPTp policy (Sao Tome and Principe was excluded because of the low malaria burden). The coverages of at least one ANC visit were corrected in 2020 and 2021 based on the country-specific disruptions to ANC services reported per country and obtained from the national pulse surveys on continuity of EHS during the COVID-19 pandemic conducted by WHO (first round in May–July 2020, second in January–March 2021, and third in November–December 2021) (*7-9*). Disruptions were quantified by using the middle value of the disruption ranges reported by countries.

A 5% reduction in ANC attendance was assumed in all countries that did not provide information on ANC service disruptions in the pulse surveys (*40-44*). The corrected number of women and girls that attended at least one ANC visit, after adjusting for disruptions, multiplied by the operational coverage of IPTp1 reported in 2020 or 2021 (calculated as the number of women and girls who received IPTp1 divided by the corrected number of women and girls who attended the first ANC visit [ANC1]) made it possible to re-estimate the expected number of pregnant women and girls who took IPTp1, which in turn made it possible to re-estimate the population coverage of IPTp1. The ratio observed among IPTp1, IPTp2 and IPTp3 was used to calculate the corrected coverage for IPTp2 and IPTp3, assuming no disruptions in IPTp dose follow-up.

Diagnostic testing and treatment

The analysis is based on the latest nationally representative household surveys (DHS and MIS) conducted between 2015 and 2023; surveys from 2005–2011 were considered as baseline surveys from sub-Saharan African countries where data on malaria case management were available. The data are only available for children aged under 5 years because DHS and MIS focus on the most population groups living in vulnerability. 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 prick as part of the care; what treatment was received for the fever and when; and, in particular, whether the child received an artemisinin-based combination therapy (ACT) or other antimalarial medicine. In addition to self-reported data, DHS and MIS also include biomarker testing for malaria, using RDTs that detect *P. falciparum* by targeting the histidine-rich protein 2 (HRP2) antigen. Percentages and 95% CIs were calculated for each country each year, taking into account the survey design. Median values and interquartile ranges were calculated using country percentages for the latest and baseline surveys. The indicators outlined at the bottom of this page are presented in **Table 7.3**.

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 question on diagnostic test and treatment is asked broadly and hence is 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, only a low percentage (<5%) of febrile children were brought to more than one source of care to receive care. Data may also be biased by the seasonality of survey data collection because DHS are carried out at various times during the year and MIS are usually timed to correspond with the high malaria transmission season. Another limitation, when undertaking trend analysis, is that DHS and MIS are done intermittently or not at all in some countries, resulting in a relatively small number of countries in sub-Saharan Africa or for any particular 4-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 30 were excluded from the calculation.

Fig. 7.6. Number of RDTs sold by manufacturers and distributed by NMPs for use in testing suspected malaria cases, 2010–2023

The number of RDTs distributed by WHO region are the sum of the total distributions reported by NMPs.

In previous years, where data on RDT distributions were missing, the reported number of tests by RDT was used as a proxy, given that the number of tests by RDTs normally approximates RDT distributions. In 2023, data on RDT distributions were not received from Botswana, French Guiana, Mayotte, Nicaragua, Peru and the Plurinational State of Bolivia. However, no proxy data were used in 2023.

Numbers of RDTs sold between 2010 and 2023 reflect sales by companies eligible for procurement. From 2010 to 2017, WHO received reports from up to 44 (cumulative number; the number of eligible manufacturers and responders differed from year to year) manufacturers that participated in the RDT Product Testing Programme by WHO, the Foundation for

Indicator	Numerator	Denominator
Median prevalence of fever in the past 2 weeks	Children aged under 5 years with a history of fever in the past 2 weeks	Children aged under 5 years
Median prevalence of fever in the past 2 weeks in children for whom treatment was sought	Children aged under 5 years with a history of fever in the past 2 weeks for whom treatment was sought	Children aged under 5 years with fever in the past 2 weeks
Median prevalence of treatment seeking by source of treatment for fever in the public sector (health facility)	Children aged under 5 years with a history of fever in the past 2 weeks for whom treatment was sought in the public sector (health facility)	Children aged under 5 years with fever in the past 2 weeks for whom treatment was sought
Median prevalence of treatment seeking by source of treatment for fever in the public sector (community health worker)	Children aged under 5 years with a history of fever in the past 2 weeks for whom treatment was sought in the public sector (community health worker)	Children aged under 5 years with fever in the past 2 weeks for whom treatment was sought
Median prevalence of treatment seeking by source of treatment for fever in the private sector (formal and informal)	Children aged under 5 years with a history of fever in the past 2 weeks for whom treatment was sought in the private sector (formal and informal)	Children aged under 5 years with fever in the past 2 weeks for whom treatment was sought
Median prevalence of receiving finger or heel prick	Children aged under 5 years with a history of fever in the past 2 weeks for whom treatment was sought and who received a finger or heel prick	Children aged under 5 years with fever in the past 2 weeks for whom treatment was sought
Median prevalence of treatment with ACTs	Children aged under 5 years with a history of fever in the past 2 weeks for whom treatment was sought and who were treated with ACTs	Children aged under 5 years with fever in the past 2 weeks for whom treatment was sought
Median prevalence of treatment with ACTs among those who received a finger or heel prick	Received ACT treatment	Children aged under 5 years with fever in the past 2 weeks for whom treatment was sought and who received a finger or heel prick
Median prevalence of treatment with ACTs	Children aged under 5 years with a history of fever in the past 2 weeks for whom treatment was sought and who were treated with ACTs	Children aged under 5 years with fever in the past 2 weeks for whom treatment was sought and who were treated with antimalarials

Innovative New Diagnostics (FIND), the US CDC and the Special Programme for Research and Training in Tropical Diseases. Since WHO prequalification became a selection criterion for procurement, sales data from 2018 onwards were provided by a limited number of eligible manufacturers. In 2023, 10 of the eligible companies reported to WHO.

Fig. 7.7. Number of ACT treatment courses delivered by manufacturers and distributed by NMPs to people with malaria, 2010–2023

Data on ACT deliveries from 2023 were provided by 13 manufacturers eligible for procurement by WHO and the UN Children's Fund (UNICEF). ACT deliveries were categorized as being to either the public sector or the private sector, also taking into account the Affordable Medicines Facility–malaria (AMFm) initiative and the Global Fund co-payment mechanism for the relevant years. Note that in 2023, an additional company, which did not provide data previously, provided data from 2019 to 2023. These newly provided data have been added to each of those years.

Data on ACTs distributed within countries through the public sector were taken from NMP reports. Between 2019 and 2022, missing data from NMP reports for ACT distributions were calculated based on the rate of ACT distributions to the number of patients treated with ACTs from the previous year, multiplied by the number of patients treated with ACTs in the current year. If these data were not available, the number of patients treated with ACTs was used as a proxy for ACT distributions. Please also refer to the methods described for **Annex 4-D**, found in **Annex 4-M**. In 2023, data on ACT distributions were missing from Botswana, Chad, Colombia, the Comoros, Djibouti, French Guiana, Haiti, Liberia, Malawi, Papua New Guinea, Peru, the Republic of Korea and Solomon Islands. No proxy data for ACT distributions were used in 2023.

Table 7.3. Summary of coverage of treatment seeking for fever, diagnosis and use of ACTs for children aged under 5 years, from household surveys in sub-Saharan Africa, at baseline (2005–2011) and most recently (2017–2023)

See the information provided in the section titled *Diagnostic testing and treatment* (under notes for **Fig. 7.5**).

Table 7.4. Summary of coverage of treatment seeking for fever, diagnosis and use of ACTs for children aged under 5 years from the most recent household survey for countries in sub-Saharan Africa

See the information provided in the section titled *Diagnostic testing and treatment* (under notes for **Fig. 7.5**).

Fig. 7.8. Percentage of children in the target population receiving pentavalent and malaria vaccines, by number of doses, in Ghana, Kenya and Malawi, 2019–2023

Vaccine introduction was implemented by the ministries of health in the three pilot countries, through the routine childhood immunization systems. In Ghana, the percentage for dose 4 increased to 85% when Ghana changed the timing of dose 4 to that of measles-containing vaccine, dose 3 (MCV3) and ITN delivery at 18 months of age. Data were reported to WHO by the Ministries of Health.

Fig. 7.9. Countries implementing malaria vaccine or approved to receive Gavi support in 2023

The map represents the countries that have been approved to receive Gavi, the Vaccine Alliance (Gavi) support for vaccine implementation. It was developed by WHO based on the outcomes of the review of malaria vaccine applications by Gavi (done quarterly).

Fig. 8.1. Estimated prevalence of *pfhrp2* gene deletions, 1996–2023

The map of the estimated prevalence of *P. falciparum* histidine-rich protein 2 (*pfhrp2*) gene deletions was based on published data included in the Malaria Threats Map (*45*). Data were extracted from articles published between 2010 and 2024, in which results of studies conducted between 1996 and 2023 are presented. Studies included symptomatic and asymptomatic patients. Prevalence was determined for each country by dividing the number of samples with *pfhrp2* deletions by country over the total number of samples positive for *P. falciparum* in that country. Countries where only one sample was tested were excluded.

Fig. 8.2. Number of *P. falciparum* TES finding more or less than 10% of treatment failures in the WHO African Region, by ACT (2015–2024), among studies with at least 20 patients

The bars show the total number of therapeutic efficacy studies (TES) from 2015 to 2024, and the number of studies which found more or less than 10% treatment failures for each ACT tested for the WHO African Region. Only studies with at least 20 patients were included. The data were obtained from the WHO *Global database on antimalarial drug efficacy and resistance* (*46*); all data shown are included in the WHO Malaria Threats Map (*45*).

Fig. 8.3. Number of *P. falciparum* TES finding more or less than 10% treatment failures, a) in the WHO Eastern Mediterranean Region, b) in the WHO South-East Asia Region and c) in the WHO Western Pacific Region, by ACT (2015–2024), among studies with at least 20 patients

The bars show the total number of TES from 2015 to 2024, and the number of studies which found more or less than 10% treatment failures for each ACT tested for the WHO Eastern Mediterranean Region, the WHO South-East Asia Region and the WHO Western Pacific Region. Only studies with at least 20 patients were included. The data were obtained from the WHO *Global database on antimalarial drug efficacy and resistance* (*46*); all data shown are included in the WHO Malaria Threats Map (*45*).

Fig. 8.4. Reported insecticide resistance status as a proportion of sites for which monitoring was conducted, by WHO region (2018–2023), for carbamates, neonicotinoids, organophosphates and pyrethroids

The status of resistance at each mosquito collection site for each insecticide class was assessed based on the lowest mosquito mortality reported across all standard WHO tube tests or US CDC bottle bioassays conducted at the site during 2018–2023, with validated discriminating concentrations of the insecticides in the class. If multiple insecticides and mosquito species were tested between 2018 and 2023 at the collection site, the lowest mosquito mortality was considered. If the lowest mosquito mortality was below 90%, resistance was considered to be confirmed at the site; if the lowest mosquito mortality was at least 90% but less than 98%, resistance was considered to be possible at the site; if the lowest mortality was 98% or more, vectors at the site were considered to be susceptible to the insecticide class. Note that to date, WHO has not received any test results that meet all of the new criteria for chlorfenapyr, and data on pirimiphos-methyl is available only for the formerly recommended concentration (0.25%). For this reason, the resistance status of both insecticides is currently set to "undetermined". The figure was developed based on data in the WHO global database for insecticide resistance in malaria vectors. These data were reported to WHO by NMPs, national public health institutes, universities and research centres, the African Network for Vector Resistance, MAP (*6*), VectorBase and the US President's Malaria Initiative (PMI), or were extracted from scientific publications. The data were obtained from the WHO database on insecticide resistance in malaria vectors (*47*); all data shown are included in the WHO Malaria Threats Map (*45*).

Fig. 8.5. Detections of *An. stephensi* in the WHO African and Eastern Mediterranean regions, as reported to WHO since 2012

These data were reported to WHO by NMPs and national public health institutes, their implementation partners, research institutions, or extracted from scientific publications. Population data were provided by WorldPop (*24*). The data were obtained from the WHO global database on invasive species (*48*); all data are also shown on the Malaria Threats Map (*45*).

Fig. 9.1. Prevalence of malaria detected by RDT in children aged under 5 years, by economic status, in 25 countries

To assess the inequities in malaria prevalence among children aged under 5 years based on economic status, data were analyzed using WHO's Health Equity Assessment Toolkit (HEAT), which uses datasets from the WHO Health Inequality Data Repository (HIDR). This toolkit facilitated the evaluation of malaria prevalence obtained from MIS and DHS. The analysis focused on children aged under 5 years diagnosed through RDT, categorizing the data by wealth quintiles across 25 countries. This approach enabled the examination of malaria prevalence across different economic strata, highlighting the impact of economic inequality on health outcomes.

Fig. 9.2. Treatment seeking behaviour in children aged under 5 years with fever who sought advice or treatment on the same or the next day, by economic status, in 34 countries

To assess the inequities in treatment seeking behaviour among children aged under 5 years based on economic status, data were analyzed using HEAT, which uses datasets from HIDR. This toolkit facilitated the evaluation of malaria prevalence obtained from MIS and DHS. The analysis focused on children aged under 5 years with fever for whom advice or treatment was sought the same or the next day, categorizing the data by wealth quintiles across 34 countries. This approach enabled the examination of malaria prevalence across different economic strata, highlighting the impact of economic inequality on health outcomes.

Fig. 9.3. Proportion of the population with out-of-pocket health spending exceeding 10% of household budget, impoverishing health spending at the relative poverty line, or both, by per capita consumption quintile across 92 countries (2015–2019)

The definitions of catastrophic and impoverishing health spending used for the global tracking of financial hardship are not mutually exclusive – people can experience neither, either or both simultaneously. This figure shows the concentration of those incurring either or both at the same time, without double counting, by per capita consumption quintile based on the latest available survey-based estimates for 92 countries at all income levels during the period 2015–2019. Background data were produced by WHO and the World Bank for the 2023 update of the WHO and World Bank global financial protection database (*49*).

Fig. 9.4. ITN a) ownership and b) use, by economic status, the Niger, 2006–2021

To assess the inequities in ITN ownership and use based on economic status, data were analyzed using HEAT, which uses datasets from HIDR. This toolkit facilitated the evaluation of malaria prevalence obtained from MIS and DHS. The analysis focused on children aged under 5 years who slept under an ITN, and also households with at least one ITN, categorizing the data by wealth quintiles in the Niger. This approach enabled the examination of malaria prevalence across different economic strata, highlighting the impact of economic inequality on health outcomes.

Fig. 9.5. Malaria prevalence in children aged under 5 years, by maternal education, in 19 sub-Saharan countries

The methodology for estimating malaria prevalence involved using several statistical techniques. First, an intercept-only generalized linear model with a Bernoulli distribution and a logit link was applied, incorporating household-specific cluster-robust standard errors using the delta method. Model predictions from this logistic regression were then used to calculate malaria prevalence percentages and their 95% CIs, utilizing post-estimation margin commands in Stata. The margins function provided the average predicted malaria cases along with CIs. To understand inequities, prevalence estimates were further stratified by equity factors, such as maternal education, household head's sex, wealth, and place of residence. Additionally, a Poisson regression model was used to compute prevalence ratios and differences, offering insights into differences across equity group. All analyses were conducted in Stata MP version 17. The 19 countries were Angola, Burkina Faso, Burundi, Cameroon, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, the Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Togo, Uganda and the United Republic of Tanzania.

Fig. 9.6. Total reported malaria a) cases and b) deaths, by sex, in the PAHO region, 2018–2023

Data were derived from NMP reports from the Pan American Health Organization (PAHO). For malaria cases, the variables male and female are a subset of total malaria cases. For malaria deaths, the variables male and female are a subset of total malaria cases.

Fig. 9.7. Under-5 mortality rate in Indigenous and non-Indigenous communities of the PAHO region, 2000 and 2010

The graph was extracted from the *Strategy and plan of action on ethnicity and health 2019-2025* (*50*).

Fig. 9.8. Total reported malaria a) cases and b) deaths among Indigenous Peoples in the PAHO region, 2018–2023

Data were derived from NMP reports from PAHO. For malaria cases, the variable malaria cases by Indigenous Peoples was a subset of total malaria cases.

Fig. 9.9. Inequities in antenatal care visits among Indigenous women compared with the general population

The graph is based on a representative sample of survey data. The countries are Belize, Costa Rica, Ethiopia, the Gambia, Guyana, Indonesia, Kenya, the Lao People's Democratic Republic, Mexico, Namibia, Nepal, Pakistan, Senegal, Sierra Leone, Suriname and Viet Nam. The two main sources of data on maternal health in low- and middle-income countries (LMIC) are the multiple indicator cluster surveys (MICS), funded by UNICEF, and DHS, funded by USAID. The figures in this graph relate to surveys undertaken under the two most recent rounds of the MICS (rounds 4 and 5). The analysis of the experience of Indigenous women and girls presented in this fact sheet only includes data from 8 of the 27 MICS reports that included analysis on the basis of ethnicity. This is because data relating to ethnicity do not always translate into data about indigeneity. There are two reasons for this: (i) disaggregation may be too broad (such as providing a binary breakdown between the majority ethnic group, and "other"); (ii) there may not be a straightforward correspondence between ethnicity and an Indigenous population – for example, where ethnicity data relates only to communities identifying as ethnic, religious or linguistic minorities.

Fig. 9.10. Countries that experienced humanitarian crisis in 2023

The figure was created based on data on IDPs by conflict and violence or by natural disaster using data from the IDMC for the year 2023.

Fig. 9.11. Level of data disaggregation by a) sex, b) age, c) pregnancy and d) risk groups, by WHO region, 2023

Data collection utilized standardized templates sent to countries, requesting the level at which data can be disaggregated by sex, age, and pregnant women and girls, along with the possibility of the identification of country-specific risk groups. For variables missing in submissions, historical routinely reported data were reviewed to supplement gaps. If no historical data were available, these entries were classified as "unknown".

References for Annex 1

1. World malaria report 2008. Geneva: World Health Organization; 2008 (https://apps.who.int/iris/handle/10665/43939).
2. Cibulskis RE, Aregawi M, Williams R, Otten M, Dye C. Worldwide incidence of malaria in 2009: estimates, time trends, and a critique of methods. PLoS Med. 2011;8:e1001142 (https://doi.org/10.1371/journal.pmed.1001142).
3. The R Project for statistical computing [website]. Vienna: R Foundation for Statistical Computing; 2023 (https://www.R-project.org/).
4. Weiss DJ, Mappin B, Dalrymple U, Bhatt S, Cameron E, Hay SI et al. Re-examining environmental correlates of *Plasmodium falciparum* malaria endemicity: a data-intensive variable selection approach. Malar J. 2015;14:68 (https://doi.org/10.1186/s12936-015-0574-x).
5. Cameron E, Battle KE, Bhatt S, Weiss DJ, Bisanzio D, Mappin B et al. Defining the relationship between infection prevalence and clinical incidence of *Plasmodium falciparum* malaria. Nat Commun. 2015;6:8170 (https://doi.org/10.1038/ncomms9170).
6. Malaria Atlas Project [website]. 2023 (https://malariaatlas.org).
7. Pulse survey on continuity of essential health services during the COVID-19 pandemic: interim report, 27 August 2020. Geneva: World Health Organization; 2020 (https://iris.who.int/handle/10665/334048).
8. Second round of the national pulse survey on continuity of essential health services during the COVID-19 pandemic: January–March 2021. Geneva: World Health Organization; 2021 (https://iris.who.int/handle/10665/340937).
9. Third round of the global pulse survey on continuity of essential health services during the COVID-19 pandemic: November–December 2021. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/351527).
10. World malaria report 2023. Geneva: World Health Organization; 2023 (https://www.who.int/publications/i/item/9789240086173).
11. Alles HK, Mendis KN, Carter R. Malaria mortality rates in South Asia and in Africa: implications for malaria control. Parasitol Today. 1998;14:369-75 (https://doi.org/10.1016/s0169-4758(98)01296-4).
12. Luxemburger C, Ricci F, Nosten F, Raimond D, Bathet S, White NJ. The epidemiology of severe malaria in an area of low transmission in Thailand. Trans R Soc Trop Med Hyg. 1997;91:256-62 (https://doi.org/10.1016/s0035-9203(97)90066-3).
13. Meek SR. Epidemiology of malaria in displaced Khmers on the Thai–Kampuchean border. Southeast Asian J Trop Med Public Health. 1988;19:243-52 (https://pubmed.ncbi.nlm.nih.gov/3067373).
14. Douglas NM, Pontororing GJ, Lampah DA, Yeo TW, Kenangalem E, Poespoprodjo JR et al. Mortality attributable to *Plasmodium vivax* malaria: a clinical audit from Papua, Indonesia. BMC Med. 2014;12:217 (https://doi.org/10.1186/s12916-014-0217-z).
15. Perin J, Mulick A, Yeung D, Villavicencio F, Lopez G, Strong KL et al. Global, regional, and national causes of under-5 mortality in 2000–19: an updated systematic analysis with implications for the Sustainable Development Goals. Lancet Child Adolesc Health. 2022;6:106-15 (https://doi.org/10.1016/S2352-4642(21)00311-4).
16. Most recent stillbirth, child and adolescent mortality estimates [website]. IGME: United Nations Inter-agency Group for Child Mortality Estimation; 2024 (https://childmortality.org/).
17. Ross A, Maire N, Molineaux L, Smith T. An epidemiologic model of severe morbidity and mortality caused by *Plasmodium falciparum*. Am J Trop Med Hyg. 2006;75:63-73 (https://doi.org/10.4269/ajtmh.2006.75.63).
18. Griffin JT, Ferguson NM, Ghani AC. Estimates of the changing age-burden of *Plasmodium falciparum* malaria disease in sub-Saharan Africa. Nat Commun. 2014;5:3136 (https://doi.org/10.1038/ncomms4136).
19. Walker PG, Griffin JT, Cairns M, Rogerson SJ, van Eijk AM, ter Kuile F et al. A model of parity-dependent immunity to placental malaria. Nat Commun. 2013;4:1609 (https://doi.org/10.1038/ncomms2605).
20. Walker PG, ter Kuile FO, Garske T, Menendez C, Ghani AC. Estimated risk of placental infection and low birthweight attributable to *Plasmodium falciparum* malaria in Africa in 2010: a modelling study. Lancet Glob Health. 2014;2:e460-7 (https://doi.org/10.1016/S2214-109X(14)70256-6).
21. Bhatt S, Weiss DJ, Cameron E, Bisanzio D, Mappin B, Dalrymple U et al. The effect of malaria control on *Plasmodium falciparum* in Africa between 2000 and 2015. Nature. 2015;526:207-11 (https://doi.org/10.1038/nature15535).
22. The DHS Program: demographic and health surveys [website]. Washington, DC: United States Agency for International Development; 2023 (https://dhsprogram.com/).
23. World population prospects 2023 [website]. New York City: United Nations; 2023 (https://population.un.org/wpp/).
24. Open spatial demographic data and research [website]. WorldPop; 2024 (https://www.worldpop.org/).
25. Cairns M, Roca-Feltrer A, Garske T, Wilson AL, Diallo D, Milligan PJ et al. Estimating the potential public health impact of seasonal malaria chemoprevention in African children. Nat Commun. 2012;3:881 (https://doi.org/10.1038/ncomms1879).
26. Adekanbi AO, Olayemi OO, Fawole AO, Afolabi KA. Scourge of intra-partum foetal death in Sub-Saharan Africa. World J Clin Cases. 2015;3:635 (https://doi.org/10.12998/wjcc.v3.i7.635).
27. Dellicour S, Tatem AJ, Guerra CA, Snow RW, ter Kuile FO. Quantifying the number of pregnancies at risk of malaria in 2007: a demographic study. PLoS Med. 2010;7:e1000221 (https://doi.org/10.1371/journal.pmed.1000221).
28. Global technical strategy for malaria 2016–2030. Geneva: World Health Organization; 2015 (https://iris.who.int/handle/10665/176712).
29. Health Financing and Economics: Choosing interventions that are cost-effective (WHO-CHOICE) [website]. Geneva: World Health Organization; 2023 (https://www.who.int/teams/health-financing-and-economics/economic-analysis).

30. Inflation, GDP deflator (annual %) [website]. World Bank; 2023 (https://data.worldbank.org/indicator/NY.GDP.DEFL.KD.ZG).

31. ForeignAssistance.gov [website]. US Agency for International Development and US Department of State; 2024 (https://foreignassistance.gov/).

32. Statistics on international development: final UK ODA spend 2023. United Kingdom: Foreign, Commonwealth & Development Office; 2024 (https://www.gov.uk/government/statistics/statistics-on-international-development-final-uk-oda-spend-2023).

33. OECD Data explorer: CRS: Creditor reporting system (flows) [cloud replica] [website]. Paris: Organisation for Economic Co-operation and Development; 2024 (https://data-explorer.oecd.org/vis?df[ds]=DisseminateFinalBoost&df[id]=DSD_CRS%40DF_CRS&df[ag]=OECD.DCD.FSD&dq=DAC..1000.100._T._T.D.Q._T..&lom=LASTNPERIODS&lo=5&to[TIME_PERIOD]=false).

34. Data service: downloads [website]. Global Fund to Fight AIDS, Tuberculosis and Malaria; 2024 (https://data-service.theglobalfund.org/downloads).

35. World Bank country and lending groups [website]. Washington, DC: World Bank; 2024 (https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups).

36. G-FINDER data portal: tracking funding for global health R&D [website]. Sydney: Impact Global Health (formerly Policy Cures Research); 2023 (https://gfinderdata.impactglobalhealth.org/).

37. Bertozzi-Villa A, Bever CA, Koenker H, Weiss DJ, Vargas-Ruiz C, Nandi AK et al. Maps and metrics of insecticide-treated net access, use, and nets-per-capita in Africa from 2000-2020. Nat Commun. 2021;12:3589 (https://doi.org/10.1038/s41467-021-23707-7).

38. Flaxman AD, Fullman N, Otten MW, Menon M, Cibulskis RE, Ng M et al. Rapid scaling up of insecticide-treated bed net coverage in Africa and its relationship with development assistance for health: a systematic synthesis of supply, distribution, and household survey data. PLoS Med. 2010;7:e1000328 (https://doi.org/10.1371/journal.pmed.1000328).

39. World malaria report 2021. Geneva: World Health Organization; 2021 (https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2021).

40. Ahmed T, Rahman AE, Amole TG, Galadanci H, Matjila M, Soma-Pillay P et al. The effect of COVID-19 on maternal newborn and child health (MNCH) services in Bangladesh, Nigeria and South Africa: call for a contextualised pandemic response in LMICs. Int J Equity Health. 2021;20:77 (https://doi.org/10.1186/s12939-021-01414-5).

41. Balogun M, Banke-Thomas A, Sekoni A, Boateng GO, Yesufu V, Wright O et al. Challenges in access and satisfaction with reproductive, maternal, newborn and child health services in Nigeria during the COVID-19 pandemic: a cross-sectional survey. PLoS One. 2021;16:e0251382 (https://doi.org/10.1371/journal.pone.0251382).

42. Burt JF, Ouma J, Lubyayi L, Amone A, Aol L, Sekikubo M et al. Indirect effects of COVID-19 on maternal, neonatal, child, sexual and reproductive health services in Kampala, Uganda. BMJ Glob Health. 2021;6:e006102 (https://doi.org/10.1136/bmjgh-2021-006102).

43. das Neves Martins Pires PH, Macaringue C, Abdirazak A, Mucufo JR, Mupueleque MA, Zakus D et al. COVID-19 pandemic impact on maternal and child health services access in Nampula, Mozambique: a mixed methods research. BMC Health Serv Res. 2021;21:860 (https://doi.org/10.1186/s12913-021-06878-3).

44. Aranda Z, Binde T, Tashman K, Tadikonda A, Mawindo B, Maweu D et al. Disruptions in maternal health service use during the COVID-19 pandemic in 2020: experiences from 37 health facilities in low-income and middle-income countries. BMJ Glob Health. 2022;7:e007247 (https://doi.org/10.1136/bmjgh-2021-007247).

45. Malaria Threats Map [website]. Geneva: World Health Organization; 2024 (https://apps.who.int/malaria/maps/threats/).

46. Global database on antimalarial drug efficacy and resistance. Geneva: World Health Organization; 2024 (https://www.who.int/teams/global-malaria-programme/case-management/drug-efficacy-and-resistance/antimalarial-drug-efficacy-database).

47. WHO global database on insecticide resistance in malaria vectors [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/global-malaria-programme/prevention/vector-control/global-database-on-insecticide-resistance-in-malaria-vectors).

48. WHO global database on invasive mosquito vector species [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/global-malaria-programme/prevention/vector-control/global-databases-on-invasive-mosquito-vector-species).

49. World Health Organization, World Bank. Tracking universal health coverage: 2023 global monitoring report. Washington, DC: World Bank; 2023 (http://hdl.handle.net/10986/40348).

50. Strategy and plan of action on ethnicity and health 2019-2025. Washington, DC: Pan American Health Organization; 2019 (https://iris.paho.org/bitstream/handle/10665.2/51744/PAHOEGC19002_eng.pdf).

Annex 2 – Number of ITNs distributed through campaigns in malaria endemic countries, 2021–2023

Data on the number of insecticide-treated mosquito nets were collected from reports from national malaria programmes and other sources by the Alliance for Malaria Prevention, RBM Partnership to End Malaria and the Global Fund.

	2021				2022		
Country	ITNs planned for distribution in 2021 (including carry-over from 2020)	ITNs distributed in 2021 (including carry-over from 2020)	ITNs remaining for distribution in 2022	Percentage of ITNs planned for distribution in 2021 distributed in 2021	ITNs distributed in 2022 from 2021 campaigns	Percentage of remaining ITNs from 2021 distributed in 2022 (including carry-over from 2021)	ITNs remaining in 2022 from 2021 campaigns
Afghanistan[1,2]	0	0	0	NA	0	NA	0
Angola[3]	0	0	0	NA	0	NA	0
Bangladesh[1]	1 052 526	823 336	229 190	78.2	229 190	100	0
Benin	0	0	0	NA	0	NA	0
Burkina Faso[1]	0	0	0	NA	0	NA	0
Burundi	0	0	0	NA	0	NA	0
Cambodia[4]	829 358	559 790	269 568	67.5	269 568	100	0
Cameroon[1]	369 000	344 763	24 237	93.4	24 237	100	0
Central African Republic[1]	1 626 470	0	1 626 470	0	1 371 125	84.3	255 345
Chad	1 000 000	0	1 000 000	0	0	0	1 000 000
Comoros	0	0	0	NA	0	NA	0
Congo[1,5]	0	0	0	NA	0	NA	0
Côte d'Ivoire	18 991 346	18 509 750	481 596	97.5	0	0	481 596
Democratic Republic of the Congo[1,4]	16 708 809	16 708 809	0	100	0	NA	0
Djibouti[1]	0	0	0	NA	0	NA	0
Ethiopia[1,2,4]	7 897 450	5 300 000	2 597 450	67.1	2 597 450	100	0
Gambia[3]	0	0	0	NA	0	NA	0
Ghana	18 948 893	15 976 996	2 971 897	84.3	0	0	2 971 897
Guinea[1]	0	0	0	NA	0	NA	0
Guinea-Bissau	0	0	0	NA	0	NA	0
Haiti	244 656	0	244 656	0	0	0	244 656
India[1,6]	9 648 384	16 197 740	NA	NA	NA	NA	NA
Indonesia	94 450	50 350	44 100	53.3	44 100	100	0
Kenya	16 151 848	15 128 756	1 023 092	93.7	0	0	1 023 092
Lao People's Democratic Republic[4]	0	0	0	NA	0	NA	0
Liberia[2,5]	2 783 264	2 783 264	0	100	0	NA	0
Madagascar[1]	13 703 700	13 288 561	415 139	97.0	415 139	100	0
Malawi	7 357 003	7 357 003	0	100	0	NA	0
Mali	1 128 120	1 128 120	0	100	0	NA	0
Mauritania	0	0	0	NA	0	NA	0
Mozambique[1]	212 074	0	212 074	0	212 074	100	212 074
Myanmar[1]	588 645	155 186	433 459	26.4	433 459	100	433 459
Nepal[1]	0	0	0	NA	0	NA	0
Niger	5 420 231	4 358 451	1 061 780	80.4	1 061 780	100	1 061 780
Nigeria[1]	27 125 810	17 397 772	9 728 038	64.1	9 728 038	100	9 728 038
Pakistan[1]	3 106 391	0	3 106 391	0	2 415 672	77.8	690 719
Papua New Guinea[1]	1 301 748	1 301 748	0	100	0	NA	0

2022				2023				
ITNs planned for distribution in 2022 (including carry-over from 2021)	ITNs distributed in 2022 (including carry-over from 2021)	ITNs remaining for distribution in 2023	Percentage of ITNs planned for distribution in 2022 distributed in 2022	ITNs distributed in 2023 from 2022 campaigns	Percentage of remaining ITNs from 2022 distributed in 2023 (including carry-over from 2022)	ITNs planned for distribution in 2023 (including carry-over from 2022)	ITNs distributed in 2023 (including carry-over from 2022)	Percentage of ITNs planned for distribution in 2023 distributed in 2023
2 195 198	1 950 586	244 612	88.9	244 612	100	414 267	414 267	100
6 927 274	6 927 274	0	100	0	0	0	0	0
900 047	600 813	299 234	66.8	299 234	100	1 375 518	1 375 518	100
0	0	0	NA	0	NA	9 838 316	7 748 415	78.8
16 051 515	14 446 364	1 605 151	90.0	0	0	0	0	0
6 611 501	6 548 442	63 059	99.0	0	0	0	0	0
307 572	307 572	0	100	0	NA	253 507	103 075	40.7
16 756 200	11 193 768	5 562 432	66.8	1 429 330	25.7	6 726 695	1 429 330	21.2
1 626 470	1 371 125	255 345	84.3	255 345	100	3 172 817	2 979 554	93.9
0	0	0	NA	0	NA	12 038 378	9 713 825	80.7
0	0	0	NA	0	NA	199 769	70 979	35.5
3 502 800	3 355 112	147 688	95.8	147 688	100	558 205	558 205	100
0	0	0	NA	0	NA	0	0	NA
37 294 622	28 131 033	9 163 589	75.4	9 163 589	100	38 918 649	38 918 649	100
236 469	215 839	20 630	91.3	20 000	96.9	0	0	0
10 398 413	8 595 938	1 802 475	82.7	1 802 475	100	19 799 526	19 799 526	100
1 594 136	1 594 136	0	100	0	0	0	0	0
0	0	0	NA	0	0	0	0	0
9 419 350	8 927 578	491 772	94.8	0	0	0	0	0
0	0	0	NA	0	NA	1 654 098	1 344 960	81.3
0	0	0	NA	0	NA	1 100 892	663 412	60.3
11 345 797	1 259 541	5 141 343	11.1	0	0	0	0	NA
2 485 716	2 485 716	0	100	0	0	0	0	NA
0	0	0	NA	0	0	0	0	NA
972 310	915 981	56 329	94.2	0	0	0	0	NA
0	0	0	NA	0	NA	3 200 000	3 200 000	100
2 106 406	1 729 231	377 175	82.1	0	0	0	0	NA
1 896 849	0	1 896 849	0	1 867 319	98.4	0	0	NA
0	0	0	NA	0	NA	12 568 419	10 845 716	86.3
0	0	0	NA	0	NA	1 641 609	1 563 181	95.2
5 198 450	5 173 420	25 030	99.5	25 030	100	13 809 532	11 400 648	82.6
541 200	464 780	76 420	85.9	76 420	100	2 250 189	723 179	32.1
344 006	101 097	242 909	29.4	84 853	34.9	0	0	NA
9 367 018	9 267 397	99 621	98.9	0	0	0	0	NA
46 131 125	43 088 675	3 042 450	93.4	3 042 450	100	29 778 331	22 813 900	76.6
3 002 590	2 415 672	586 918	80.5	586 918	100	6 136 700	2 019 054	32.9
1 332 559	973 828	358 731	73.1	358 731	100	1 345 966	1 218 918	90.6

Annex 2 – Number of ITNs distributed through campaigns in malaria endemic countries, 2021–2023

Data on the number of insecticide-treated mosquito nets were collected from reports from national malaria programmes and other sources by the Alliance for Malaria Prevention, RBM Partnership to End Malaria and the Global Fund.

	2021				2022		
Country	**ITNs planned for distribution in 2021 (including carry-over from 2020)**	**ITNs distributed in 2021 (including carry-over from 2020)**	**ITNs remaining for distribution in 2022**	**Percentage of ITNs planned for distribution in 2021 distributed in 2021**	**ITNs distributed in 2022 from 2021 campaigns**	**Percentage of remaining ITNs from 2021 distributed in 2022 (including carry-over from 2021)**	**ITNs remaining in 2022 from 2021 campaigns**
Rwanda[3,5]	0	0	0	NA	0	NA	0
Senegal[2]	0	0	0	NA	0	NA	0
Sierra Leone[2]	0	0	0	NA	0	NA	0
Solomon Islands	605 384	164 384	441 000	27.2	0	0	441 000
Somalia	1 597 274	0	1 597 274	0	1 597 274	100	0
South Sudan[1,2]	1 586 285	1 586 285	0	100	0	NA	0
Sudan[4]	0	0	0	NA	0	NA	0
Togo	0	0	0	NA	0	NA	0
Uganda	0	0	0	NA	0	NA	0
United Republic of Tanzania (Mainland)[4]	611 717	611 717	0	100	0	NA	0
Zanzibar[2,3]	746 420	712 872	33 548	95.5	0	0	33 548
Viet Nam	1 629 600	1 481 700	147 900	90.9	147 900	100	0
Yemen[4,5]	2 890 856	1 126 314	1 764 542	39.0	900 955	51.1	863 587
Zambia[4]	0	0	0	NA	0	NA	0
Zimbabwe[1,4]	1 017 646	1 017 646	0	100	0	NA	0
Total	**166 975 358**	**144 071 313**	**29 453 401**	**86.3**	**21 447 961**	**72.8**	**19 440 791**

ITN: insecticide-treated mosquito net; NA: not applicable.

[1] The 2022 mass campaign resulted in carry-over of ITNs that were distributed in 2023.

[2] No data were reported on planned distribution; therefore adjustment was made that planned distribution was equal to ITNs distributed in 2023.

[3] No data were reported on planned distribution; therefore adjustment was made that planned distribution was equal to ITNs distributed in 2022.

[4] Planned distribution was adjusted based on ITNs distributed; where ITN distribution was more than planned in 2022, planned distribution in 2022 was made equal to ITNs distributed in 2022.

[5] Planned distribution was adjusted based on ITNs distributed; where ITN distribution was more than planned in 2023, planned distribution in 2023 was made equal to ITNs distributed in 2023.

[6] India provided information on its mass campaign distributions between 2020 and 2022 based on the initial ITNs planned for 2020. Adjustments were made for 2022 to determine the proportion of ITNs distributed by the end of 2022 out of the initial number of ITNs planned to be distributed in 2020.

Note: Remaining ITNs not distributed through mass campaigns may be distributed through other channels (e.g. antenatal care).

2022				2023				
ITNs planned for distribution in 2022 (including carry-over from 2021)	ITNs distributed in 2022 (including carry-over from 2021)	ITNs remaining for distribution in 2023	Percentage of ITNs planned for distribution in 2022 distributed in 2022	ITNs distributed in 2023 from 2022 campaigns	Percentage of remaining ITNs from 2022 distributed in 2023 (including carry-over from 2022)	ITNs planned for distribution in 2023 (including carry-over from 2022)	ITNs distributed in 2023 (including carry-over from 2022)	Percentage of ITNs planned for distribution in 2023 distributed in 2023
4 437 461	4 437 461	0	100	0	NA	1 981 118	1 981 118	100
6 976 498	6 935 681	40 817	99.4	40 817	100	0	0	NA
0	0	0	NA	0	NA	4 905 695	4 905 695	100
0	0	0	NA	0	NA	123 385	29 941	24.3
2 707 067	2 707 067	0	100	0	NA	188 890	25 689	13.6
2 468 144	969 822	1 498 322	39.3	1 498 322	100	6 667 222	6 227 626	93.4
18 758 082	18 758 082	0	100	0	0	0	0	NA
0	0	0	NA	0	NA	6 993 848	6 074 033	86.8
0	0	0	NA	0	NA	27 770 070	27 770 070	100
818 644	818 644	0	100	0	NA	3 045 176	3 045 176	100
0	0	0	NA	0	NA	252 155	252 155	100
151 093	151 093	0	100	0	NA	293 435	167 164	57.0
2 527 322	900 955	1 626 367	35.6	952 000	58.5	952 000	952 000	100
0	0	0	NA	0	NA	11 628 535	11 628 535	100
2 586 904	2 538 878	48 026	98.1	48 026	100	1 146 204	428 037	37.3
239 976 808	**200 258 601**	**34 773 294**	**83.4**	**21 943 159**	**63.1**	**232 729 116**	**202 391 550**	**87.1**

Annex 3 – A. WHO African Region, a. West Africa

In 2023, there were 15 malaria endemic countries in the World Health Organization (WHO) African subregion of west Africa. In 2023, Cabo Verde was certified malaria free, making it the third country in the WHO African Region to achieve this status, after Mauritius (1973) and Algeria (2019). This milestone reflects Cabo Verde's successful efforts to eliminate malaria, which was a leading cause of death across its islands in the 1950s. In this subregion, the high burden to high impact (HBHI) initiative was implemented in Burkina Faso, Ghana, the Niger and Nigeria in 2019, and in Mali in 2020. In 2024 all five countries signed the Yaoundé Declaration, pledging their "unwavering commitment" to the principle that "no one should die from malaria given the tools and systems available". Since 2020, the HBHI initiative has been expanded to Benin, Côte d'Ivoire, Guinea, Liberia and Togo, leading to evidence-based national strategic plans and funding requests. In all countries of this subregion except Algeria and Cabo Verde, malaria transmission occurs year round and is almost exclusively due to *Plasmodium falciparum*, with strong seasonality in the Sahelian countries.

Furthermore, in 2023, the subregion had an estimated 124 million cases and 311 000 deaths – a 5% increase and an 18% decrease, respectively, compared with 2010. Five countries accounted for more than 80% of the estimated cases: Nigeria (55%), Burkina Faso (7%), Mali (7%), the Niger (6%) and Côte d'Ivoire (6%). More than 71 million cases were reported in the public and private sectors and in the community, of which 67 million were confirmed and 34.6% were in children aged under 5 years. The proportion of total cases that were confirmed has improved substantially over time, from only 22.1% in 2010 to 64.1% in 2015, to 93.8% in 2023. Most deaths were in children aged under 5 years (67%).

In 13 of the 15 endemic countries in this subregion, where routine distribution of insecticide-treated mosquito nets (ITNs) is applicable, 50% or more of the population was estimated to have access to ITNs, despite country-specific variations. In 2023, Benin, Guinea-Bissau, Liberia, Mali, Mauritania, Nigeria, Sierra Leone and Togo carried out mass ITN campaigns. In this subregion, a total of 72 million ITNs was distributed through both mass campaigns and routine channels in 2023. Thirteen countries in the subregion implemented seasonal malaria chemoprevention (SMC) with varying numbers of rounds, providing about 47 million children with at least one dose of SMC per cycle. Côte d'Ivoire implemented SMC in piloting districts for the first time in 2023. Fourteen countries in the subregion implemented intermittent preventive treatment of malaria in pregnancy (IPTp) in 2023, and eight had more than 50% coverage of three doses of IPTp (IPTp3). Ghana has been part of the malaria vaccine implementation programme for the programmatic use of RTS,S/AS01 (RTS,S) since 2019. As of October 2024, an additional six countries in the subregion have introduced the malaria vaccine subnationally: Benin, Burkina Faso, Côte d'Ivoire, Liberia, the Niger and Sierra Leone.

Two countries have already met the *Global technical strategy for malaria 2016–2030* (GTS) 2025 target as they reached zero indigenous malaria cases in 2023 compared with 2015: Algeria and Cabo Verde (which are already certified malaria free). In 11 countries, although there has been progress towards meeting the GTS target, reductions in incidence were less than 63% (the expected reduction for countries to be on track to meet the GTS 2025 target): Benin, Burkina Faso, the Gambia, Ghana, Guinea, Liberia, Mali, Mauritania, the Niger, Sierra Leone and Togo. In Côte d'Ivoire, Guinea-Bissau, Nigeria and Senegal, incidence increased in 2023 compared with 2015.

The subregion is also facing biological threats to malaria interventions. *P. falciparum* histidine-rich protein (*pfhrp*) *2/3* gene deletions have been previously confirmed in Benin, Ghana, Mali, Nigeria, Sierra Leone and Senegal. More recently, *Pfhrp2/3* gene deletions were confirmed in Burkina Faso (2020, 2022) and Togo (2021). Antimalarial drug efficacy is high among therapeutic efficacy studies (TES) conducted according to the WHO standard protocol between 2015 and 2024. Among 61 TES of artemether–lumefantrine (AL) and 13 studies of dihydroartemisinin–piperaquine (DHA-PPQ), all studies had treatment failure rates of less than 10%, with the exception of three studies of AL and two studies of DHA-PPQ that were conducted in Burkina Faso in 2017. These results warrant further investigation as they could be a sign of emergence of artemisinin-based combination therapy (ACT) partner drug resistance in the subregion. Regarding insecticide resistance, bioassay tests conducted between 2018 and 2023 confirmed resistance to carbamates in nine of the 12 countries where it was monitored. Resistance to neonicotinoids was detected for the first time in three of seven countries where monitored (Burkina Faso, Côte d'Ivoire and Ghana). Resistance to organophosphates was detected in five of the 12 countries where monitored. Resistance to pyrethroids was detected in all 12 countries where monitored.

Since 2010, malaria funding in the subregion has seen a substantial 75% increase, driven predominantly by international sources, which now account for over US$ 700 million, or 65% of the total funding. However, in comparison to 2022, total funding dropped by more than US$ 100 million, from US$ 1.2 billion to US$ 1.1 billion, representing a 10% decline. This decrease was due to reductions in both domestic and international contributions. Over the past 3 years, funding per person at risk has varied significantly, ranging from US$ 0.07 in Mauritania to US$ 9.63 in Liberia. This is consistent with, but slightly lower than, the 2020–2022 average, largely due to the decrease in funding experienced in 2023.

The Nouakchott Declaration was adopted in 2013 and has now become the Sahel Malaria Elimination initiative (SaME), which was launched in 2018 by ministers of the eight Sahelian countries (Burkina Faso, Cabo Verde, Chad, the Gambia, Mali, Mauritania, the Niger and Senegal) to accelerate implementation of high-impact strategies towards eliminating malaria by 2030 in the Sahel region. In line with this initiative, an action plan was adopted in 2019. In addition to Cabo Verde as an eliminating country, the Gambia, Mauritania, the Niger and Senegal have reoriented their programmes towards malaria subnational elimination. Furthermore, subnational tailoring and stratification have been implemented in Côte d'Ivoire, Ghana, Guinea, Liberia, Mali, Nigeria, Senegal, Sierra Leone and Togo.

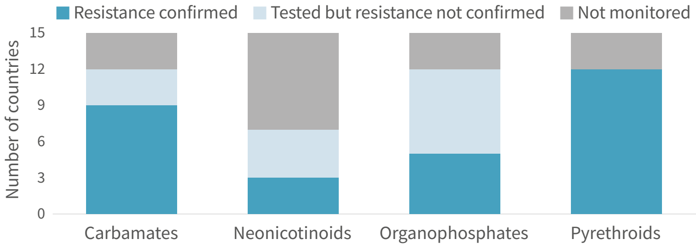
While some countries have made progress in reducing malaria, such as Ghana (17% reduction in estimated cases between 2015 and 2023) and Liberia, which has rolled out new generation ITNs and invested in community health (34% reduction in estimated cases between 2015 and 2023), several countries in the subregion are facing conflicts and political instability. This has jeopardized malaria prevention and response efforts in these countries, especially as funding remains limited. Other challenges include weak malaria programme management, insufficient prioritization and sustainability of interventions, limited community engagement, inappropriate application of case management guidelines and weak surveillance systems. This includes a lack of well-functioning vital registration systems and a shortage of human resources to implement malaria activities. Addressing these issues could significantly improve the malaria situation in the subregion.

THERAPEUTIC EFFICACY STUDIES (CLINICAL AND PARASITOLOGICAL FAILURE AMONG PATIENTS WITH *P. FALCIPARUM* MALARIA, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	Percentile 25	Percentile 75
AL	2015–2021	61	0.0	1.2	42.6	0.0	3.6
AS-AQ	2015–2019	46	0.0	0.0	9.8	0.0	2.0
DHA-PPQ	2016–2021	13	0.0	1.2	18.7	0.0	2.9

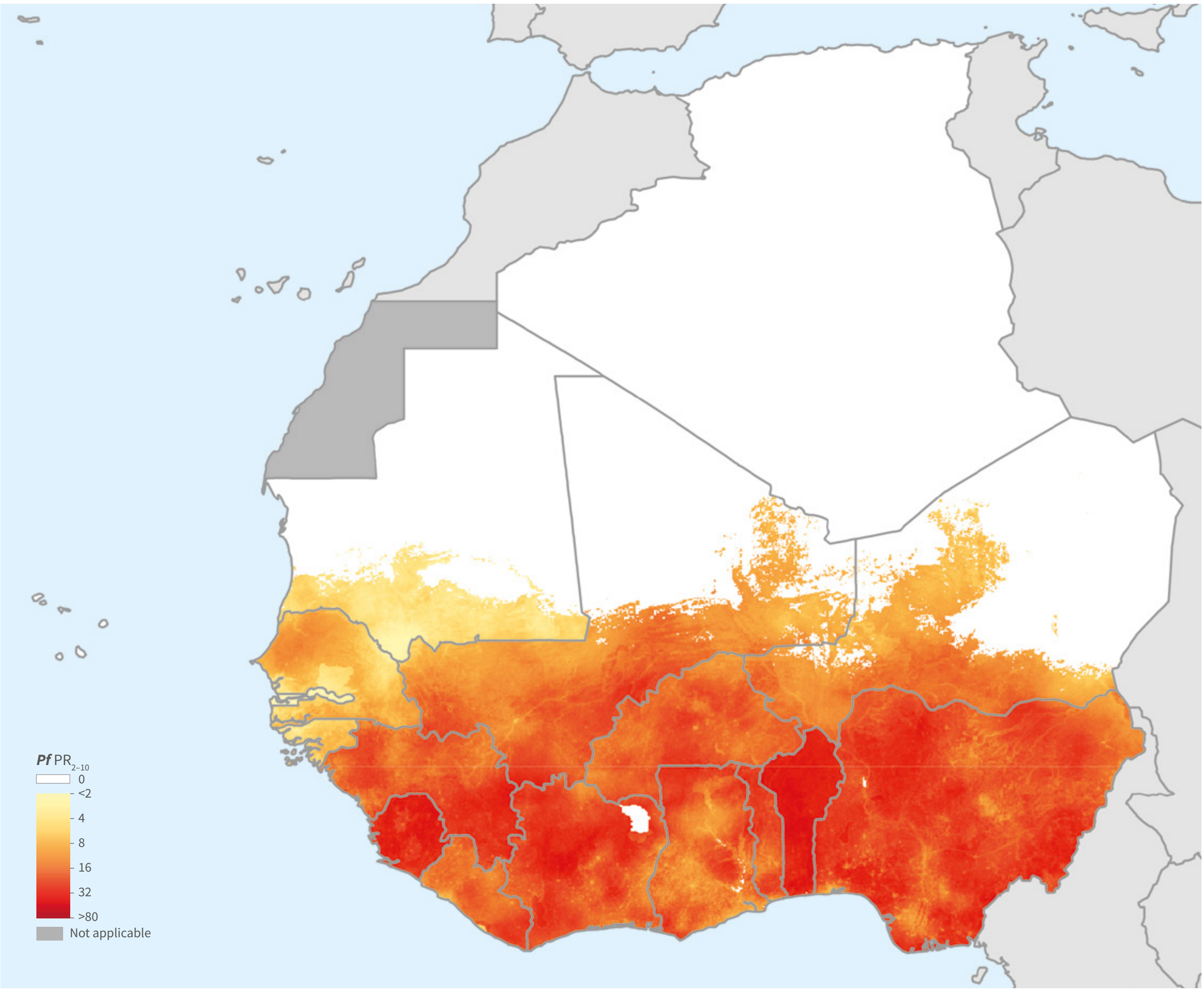
AL: artemether–lumefantrine; AS-AQ: artesunate–amodiaquine; DHA-PPQ: dihydroartemisinin–piperaquine.

STATUS OF INSECTICIDE RESISTANCE[a] PER INSECTICIDE CLASS (2018–2023)



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

A. *P. falciparum* parasite rate (*Pf* PR), 2023



Annex 3 – A. WHO African Region, a. West Africa

EPIDEMIOLOGY

Malaria endemic countries: Benin, Burkina Faso, Côte d'Ivoire, the Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, the Niger, Nigeria, Senegal, Sierra Leone and Togo

Population denominator used to compute incidence and mortality rate in 2023: 448 million

Parasites: *P. falciparum* (almost 100%) and other/mixed (<1%)

Vectors: *An. arabiensis, An. coluzzii, An. funestus, An. gambiae, An. melas, An. nili, An. pharoensis* and *An. stephensi*[a]

[a] Has been detected in Ghana and Nigeria.

FUNDING (US$), 2010–2023

651.3 million (2010), 664.8 million (2015), 1137.7 million (2023); 2010–2023: 75% increase

Proportion of domestic source[a] in 2023: 35%

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

INTERVENTIONS, 2010–2023

Countries that carried out ITN mass campaigns in 2023 (including carry-over from 2022): Benin, Guinea-Bissau, Liberia, Mali, Mauritania, Nigeria, Sierra Leone and Togo

Countries with ≥80% coverage with either ITNs or IRS in 2023:[a] Burkina Faso, the Gambia, the Niger and Togo

Countries with 50–80% coverage with either ITNs or IRS in 2023:[a] Benin, Côte d'Ivoire, Ghana, Guinea, Liberia, Mali, Nigeria, Senegal and Sierra Leone

Countries that implemented IPTp in 2023: Benin, Burkina Faso, Côte d'Ivoire, the Gambia, Ghana, Guinea, Guinea-Bissau, Mali, Mauritania, the Niger, Nigeria, Senegal, Sierra Leone and Togo

Countries with >50% IPTp3+ in 2023: Burkina Faso, the Gambia, Ghana, Guinea, Liberia, the Niger, Sierra Leone and Togo

Countries that implemented SMC: Benin, Burkina Faso, Côte d'Ivoire, the Gambia, Ghana, Guinea, Guinea-Bissau, Mali, Mauritania, the Niger, Nigeria, Senegal and Togo

Children treated with at least one dose of SMC per cycle in 2023: 46.6 million

Percentage of suspected cases tested (reported): 54.4% (2010), 72.7% (2015), 89.3% (2023)

Number of ACT courses distributed:[b] 32.2 million (2010), 47.4 million (2015), 88.6 million (2023)

Number of any antimalarial treatment courses (incl. ACT) distributed:[b] 32.2 million (2010), 49.4 million (2015), 90.1 million (2023)

[a] ITN coverage model from MAP; [b] No data for Liberia in 2023.

REPORTED CASES AND DEATHS,[a] 2010–2023

Total (presumed and confirmed) cases: 30.6 million (2010), 56.8 million (2015), 71.4 million (2023)

Confirmed cases: 6.8 million (2010), 36.4 million (2015), 66.9 million (2023)

Percentage of total cases confirmed: 22.1% (2010), 64.1% (2015), 93.8% (2023)

Deaths:[b] 39 000 (2010), 30 900 (2015), 25 600 (2023)

Children aged under 5 years, presumed and confirmed cases: 11.9 million (2010), 21.0 million (2015), 24.7 million (2023)

Children aged under 5 years, percentage of total cases: 38.9% (2010), 37.0% (2015), 34.6% (2023)

Children aged under 5 years, deaths: 22 900 (2010), 22 100 (2015), 17 100 (2023)

Children aged under 5 years, percentage of total deaths: 59% (2020), 72% (2015), 67% (2023)

[a] Includes malaria endemic countries only; [b] Mauritania and Nigeria only report deaths in children aged under 5 years.

ESTIMATED CASES AND DEATHS, 2010–2023

Cases: 118.4 million (2010), 108.9 million (2015), 123.9 million (2023); 2010–2023: 5% increase

Deaths: 380 700 (2010), 311 400 (2015), 311 500 (2023); 2010–2023: 18% decrease

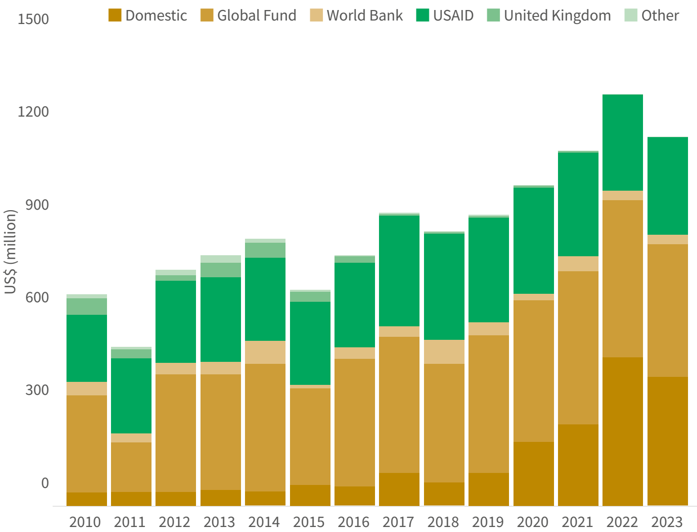
ACCELERATION TO ELIMINATION

Countries with subnational/territorial elimination programme: the Gambia, Mauritania, the Niger and Senegal

Countries with nationwide elimination programme: Cabo Verde

Certified as malaria free since 2010: Algeria (2019) and Cabo Verde (2023)

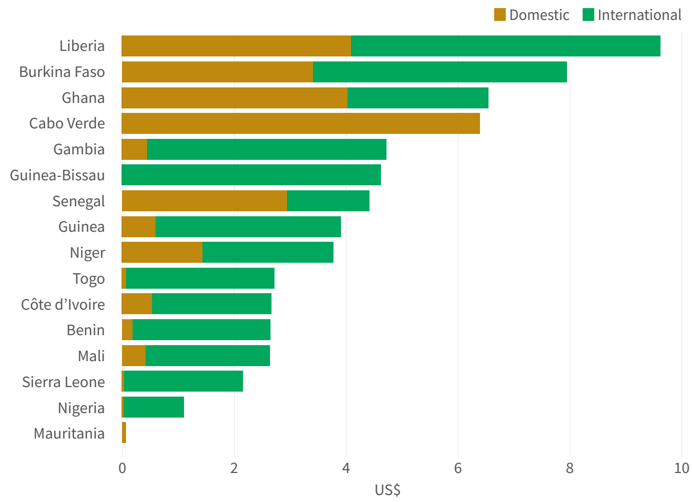
B. Malaria funding[a] by source, 2010–2023



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

[a] Excludes patient service delivery costs and out-of-pocket expenditure.

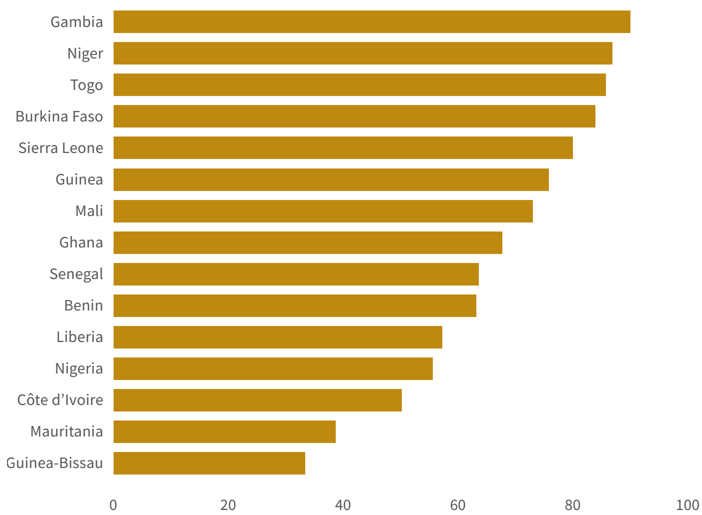
C. Malaria funding[a] per person at risk, average 2021–2023



[a] Data are not collected on out-of-pocket expenditure and exclude patient service delivery costs; total funding includes negative disbursements due to under expenditure of international funding.

D. Percentage of population with access to an ITN, 2023

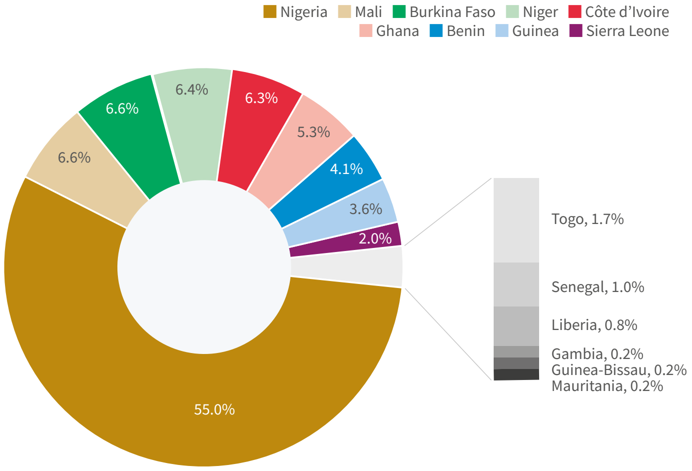
Source: ITN coverage model from MAP



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

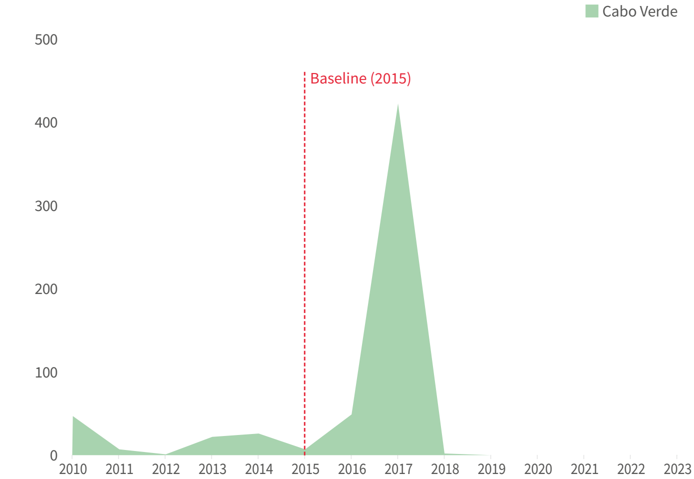
Note: Algeria and Cabo Verde were certified malaria free in 2019 and 2023, respectively.

E. Share of estimated malaria cases, 2023



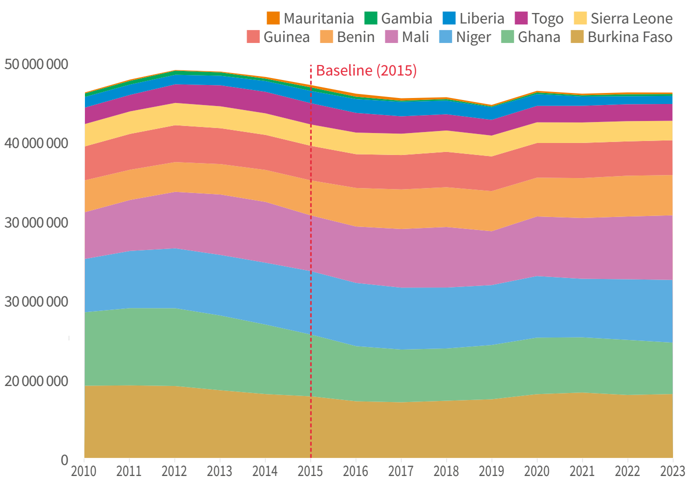
Note: Cabo Verde had zero malaria cases in 2023.

F. Estimated number of cases in countries that reduced incidence by ≥63%[a] in 2023 compared with 2015



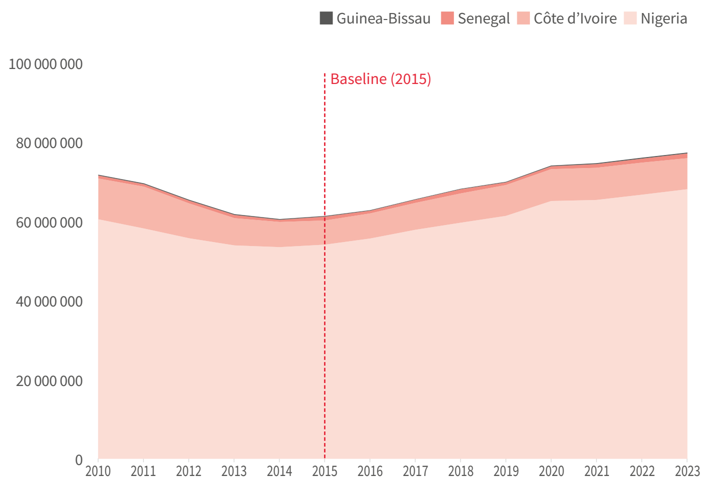
[a] 63% reduction represents the estimated expected reduction for 2023 between the GTS targets of 2020 (40%) and 2025 (75%).
Note: Algeria and Cabo Verde were certified malaria free in 2019 and 2023, respectively.

G. Estimated number of cases in countries that reduced incidence by <63%[a] in 2023 compared with 2015



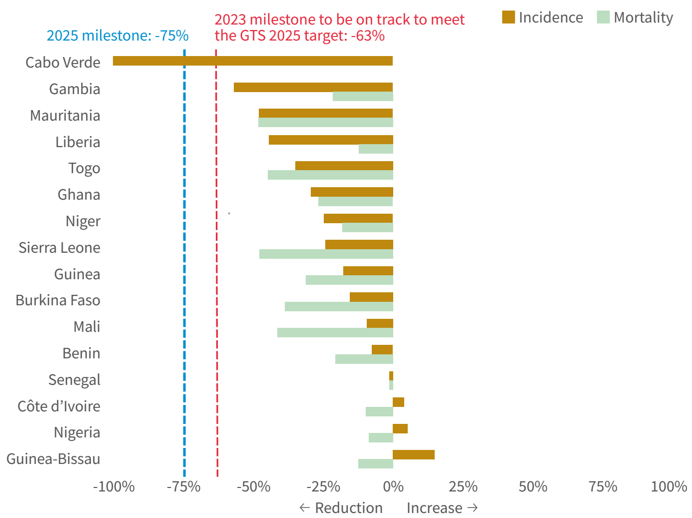
[a] 63% reduction represents the estimated expected reduction for 2023 between the GTS targets of 2020 (40%) and 2025 (75%).

H. Estimated number of cases in countries with an increase or no change[a] in incidence, 2015–2023



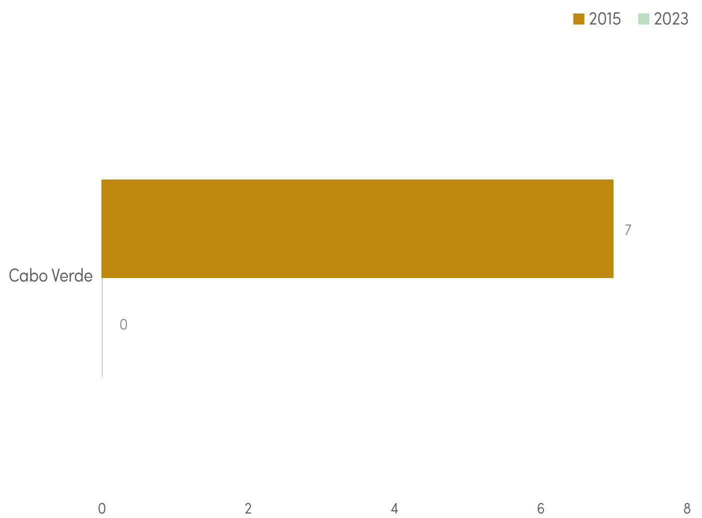
[a] A decrease or increase of less than 5% in 2023 compared with 2015 is categorized as no change.

I. Change in estimated malaria incidence and mortality rate, 2015–2023



Note: Cabo Verde was certified malaria free in 2023.

J. Reported indigenous cases in countries with national elimination activities, 2015 versus 2023



Note: Cabo Verde was certified malaria free in 2023.

Annex 3 – A. WHO African Region, b. Central Africa

About 220 million people living in the 10 countries of central Africa are at high risk of malaria. Malaria transmission, almost exclusively due to *P. falciparum*, occurs throughout the year except in the north of Cameroon, northern Chad and the southern part of the Democratic Republic of the Congo. The HBHI initiative has been implemented in Cameroon and the Democratic Republic of the Congo.

In 2023, the subregion had almost 60 million estimated cases and almost 124 000 estimated deaths – a 36% increase and a 9% decrease, respectively, compared with 2010. Three countries in the region accounted for more than 80% of the estimated cases: the Democratic Republic of the Congo (55%), Angola (14%) and Cameroon (12%). A similar distribution was seen for estimated malaria deaths, which were mainly observed in the Democratic Republic of the Congo (55%), Angola (13%) and Cameroon (11%). There were 54 million cases reported in the public and private sectors and in the community; of these, 43% were in children aged under 5 years and 51 million (93%) were confirmed. The proportion of total cases that were confirmed has improved substantially over time, from only 30% in 2010.

Estimated population access to ITNs remains low in the subregion, with only six of the 10 countries having more than 50% access to ITNs. In 2023, Cameroon, the Central African Republic, Chad, the Congo and the Democratic Republic of the Congo carried out ITN mass campaigns. Additionally, Cameroon and Chad are implementing SMC in targeted areas of each country, covering 4.8 million children with at least one dose of SMC per cycle in 2023. Nine of 10 countries in this subregion (Angola, Burundi, Cameroon, the Central African Republic, Chad, the Congo, the Democratic Republic of the Congo, Equatorial Guinea and Gabon) reported implementing IPTp in 2023, and only two (Burundi and the Democratic Republic of the Congo) had more than 50% IPTp3 coverage. As of October 2024, an additional two countries (Cameroon and the Central African Republic) had introduced the malaria vaccine subnationally.

None of the countries in the subregion are on track to meet the GTS target for 2025 (i.e. 75% reduction in incidence and mortality compared with 2015). Three countries, Cameroon, the Central African Republic and Equatorial Guinea, experienced reductions in incidence, but by less than 63% (the expected reduction in 2023 for countries to be on track to meet the GTS 2025 target). Two countries saw an increase of more than 5% in estimated malaria incidence between 2015 and 2023; Angola had the largest increase (27%), followed by Burundi (23%). Sao Tome and Principe, which is part of the malaria eliminating countries for 2025 (E-2025) initiative, reported a 41% increase in the number of indigenous cases in 2023 compared with 2022.

The subregion is also facing biological threats to malaria interventions. *Pfhrp2/3* gene deletions have been previously confirmed in Cameroon, the Democratic Republic of the Congo, Equatorial Guinea and Gabon. Most recently, they were confirmed in 2020 in Chad. Based on available data, most TES conducted according to the WHO standard protocol between 2015 and 2024 in this subregion have shown high efficacy of antimalarial treatment. High treatment failure rates were previously reported in Angola during TES of AL conducted in 2015, 2019 and 2021 and in the Democratic Republic of the Congo during TES of AL and DHA-PPQ in 2018. However, no subsequent reports of high treatment failure rates have been received. More surveillance is needed to fully understand the recent trends. Regarding insecticide resistance, between 2018 and 2023, among the 10 countries in this subregion, resistance to carbamates was confirmed in three of the six countries where it was monitored. Resistance to neonicotinoids was confirmed for the first time in one of two countries where monitored (Cameroon), and resistance to organophosphates was confirmed in two of the six countries where monitored. Resistance to pyrethroids was detected in all seven countries where it was monitored.

Total malaria funding has fluctuated since 2010, showing an overall increase of 50%. The highest level of funding was reached in 2022, followed by a sharp decline in 2023. Compared with 2022, total funding decreased by nearly US$ 150 million, from US$ 580 million to US$ 440 million, or 25%, mainly due to a significant reduction in international funding, particularly a 39% drop in contributions from the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) following the end of the recent grant cycle from 2020 to 2022 (from US$ 400 million to US$ 250 million). Domestic expenditures accounted for 19% of total funding, up from 10% in 2022. Over the 3-year average, funding per person at risk ranged from US$ 0.20 in Gabon to US$ 5.24 in Sao Tome and Principe, marking a substantial increase, mainly in Sao Tome and Principe, which saw a 46% rise compared with the previous 3-year average. In eight of the 10 countries in the subregion, the average funding per person at risk exceeded US$ 1.00.

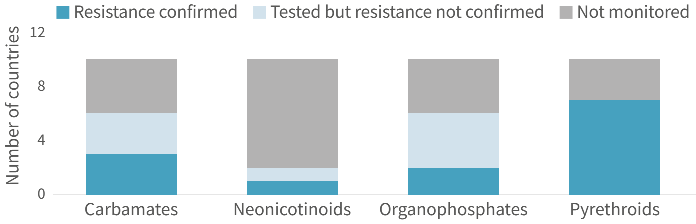
While progress has been made in reducing malaria-related deaths in the subregion, through improved quality of care and the rollout of effective case management, several challenges have impeded significant reductions in the number of cases. Among these are insufficient funding from both domestic and international sources, which hampers the implementation of effective malaria programmes, and limited access to ITNs. Addressing these issues could substantially improve the malaria situation in the subregion.

THERAPEUTIC EFFICACY STUDIES (CLINICAL AND PARASITOLOGICAL FAILURE AMONG PATIENTS WITH *P. FALCIPARUM* MALARIA, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	Percentile 25	Percentile 75
AL	2015–2021	39	0.0	1.9	18.0	0.0	4.7
AS-AQ	2015–2021	39	0.0	0.0	9.0	0.0	5.0
DHA-PPQ	2015–2021	16	0.0	0.0	12.0	0.0	1.7

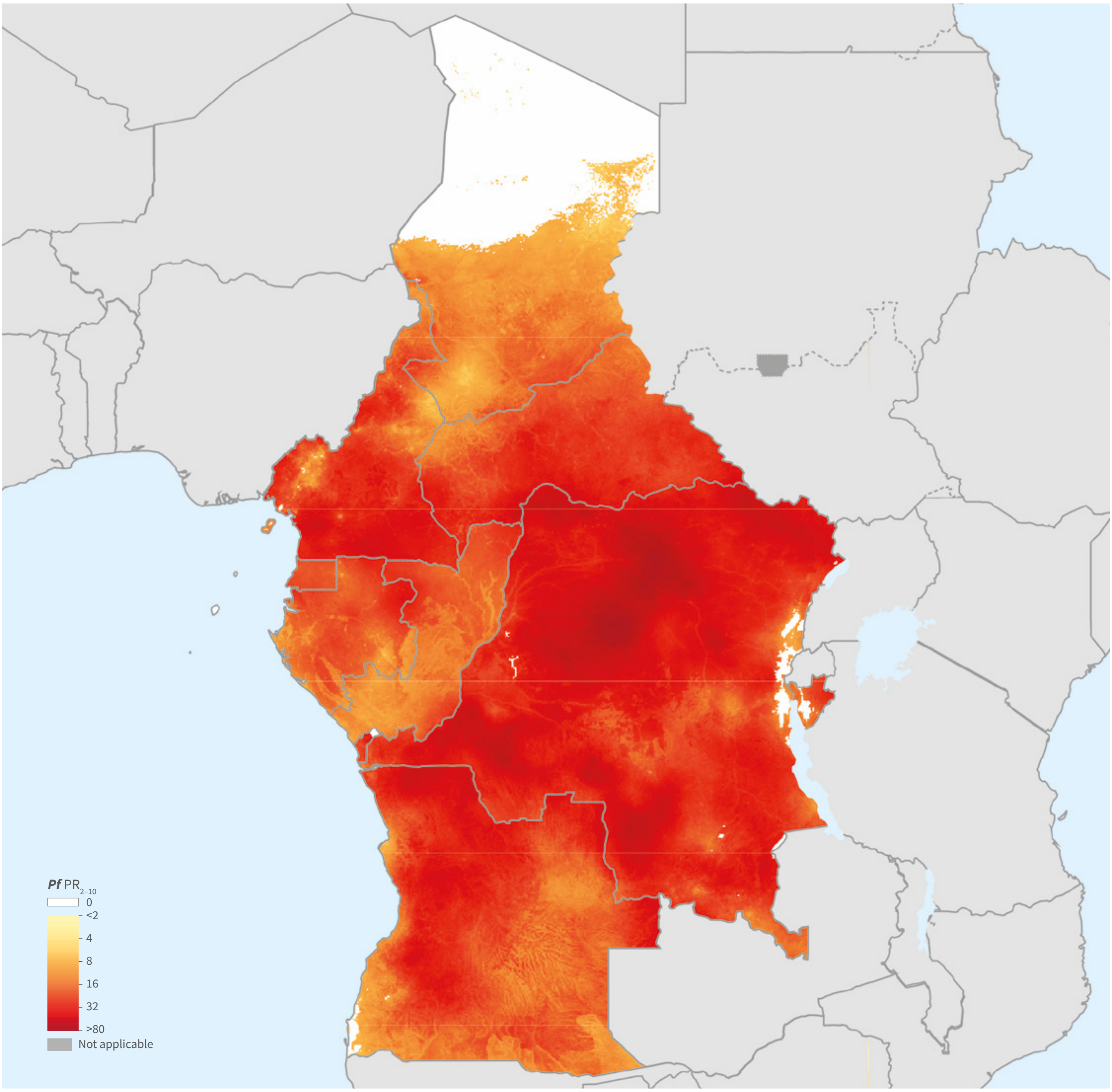
AL: artemether-lumefantrine; AS-AQ: artesunate-amodiaquine; DHA-PPQ: dihydroartemisinin-piperaquine.

STATUS OF INSECTICIDE RESISTANCE[a] PER INSECTICIDE CLASS (2018–2023)



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

A. *P. falciparum* parasite rate (*Pf* PR), 2023



Annex 3 – A. WHO African Region, b. Central Africa

EPIDEMIOLOGY

Malaria endemic countries: Angola, Burundi, Cameroon, the Central African Republic, Chad, the Congo, the Democratic Republic of the Congo, Equatorial Guinea, Gabon and Sao Tome and Principe

Population denominator used to compute incidence and mortality rate in 2023: 220 million

Parasites: *P. falciparum* (almost 100%) and other/mixed (<1%)

Vectors:[a] *An. arabiensis, An. coluzzii, An. coustani, An. funestus, An. gambiae, An. melas, An. moucheti, An nili, An. paludis* and *An. rufipes*

[a] *An. stephensi* has not been detected in this subregion.

FUNDING (US$), 2010–2023

292.8 million (2010), 440.1 million (2015), 440.3 million (2023); 2010–2023: 50% increase

Proportion of domestic source[a] in 2023: 19%

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

INTERVENTIONS, 2010–2023

Countries that carried out ITN mass campaigns in 2023 (including carry-over from 2022): Cameroon, the Central African Republic, Chad, the Congo and the Democratic Republic of the Congo

Countries with ≥80% coverage with either ITNs or IRS in 2023:[a] the Central African Republic, the Congo and the Democratic Republic of the Congo

Countries with 50–80% coverage with either ITNs or IRS in 2023:[a] Burundi, Cameroon and Chad

Countries that implemented IPTp in 2023: Angola, Burundi, Cameroon, the Central African Republic, Chad, the Congo, the Democratic Republic of the Congo, Equatorial Guinea and Gabon

Countries with >50% IPTp3+ in 2023: Burundi and the Democratic Republic of the Congo

Countries that implemented SMC: Cameroon and Chad

Children treated with at least one dose of SMC per cycle in 2023: 4.8 million

Percentage of suspected cases tested (reported): 45.8% (2010), 92.0% (2015), 94.6% (2023)

Number of ACT courses distributed:[b] 18.2 million (2010), 22.4 million (2015), 39.0 million (2023)

Number of any antimalarial treatment courses (incl. ACT) distributed:[b] 19.1 million (2010), 22.4 million (2015), 39.4 million (2023)

[a] ITN coverage model from MAP; [b] No data for Chad in 2023.

REPORTED CASES AND DEATHS,[a] 2010–2023

Total (presumed and confirmed) cases: 20.4 million (2010), 26.6 million (2015), 54.0 million (2023)

Confirmed cases: 6.1 million (2010), 23.4 million (2015), 50.0 million (2023)

Percentage of total cases confirmed: 30.1% (2010), 87.9% (2015), 92.6% (2023)

Deaths: 40 400 (2010), 58 200 (2015), 42 500 (2023)

Children aged under 5 years, presumed and confirmed cases:[b] 9.1 million (2010), 11.3 million (2015), 23.2 million (2023)

Children aged under 5 years, percentage of total cases: 44.9% (2010), 42.6% (2015), 42.9% (2023)

Children aged under 5 years, deaths:[b] 26 000 (2010), 37 100 (2015), 24 700 (2023)

Children aged under 5 years, percentage of total deaths: 64% (2010), 64% (2015), 58% (2023)

[a] Includes malaria endemic countries only; [b] No data for Sao Tome and Principe in 2023.

ESTIMATED CASES AND DEATHS, 2010–2023

Cases: 44.1 million (2010), 44.5 million (2015), 59.9 million (2023); 2010–2023: 36% increase

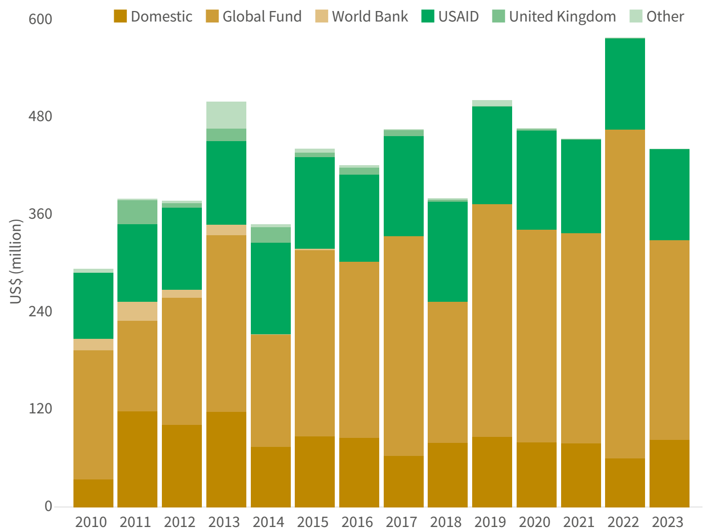
Deaths: 136 200 (2010), 110 600 (2015), 123 700 (2023); 2010–2023: 9% decrease

ACCELERATION TO ELIMINATION

Countries with nationwide elimination programme: Sao Tome and Principe

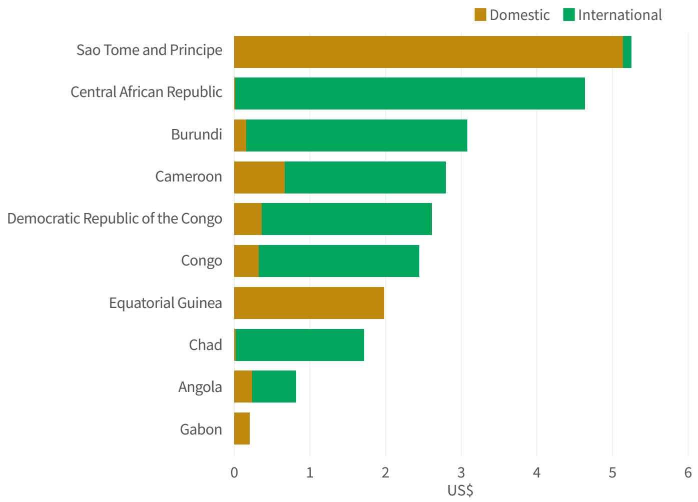
Countries part of the E-2025 initiative: Sao Tome and Principe

B. Malaria funding[a] by source, 2010–2023



Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; USAID: United States Agency for International Development.
[a] Excludes patient service delivery costs and out-of-pocket expenditure.

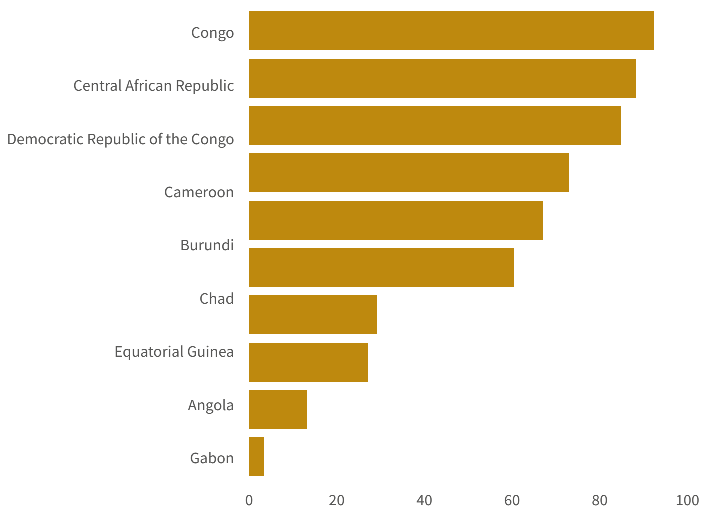
C. Malaria funding[a] per person at risk, average 2021–2023



[a] Data are not collected on out-of-pocket expenditure and exclude patient service delivery costs; total funding includes negative disbursements due to under expenditure of international funding.

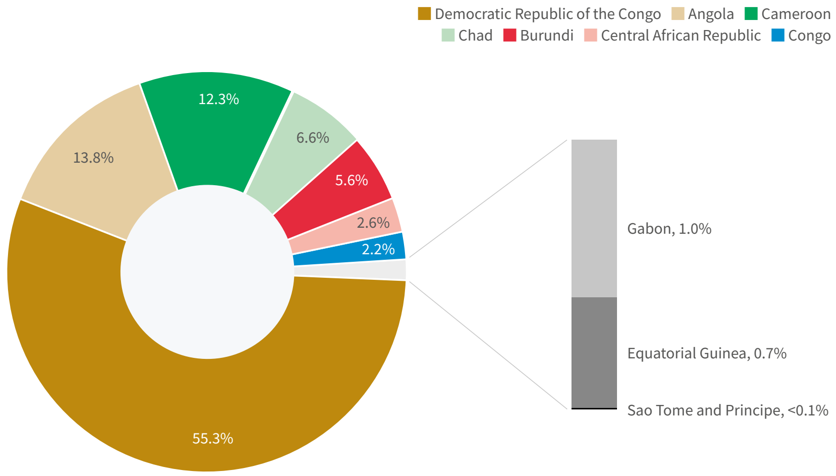
D. Percentage of population with access to an ITN, 2023

Source: ITN coverage model from MAP

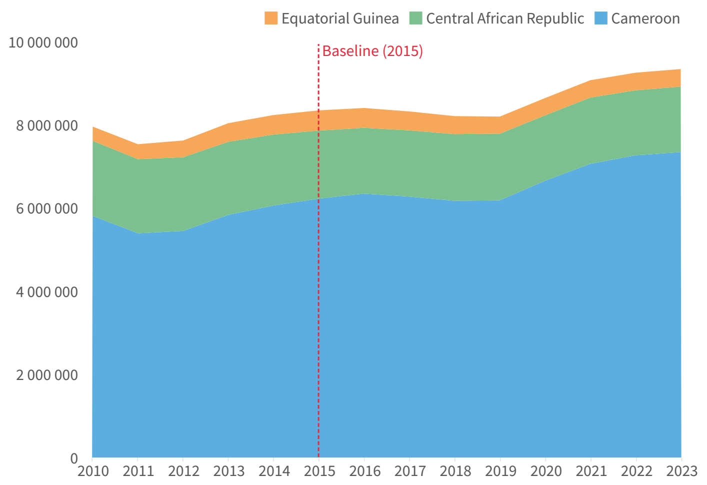


ITN: insecticide-treated mosquito net; MAP: Malaria Atlas Project.
Note: Sao Tome and Principe is a low transmission country where vector control is targeted to foci.

E. Share of estimated malaria cases, 2023

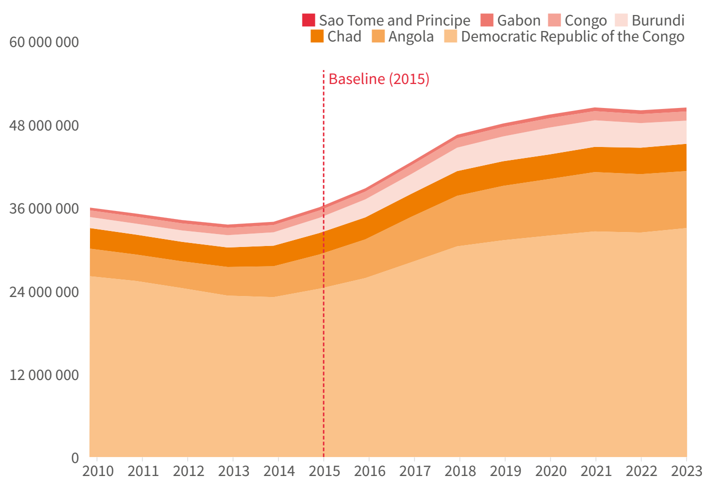


F. Estimated number of cases in countries that reduced incidence by <63%[a] in 2023 compared with 2015



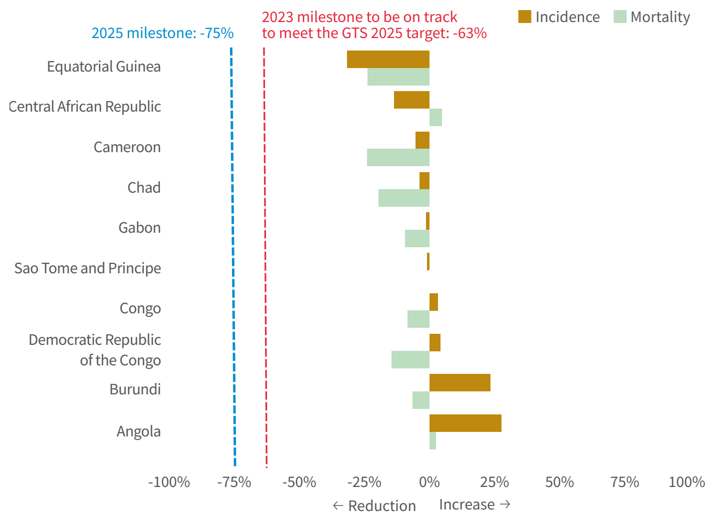
[a] 63% reduction represents the estimated expected reduction for 2023 between the GTS targets of 2020 (40%) and 2025 (75%).

G. Estimated number of cases in countries with an increase or no change[a] in incidence, 2015–2023

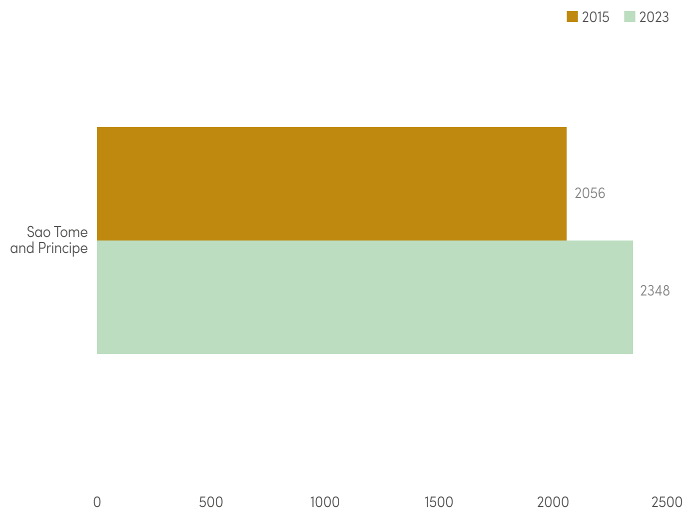


[a] A decrease or increase of less than 5% in 2023 compared with 2015 is categorized as no change.

H. Change in estimated malaria incidence and mortality rate, 2015–2023



I. Reported indigenous cases in countries with national elimination activities, 2015 versus 2023



Annex 3 – A. WHO African Region, c. Countries with high transmission in east and southern Africa

About 403 million people in the 11 countries with high transmission in east and southern Africa are at high risk of malaria. Malaria transmission is almost exclusively due to *P. falciparum* (except in Ethiopia) and is highly seasonal in Ethiopia, Zimbabwe and in coastal and highland areas of Kenya and Madagascar. In Madagascar, malaria transmission also occurs in the semi-arid region of the south, which is affected by climate change. Malaria transmission is stable in most of Malawi, Mozambique, South Sudan, Uganda, the United Republic of Tanzania and Zambia. The HBHI initiative was implemented in Mozambique in 2018 and Uganda in 2019.

In 2023, the subregion had an estimated 62 million cases and 133 000 deaths – a 14% increase and a 1% increase, respectively, compared with 2010. Three countries accounted for more than 50% of the estimated cases: Uganda (20%), Ethiopia (15%) and Mozambique (15%). In these countries, around 67 million cases were reported in the public and private sectors and the community, of which 64 million (94.5%) were confirmed and 33.5% were in children aged under 5 years. The proportion of total cases that were confirmed improved substantially over time, from only 16% in 2010 to 94.5% in 2023. In 2023, 44% of the reported deaths were among children aged under 5 years.

In eight countries in 2023, an estimated 50% or more of the population had access to ITNs, and nine countries implemented IPTp, with four countries reporting that more than 50% of pregnant women attending antenatal care (ANC) received three or more doses of IPTp. In 2023, Ethiopia, Mozambique, Rwanda, South Sudan, Uganda, the United Republic of Tanzania, Zambia and Zimbabwe carried out mass ITN campaigns. Madagascar implemented SMC for the first time and, together with Mozambique, South Sudan and Uganda, distributed at least one dose of SMC per cycle in 2023 to more than 1.9 million children. Malawi and Kenya have been part of the malaria vaccine implementation programme for the programmatic use of RTS,S since 2019. As of October 2024, an additional two countries (South Sudan and Mozambique) had introduced the malaria vaccine subnationally.

Rwanda is on track to meet the GTS target of a 75% reduction in incidence by 2025 compared with the GTS baseline in 2015. Ethiopia, Kenya, Mozambique, the United Republic of Tanzania, South Sudan, Zambia and Zimbabwe did reduce their incidence, but by less than 63% (the expected reduction for countries to be on track to meet the GTS 2025 target) in 2023 compared with 2015. A large 87% increase in incidence was seen in Madagascar. There were no changes in incidence in Malawi and Uganda.

Compared with 2022, several countries reported a significant increase in malaria cases in 2023. Ethiopia recorded an additional 1.5 million cases, thought to be due to ongoing conflicts that have weakened health programmes. Madagascar reported 1.2 million more cases, likely linked to extreme weather events, such as cyclones and heavy rains, which caused flooding – creating ideal breeding conditions for *Anopheles* mosquitoes – and disrupted infrastructure, preventing access to health care. Zimbabwe also saw a 76% increase in cases, rising from 140 000 in 2022. In contrast, Rwanda continued to see a decline in malaria cases, with 300 000 fewer cases reported in 2023 compared with 2022, marking a 36% reduction, attributed to a strong programmatic response.

The subregion is also facing biological threats to malaria interventions. *Pfhrp2/3* deletions have been previously confirmed in Ethiopia, Kenya, Madagascar, Mozambique, Rwanda, South Sudan, Uganda, the United Republic of Tanzania and Zambia. No new countries from this region reported deletions in 2023. Based on available data, most TES conducted according to the WHO standard protocol between 2015 and 2024 in this subregion have shown high efficacy of antimalarial treatment. High treatment failure rates were previously reported in Uganda during TES of AL conducted in 2015 and 2018, and in Kenya during TES of AL in 2016. However, no subsequent reports of high treatment failure rates have been received. More surveillance is needed to fully understand the recent trends. Surveillance of *P. falciparum Kelch 13* (*PfKelch13*) polymorphisms has previously led to the detection of artemisinin partial resistance associated with *PfKelch13* mutations in Rwanda, Uganda and the United Republic of Tanzania. Most recently, molecular surveillance has detected a high prevalence of a *PfKelch13* mutation associated with partial artemisinin resistance (P441L) in Zambia in 2023. Regarding insecticide resistance, bioassays conducted between 2018 and 2023 confirmed resistance to carbamates in all seven of the countries where it was tested, resistance to neonicotinoids was detected for the first time in one of the seven countries where it was monitored (Rwanda), and resistance to organophosphates was confirmed in one of the 10 countries where monitored. Resistance to pyrethroids was detected in all 10 countries where it was monitored.

Total funding in the subregion has increased by 9% since 2010, from US$ 870 million to US$ 970 million, with some fluctuations over the past decade but generally remaining stable over the past 3 years. Compared with 2022, domestic funding saw a decline (of US$ 20 million), while international funding increased (by $US 13 million). Over a 3-year average, funding per person at risk ranged from US$ 1.03 in Ethiopia to US$ 5.59 in Rwanda. This marks a shift from the previous 3-year average, where Kenya had the lowest funding per person at risk, while other figures remained relatively consistent. All 11 countries in the subregion reported average funding per person at risk exceeding US$ 1.00.

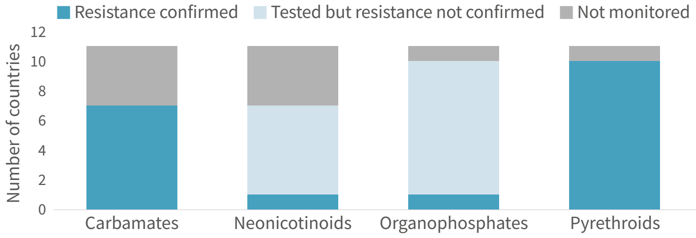
While some countries (Rwanda) made significant progress, in 2023, the subregion faced significant challenges due to climate change, extreme weather events during the El Niño season and ongoing conflicts (Ethiopia). These humanitarian, health and climate crises severely disrupted access to care and weakened health programmes. The changing climatic conditions, including increased rainfall and flooding, created more favourable breeding environments for *Anopheles* mosquitoes, making affected areas more receptive to malaria transmission. Political instability in some countries, along with inadequate funding for interventions and human resources, further compounded the challenges.

THERAPEUTIC EFFICACY STUDIES (CLINICAL AND PARASITOLOGICAL FAILURE AMONG PATIENTS WITH *P. FALCIPARUM* MALARIA, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	Percentile 25	Percentile 75
AL	2015–2022	67	0.0	1.4	17.9	0.0	3.5
AS-AQ	2016–2022	20	0.0	0.0	2.0	0.0	0.0
DHA-PPQ	2015–2019	17	0.0	1.1	9.2	0.0	1.6

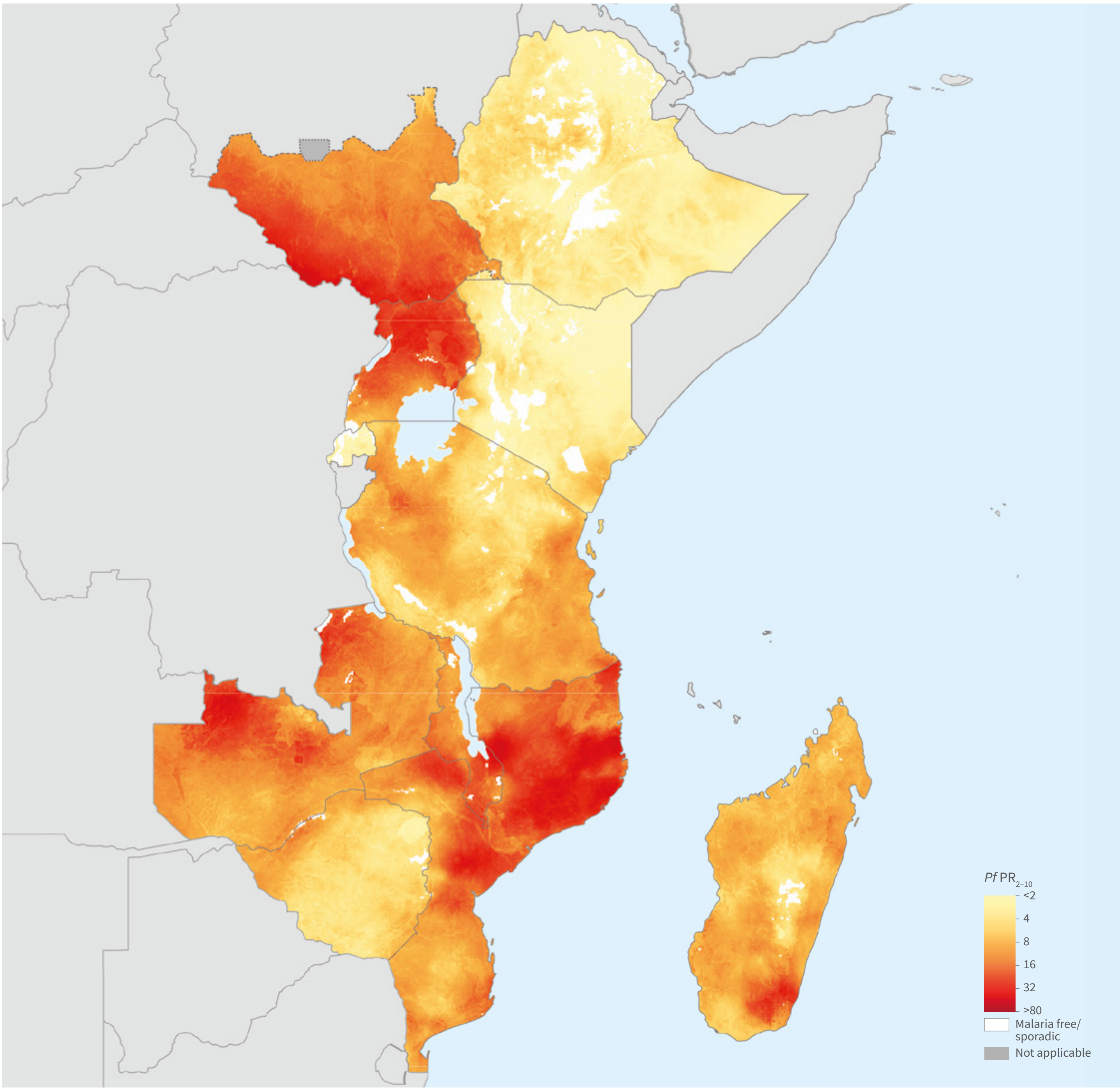
AL: artemether-lumefantrine; AS-AQ: artesunate-amodiaquine; DHA-PPQ: dihydroartemisinin-piperaquine.

STATUS OF INSECTICIDE RESISTANCE[a] PER INSECTICIDE CLASS (2018–2023)



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

A. *P. falciparum* parasite rate (*Pf* PR), 2023



Annex 3 – A. WHO African Region, c. Countries with high transmission in east and southern Africa

EPIDEMIOLOGY

Malaria endemic countries: Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Rwanda, South Sudan, Uganda, the United Republic of Tanzania, Zambia and Zimbabwe

Population denominator used to compute incidence and mortality rate in 2023: 403 million

Parasites: *P. falciparum* and mixed (99%), *P. vivax* (1%) and other (<1%)

Vectors: *An. arabiensis*, *An. funestus* s.l., *An. gambiae*, *An. leesoni*, *An. mascarensis*, *An. merus*, *An. nili*, *An. parensis*, *An. pharoensis*, *An. rivulorum*, *An. rufipes* and *An. stephensi*[a]

[a] Has been detected in Ethiopia and Kenya.

FUNDING (US$), 2010–2023

886.9 million (2010), 857.8 million (2015), 970.1 million (2023); 2010–2023: 9% increase

Proportion of domestic source[a] in 2023: 16%

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

INTERVENTIONS, 2010–2023

Countries that carried out ITN mass campaigns in 2023 (including carry-over from 2022): Ethiopia, Mozambique, Rwanda, South Sudan, Uganda, the United Republic of Tanzania, Zambia and Zimbabwe

Countries with 50–80% coverage with either ITN or IRS in 2023:[a] Madagascar, Mozambique, Rwanda, South Sudan, Uganda, the United Republic of Tanzania, Zambia and Zimbabwe

Countries that implemented IPTp in 2023: Kenya, Madagascar, Malawi, Mozambique, South Sudan, Uganda, the United Republic of Tanzania (mainland), Zambia and Zimbabwe

Countries with >50% IPTp3+ in 2023: Malawi, Mozambique, Uganda and Zambia

Countries that implemented SMC: Madagascar, Mozambique, South Sudan and Uganda

Children treated with at least one dose of SMC per cycle in 2023: 1.9 million

Percentage of suspected cases tested (reported): 38.2% (2010), 79.6% (2015), 96.6% (2023)

Number of ACT courses distributed:[b] 67.9 million (2010), 108.2 million (2015), 99.6% (2023)

Number of any antimalarial treatment courses (incl. ACT) distributed:[b] 68.0 million (2010), 109.9 million (2015), 104.5 million (2023)

[a] ITN coverage model from MAP; [b] No data for Malawi in 2023.

REPORTED CASES AND DEATHS,[a] 2010–2023

Total (presumed and confirmed) cases: 53.3 million (2010), 59.0 million (2015), 67.3 million (2023)

Confirmed cases: 8.6 million (2010), 36.2 million (2015), 63.6 million (2023)

Percentage of total cases confirmed: 16.1% (2010), 61.5% (2015), 94.5% (2023)

Deaths: 70 700 (2010), 38 400 (2015), 12 200 (2023)

Children aged under 5 years, presumed and confirmed cases: 21.6 million (2010), 17.6 million (2015), 22.6 million (2023)

Children aged under 5 years, percentage of total cases: 40.5% (2010), 29.9% (2015), 33.5% (2023)

Children aged under 5 years, deaths:[b] 25 300 (2010), 10 400 (2015), 5376 (2023)

Children aged under 5 years, percentage of total deaths:[b] 36% (2010), 27% (2015), 44% (2023)

[a] Includes malaria endemic countries only; [b] No data for Mozambique in 2023.

ESTIMATED CASES AND DEATHS, 2010–2023

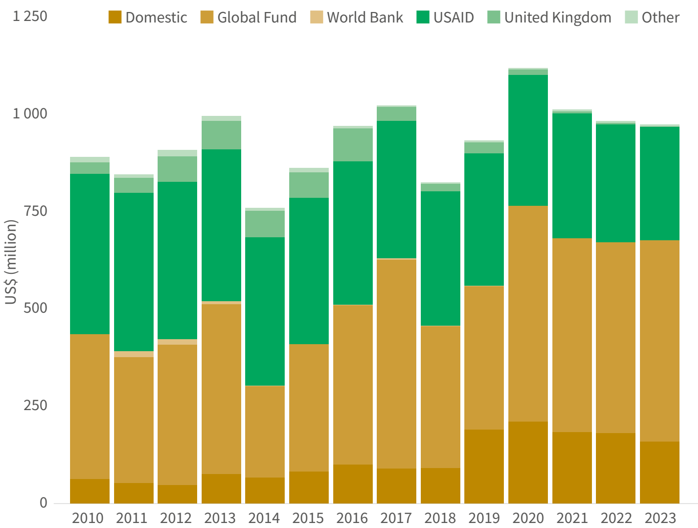
Cases: 54.7 million (2010), 56.8 million (2015), 62.2 million (2023); 2010–2023: 14% increase

Deaths: 132 200 (2010), 127 800 (2015), 132 900 (2023); 2010–2023: 1% increase

ACCELERATION TO ELIMINATION

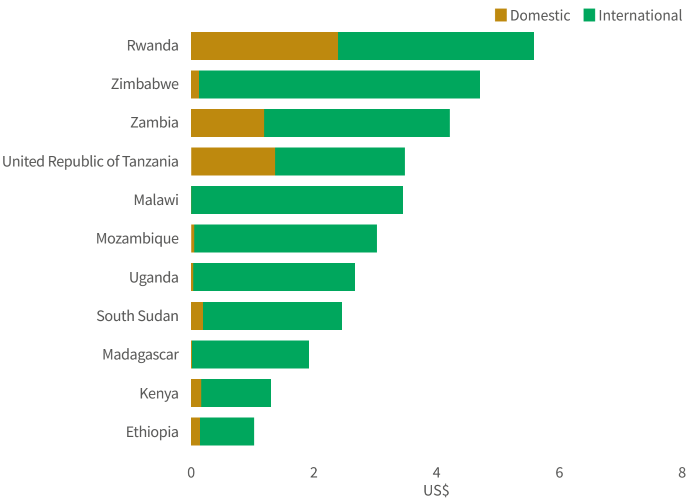
Countries with subnational/territorial elimination programme: the United Republic of Tanzania (Zanzibar), Zambia and Zimbabwe

B. Malaria funding[a] by source, 2010–2023



Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; USAID: United States Agency for International Development.
[a] Excludes patient service delivery costs and out-of-pocket expenditure.

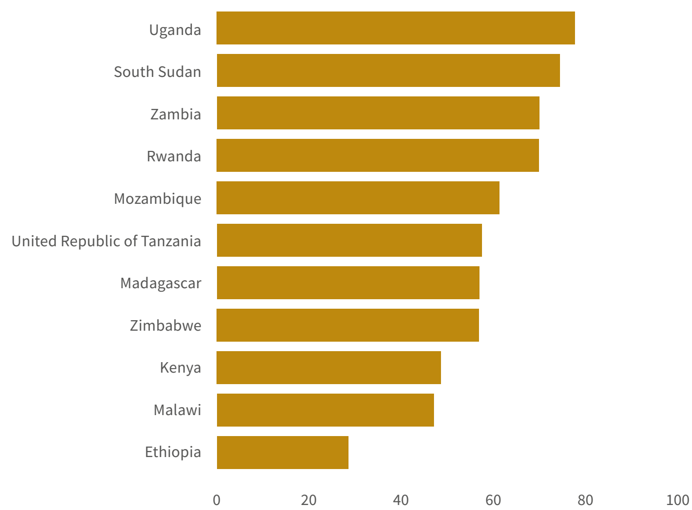
C. Malaria funding[a] per person at risk, average 2021–2023



[a] Data are not collected on out-of-pocket expenditure and exclude patient service delivery costs; total funding includes negative disbursements due to under expenditure of international funding.

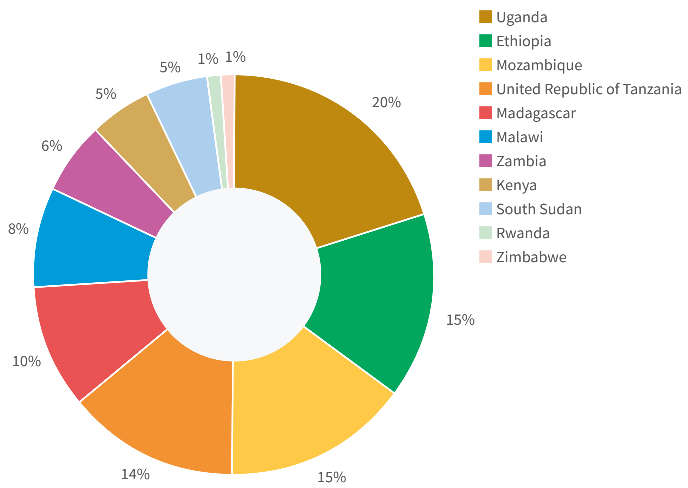
D. Percentage of population with access to an ITN, 2023

Source: ITN coverage model from MAP

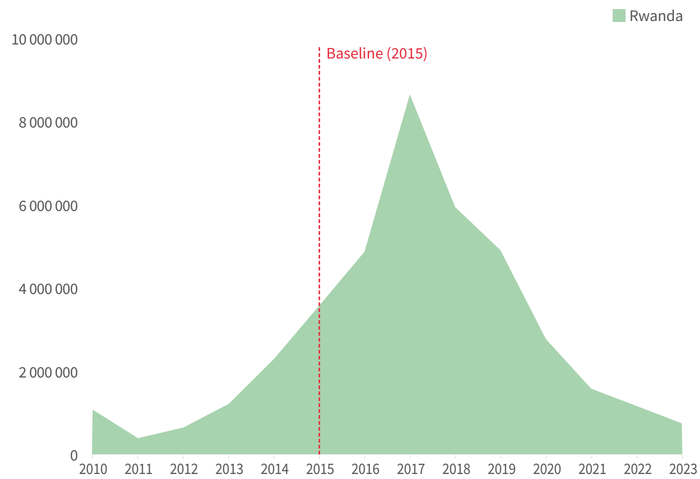


ITN: insecticide-treated mosquito net; MAP: Malaria Atlas Project.

E. Share of estimated malaria cases, 2023

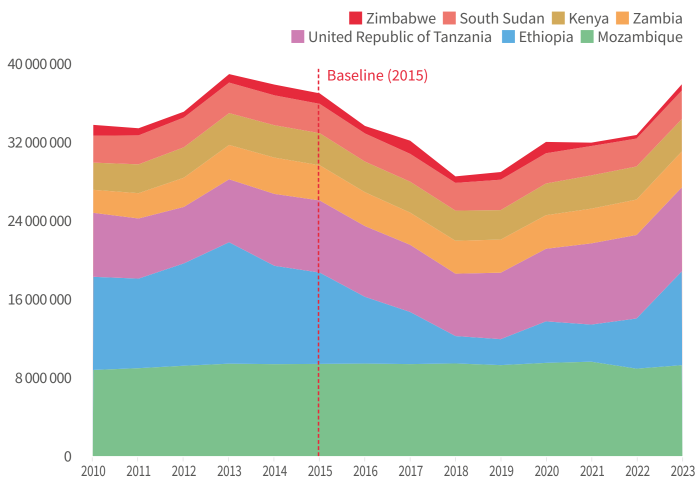


F. Estimated number of cases in countries that reduced incidence by ≥63%[a] in 2023 compared with 2015



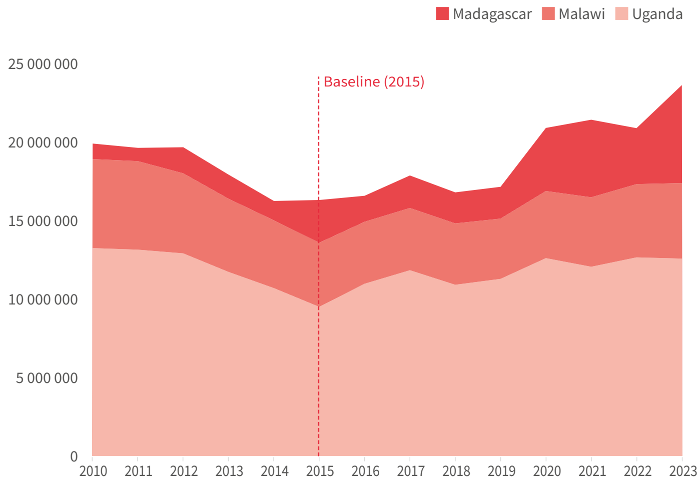
[a] 63% reduction represents the estimated expected reduction for 2023 between the GTS targets of 2020 (40%) and 2025 (75%).

G. Estimated number of cases in countries that reduced incidence by <63%[a] in 2023 compared with 2015



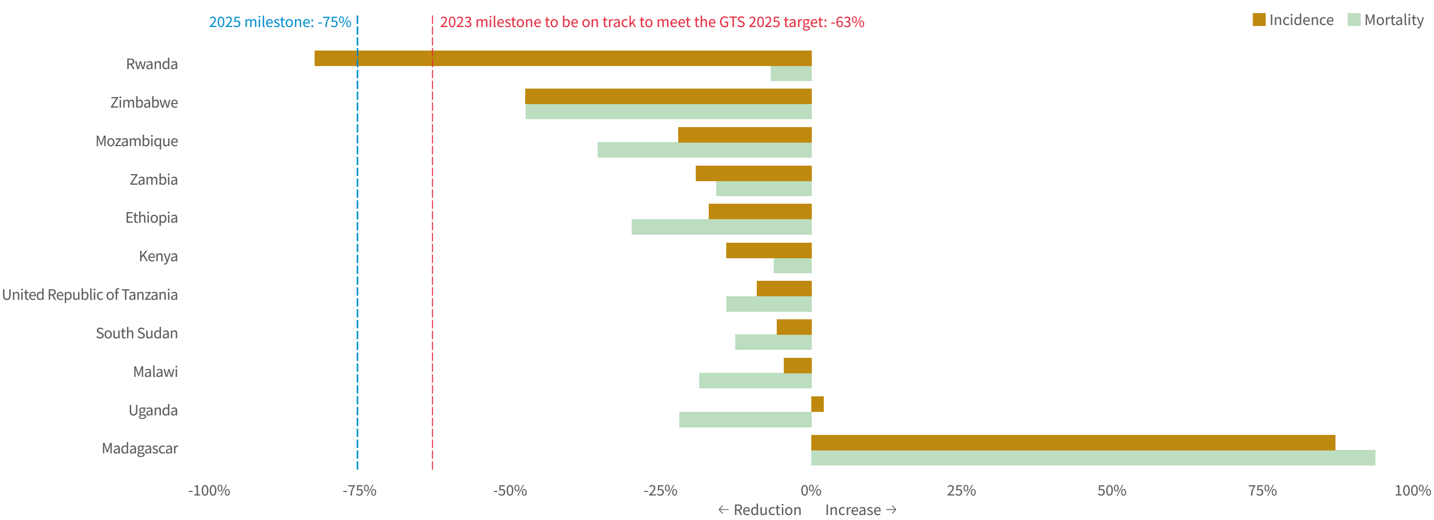
[a] 63% reduction represents the estimated expected reduction for 2023 between the GTS targets of 2020 (40%) and 2025 (75%).

H. Estimated number of cases in countries with an increase or no change[a] in incidence, 2015–2023



[a] A decrease or increase of less than 5% in 2023 compared with 2015 is categorized as no change.

I. Change in estimated malaria incidence and mortality rate, 2015–2023



Annex 3 – A. WHO African Region, d. Countries with low transmission in east and southern Africa

About 15 million people in the six countries with low transmission in east and southern Africa are at risk of malaria. More than 148 000 cases were reported, of which 99.3% were confirmed and 11.1% were in children aged under 5 years. The proportion of total cases that were confirmed has improved substantially over time, from only 40.2% in 2010 to 97% in 2023. The proportion of all malaria deaths that were in children aged under 5 years decreased significantly, from 15% in 2010 to 7% in 2023. Most of the cases in the subregion (85%) are due to *P. falciparum*. In 2023, the Comoros carried out a mass ITN campaign. All countries in the subregion, except for Eritrea, conduct indoor residual spraying (IRS) subnationally.

In 2023, there were an estimated 267 100 malaria cases and 610 deaths, representing increases of 101% and 47%, respectively, compared with 2010. Eritrea accounted for 82% of the estimated cases in the subregion, followed by the Comoros (8%) and Namibia (7%). None of the countries in the subregion are on track to meet the GTS 2025 targets, as all have seen increases in malaria incidence or have maintained a similar burden since 2015 (Namibia and South Africa). Compared with 2022, the estimated number of cases more than doubled in South Africa and Eswatini in 2023, while rising by 56% in Eritrea and 41% in Botswana. While some of these increases may be due to improvements in routine health information systems, changing climate patterns may also have contributed. Four countries – Botswana, the Comoros, Eswatini and South Africa – that are part of the E-2025 initiative continue to lead the race towards malaria elimination within the subregion.

The subregion is also facing biological threats to malaria interventions. *Pfhrp2* gene deletions have been confirmed in Eritrea; *Pfhrp3* gene deletions have been confirmed in Eswatini. No new countries from this region reported *Pfhrp2* deletions in 2023. There are few data on antimalarial drug efficacy from this subregion: among five TES of AL from Eritrea and the Comoros (2017–2020), no studies detected treatment failure rates of more than 10%. However, in Eritrea, evidence of delayed clearance after treatment with ACTs was detected in 2017, and the *PfKelch13* mutation associated with artemisinin partial resistance (R622I) has also been detected in Eritrea (2016–2019). In 2023, a high prevalence of a *PfKelch13* mutation associated with artemisinin partial resistance (P441L) in Namibia was reported. More surveillance is needed to fully understand the recent findings. Regarding insecticide resistance, between 2018 and 2023, among the six countries in this subregion, resistance to carbamates was confirmed in one of the five countries where it was tested. No testing of neonicotinoids was done in the subregion during this period. Resistance to organophosphates was not detected in any of the six countries where it was tested. Resistance to pyrethroids was confirmed in five of the six countries where it was tested.

Funding in the subregion has decreased by 37% from 2010 to 2023, continuing the trend observed in 2022. While total funding saw a slight increase from US$ 48 million in 2022 to US$ 51 million in 2023, this remains a significant decline from the US$ 80 million reported in 2010. The slight increase in funding in 2023 was driven by a 47% rise in international contributions from the Global Fund, while domestic funding saw a modest 6% decline, with domestic sources making up 70% of total funding (down from 79% in 2022). Over a 3-year average, funding per person at risk ranged from US$ 1.79 in Botswana to US$ 5.56 in Namibia. Eritrea's funding per person at risk was US$ 2.45. All six countries in the subregion reported average funding per person at risk exceeding US$ 1.00, with five exceeding US$ 2.00.

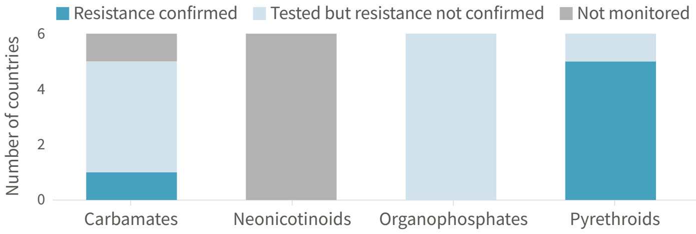
The subregion has experienced an increase in malaria cases. While the causes are multifactorial, weather events in 2023 may have played a significant role, and trends could shift in the coming years. In addition, multiple challenges persist, including the importation of malaria cases from neighbouring countries with higher burdens (e.g. Angola and Mozambique), limited targeting of vector control interventions, insufficient human and logistical resources to meet the operational needs of malaria programmes, and inadequate sustainable funding.

THERAPEUTIC EFFICACY STUDIES (CLINICAL AND PARASITOLOGICAL FAILURE AMONG PATIENTS WITH *P. FALCIPARUM* MALARIA, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	Percentile 25	Percentile 75
AL	2017–2020	5	0.0	0.0	1.0	0.0	0.0
AS-AQ	2016–2019	8	0.0	3.2	4.7	1.1	4.4

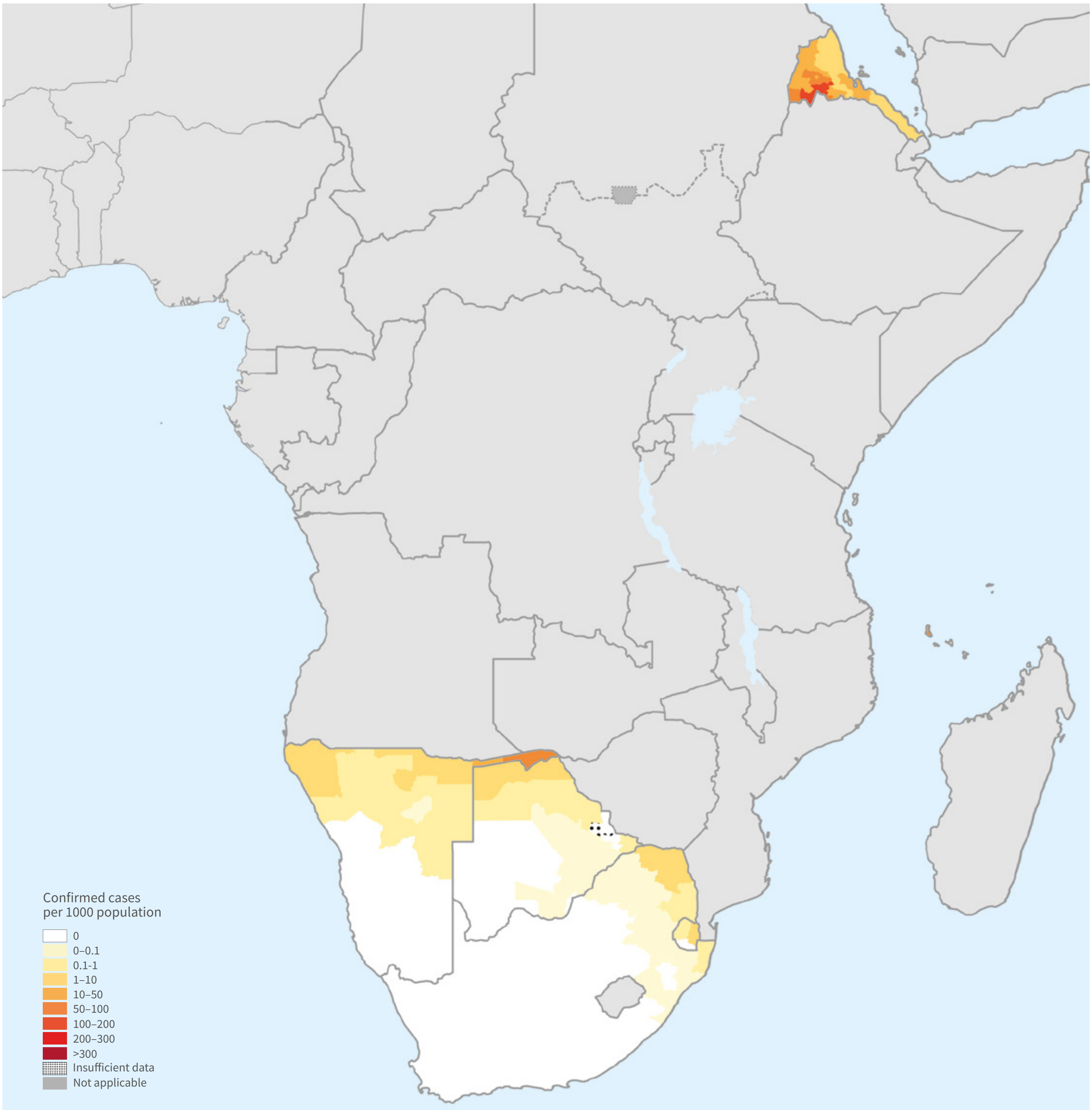
AL: artemether-lumefantrine; AS-AQ: artesunate-amodiaquine.

STATUS OF INSECTICIDE RESISTANCE[a] PER INSECTICIDE CLASS (2018–2023)



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

A. Confirmed malaria cases per 1000 population, 2023



Annex 3 – A. WHO African Region, d. Countries with low transmission in east and southern Africa

EPIDEMIOLOGY

Malaria endemic countries: Botswana, the Comoros, Eritrea, Eswatini, Namibia and South Africa

Population denominator used to compute incidence and mortality rate in 2023: 15 million

Parasites: *P. falciparum* and mixed (85%), *P. vivax* (15%) and other (<1%)

Vectors: *An. arabiensis, An. funestus, An. gambiae, An. mascarensis, An. merus, An. parensis, An. rivulorum* and *An. stephensi*[a]

[a] Has been detected in Eritrea.

FUNDING (US$), 2010–2023

80.5 million (2010), 30.3 million (2015), 51.0 million (2023); 2010–2023: 37% decrease

Proportion of domestic source[a] in 2023: 70%

Regional funding mechanisms: Southern African Development Community Malaria Elimination Eight Initiative

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

INTERVENTIONS, 2010–2023

Countries that carried out ITN mass campaigns in 2023 (including carry-over from 2022): the Comoros

Countries with 50–80% coverage of high-risk population with either ITNs or IRS in 2023:[a] the Comoros

Percentage of suspected cases tested (reported): 80.8% (2010), 99.0% (2015), 99.4% (2023)

Number of ACT courses distributed:[b] 574 800 (2010), 365 900 (2015), 241 700 (2023)

Number of any antimalarial treatment courses (incl. ACT) distributed:[b] 574 800 (2010), 366 000 (2015), 240 600 (2023)

[a] ITN coverage model from MAP; [b] No data for Botswana and the Comoros in 2023.

REPORTED CASES AND DEATHS,[a] 2010–2023

Total (presumed and confirmed) cases: 205 300 (2010), 52 900 (2015), 148 700 (2023)

Confirmed cases: 82 500 (2010), 47 700 (2015), 147 600 (2023)

Percentage of total cases confirmed: 40.2% (2010), 90.2% (2015), 99.3% (2023)

Deaths: 242 (2010), 176 (2015), 166 (2023)

Children aged under 5 years, presumed and confirmed cases: 56 400 (2010), 7261 (2015), 16 500 (2023)

Children aged under 5 years, percentage of total cases: 27.5% (2010), 13.7% (2015), 11.1% (2023)

Children aged under 5 years, deaths:[b] 37 (2010), 16 (2015), 12 (2023)

Children aged under 5 years, percentage of total deaths:[b] 15% (2010), 9% (2015), 7% (2023)

[a] Includes malaria endemic countries only; [b] No data for Namibia in 2023.

ESTIMATED CASES AND DEATHS, 2010–2023

Cases: 133 200 (2010), 86 700 (2015), 267 100 (2023); 2010–2023: 101% increase

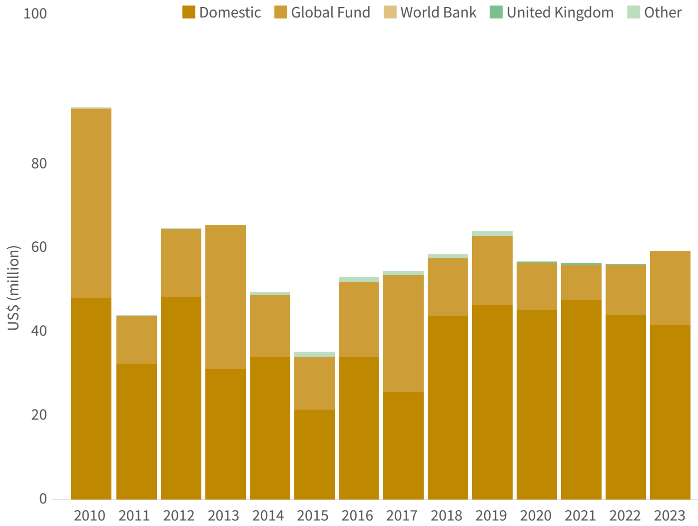
Deaths: 415 (2010), 284 (2015), 610 (2023); 2010–2023: 47% increase

ACCELERATION TO ELIMINATION

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

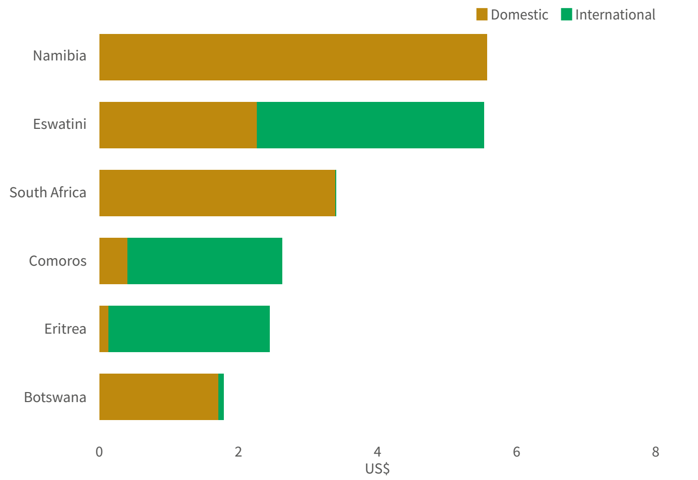
Countries part of the E-2025 initiative: Botswana, the Comoros, Eswatini and South Africa

B. Malaria funding[a] by source, 2010–2023



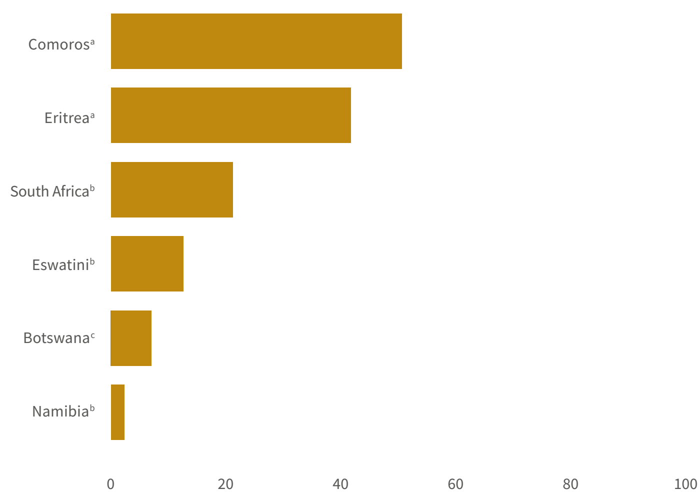
Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria.
[a] Excludes patient service delivery costs and out-of-pocket expenditure.

C. Malaria funding[a] per person at risk, average 2021–2023



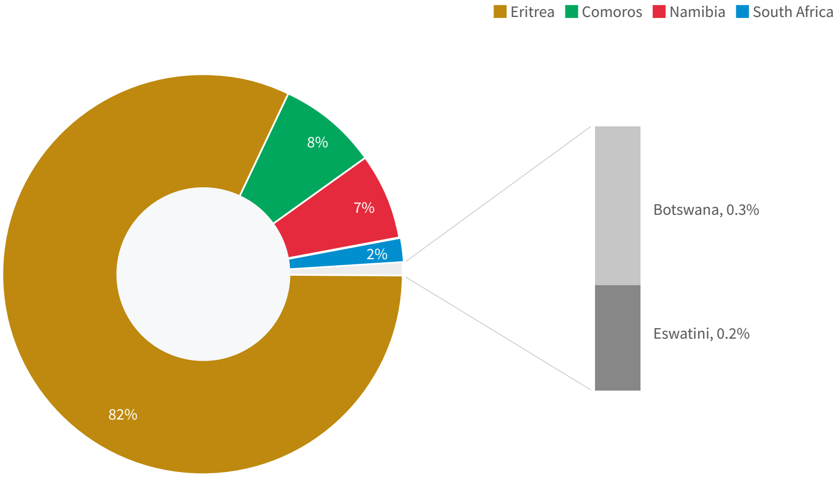
[a] Data are not collected on out-of-pocket expenditure and exclude patient service delivery costs; total funding includes negative disbursements due to under expenditure of international funding.

D. Percentage of population with access to either ITNs or IRS, 2023

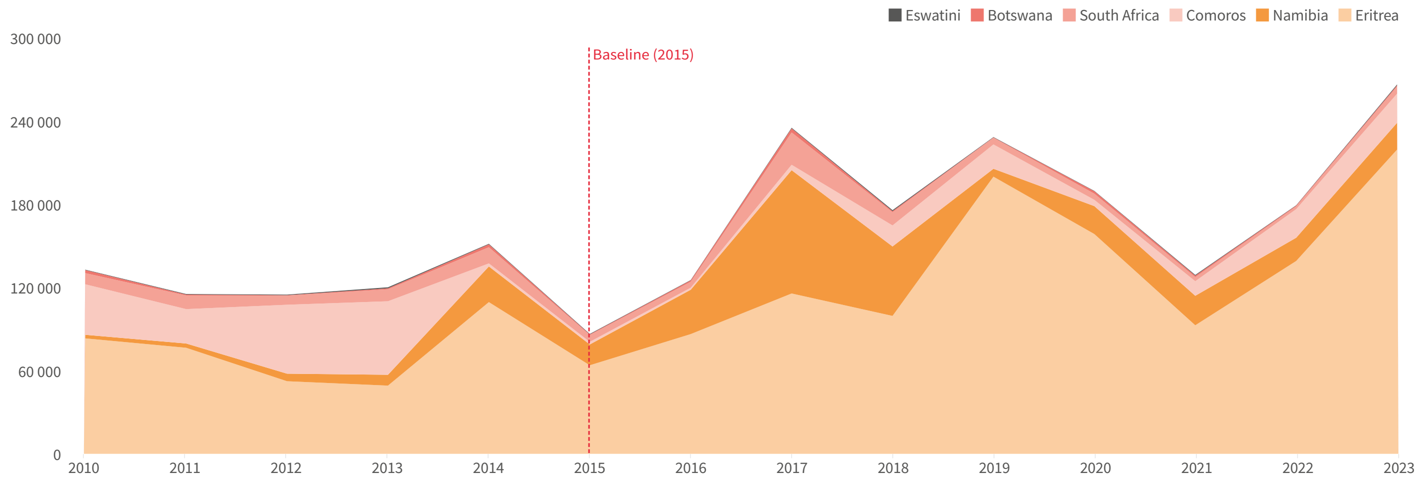


IRS: indoor residual spraying; ITN: insecticide-treated mosquito net; MAP: Malaria Atlas Project: NMP: national malaria programme.
[a] ITN coverage estimated by a model from MAP; [b] IRS coverage reported by NMPs; [c] No IRS data were provided for 2023; however, this country conducts IRS annually.

E. Share of estimated malaria cases, 2023

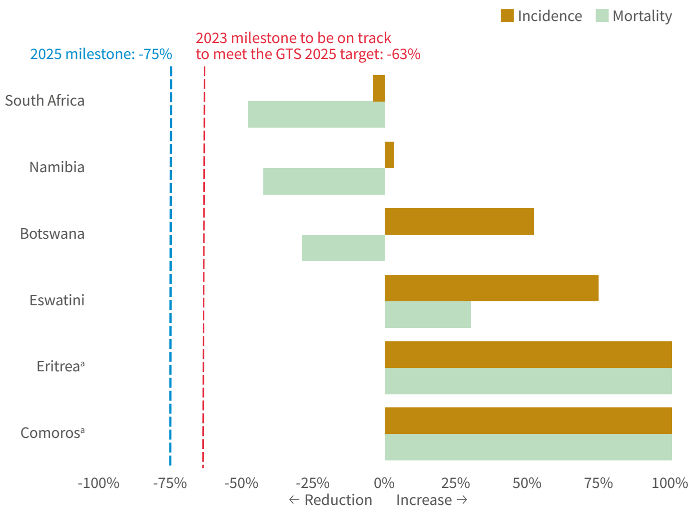


F. Estimated number of cases in countries with an increase or no change[a] in incidence, 2015–2023



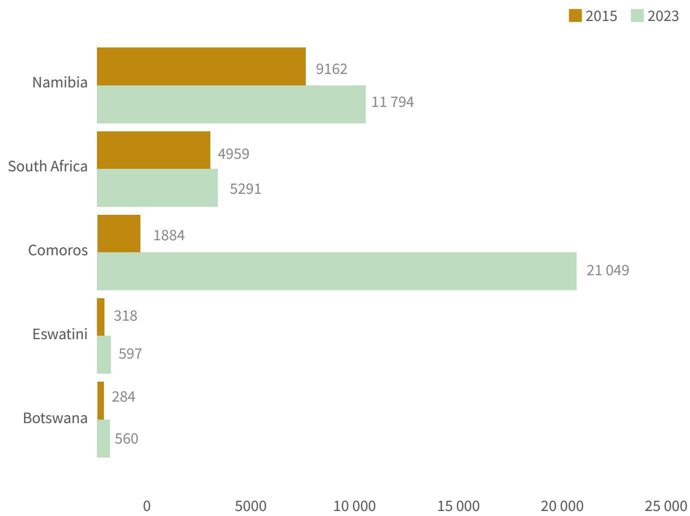
[a] A decrease or increase of less than 5% in 2023 compared with 2015 is categorized as no change.

G. Change in estimated malaria incidence and mortality rate, 2015–2023



[a] In these countries, change in incidence is more than 100%.

H. Reported indigenous cases in countries with national elimination activities, 2015 versus 2023



Annex 3 – B. WHO Region of the Americas

Sixteen countries and one territory in the WHO Region of the Americas are currently at risk of malaria. Paraguay, Argentina, El Salvador and, recently, Belize were certified malaria free by WHO in 2018, 2019, 2021 and 2023, respectively. Suriname reported zero indigenous cases for the second consecutive year in 2023. Three quarters of reported malaria cases in the region are caused by *P. vivax*. In 2023, the region reported 505 642 malaria cases (including relapses) and 116 indigenous deaths – decreases of 25% and 39%, respectively, compared with 2010. Five countries accounted for almost 90% of the reported cases: Brazil (33%), the Bolivarian Republic of Venezuela (26%), Colombia (21%), Guyana (6%) and Peru (4%).

Ten countries and one territory experienced reductions in the number of reported cases between 2015 and 2023: Belize (85%), Suriname (73%), Peru (66%), the Dominican Republic (59%), Guatemala (45%), Mexico (38%), Honduras (26%), French Guiana (22%), Haiti (18%), the Bolivarian Republic of Venezuela (6%) and Brazil (1%). All other countries in the region experienced varying levels of increases in reported cases. Increases in reported cases in 2023 are attributed to population movement within and between countries due to, for example, economic activities such as agriculture and gold mining, and gaps in the malaria response. For instance, Costa Rica continues to experience an increase in *P. falciparum*, associated with the movement of agricultural workers and transmission across the border with Nicaragua, and Panama has been experiencing an increase in malaria burden (*P. vivax*) along the Darien route (west region) used by migrants moving north.

All the indigenous cases reported by Guatemala and Mexico were due to *P. vivax*. Between 60% and 99% of the reported indigenous cases were due to *P. vivax* in the Bolivarian Republic of Venezuela, Brazil, Colombia, Ecuador, French Guiana, Guyana, Honduras, Nicaragua, Panama, Peru and the Plurinational State of Bolivia. Conversely, all the indigenous cases reported by the Dominican Republic and Haiti and 92% of the indigenous cases reported in Costa Rica in 2023 were due to *P. falciparum*. Colombia was the country with the highest number of *P. falciparum* cases in the region.

Five countries and one territory in the region were on track to meet the GTS target for 2025 (i.e. 75% reduction in incidence and mortality compared with 2015), by reducing case incidence by 63% or more (the expected reduction for countries to be on track to meet the GTS 2025 target) in 2023 compared with 2015. These were Belize, the Dominican Republic, French Guiana, Mexico, Peru and Suriname. Six countries – the Bolivarian Republic of Venezuela, Brazil, Ecuador, Guatemala, Haiti and Honduras – reduced case incidence, but by less than 63%. Six countries – Colombia, Costa Rica, Guyana, Nicaragua, Panama and the Plurinational State of Bolivia – saw increases in incidence in 2023 compared with 2015. Belize, Costa Rica, the Dominican Republic, Guatemala, Honduras, Nicaragua, Panama, the Plurinational State of Bolivia and Suriname reported zero deaths in 2023. Additionally, the Bolivarian Republic of Venezuela, Peru and Haiti experienced a reduction in mortality of 74%, 34% and 15%, respectively, between 2015 and 2023.

Nine countries and one territory in this region are part of the E-2025 initiative: Belize, Costa Rica, the Dominican Republic, Ecuador, French Guiana, Guatemala, Honduras, Mexico, Panama and Suriname. Countries in Central America, the Dominican Republic and Colombia are part of the Regional Malaria Elimination Initiative, a subregional initiative to eliminate malaria by 2025. In 2023, imported cases accounted for all the cases in Belize (2/2) and Suriname (102/102), 87% of the cases in Mexico (298/342), 15% of the cases in Costa Rica (93/641), 7% of the cases in the Dominican Republic (18/271) and 8% of the cases in Ecuador (59/757). The proportion of all cases that were classified as relapses was 17% in Panama, 15% in Brazil, 12% in Ecuador, 11% in the Bolivarian Republic of Venezuela and 3% in Nicaragua.

Pfhrp2/3 deletions have been previously reported in Brazil, Colombia, Ecuador, Guatemala, Honduras, Nicaragua, Peru, the Plurinational State of Bolivia and Suriname. Some countries, such as Brazil and Peru, are using rapid diagnostic tests (RDTs) that include more than one target for the detection of *P. falciparum*: HRP2 and *Pf*-LDH (*P. falciparum*-specific lactate dehydrogenase enzyme). Surveillance conducted in other countries and territories (the Bolivarian Republic of Venezuela, French Guiana and Guyana) during 2022–2023 reported very low prevalence of *Pfhrp2/3* deletions. Limited new data on antimalarial drug efficacy are available from this region: studies of AL conducted in Brazil, Colombia and Guyana[1] found high efficacy in 2015, 2018 and 2019, respectively. Molecular markers associated with artemisinin partial resistance were detected in Guyana between 2010 and 2017, but no recent findings have been reported despite continued surveillance of *Pfkelch13* genotyping with samples taken in 2020 and 2023. Samples from the Bolivarian Republic of Venezuela (collected in 2017 and 2018) were also analysed, and no parasites were identified with mutations in the propeller region of the *Pfkelch13* gene. Molecular markers associated with piperaquine resistance have been previously found in Guyana, Suriname and French Guiana; a recent publication from French Guiana found treatment failure among patients between 2016 and 2018 to be associated with these markers. Surveillance of the *P. falciparum* chloroquine resistance transporter (*Pfcrt*) molecular marker conducted in some Central American countries in 2021 demonstrated a genotype associated with chloroquine (CQ) susceptibility. High efficacy of CQ for the treatment of *P. vivax* has been reported in studies conducted in Brazil (2016–2020). Surveillance is needed to fully establish current trends of in vivo responses to CQ

[1] Unpublished data.

THERAPEUTIC EFFICACY STUDIES (CLINICAL AND PARASITOLOGICAL FAILURE AMONG PATIENTS WITH *P. FALCIPARUM* MALARIA, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	Percentile 25	Percentile 75
AL	2015–2019	2	0.0	0.0	0.0	0.0	0.0

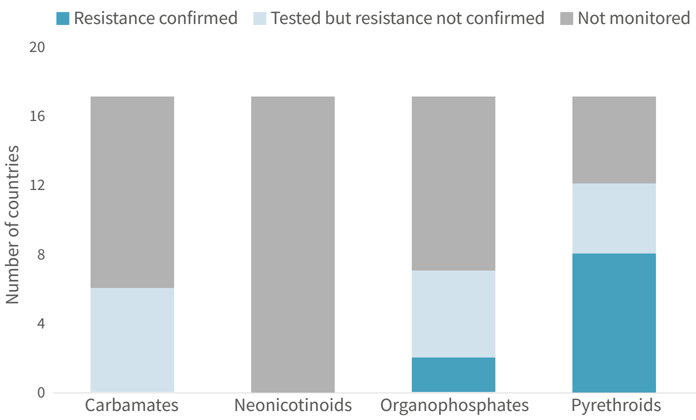
AL: artemether–lumefantrine.

THERAPEUTIC EFFICACY STUDIES (CLINICAL AND PARASITOLOGICAL FAILURE AMONG PATIENTS WITH *P. VIVAX* MALARIA, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	Percentile 25	Percentile 75
CQ	2019–2020	1	0.0	0.0	0.0	0.0	0.0
CQ+PQ	2016–2020	3	0.0	0.0	1.2	0.0	1.2

CQ: chloroquine; CQ+PQ: chloroquine plus primaquine.

STATUS OF INSECTICIDE RESISTANCE[a] PER INSECTICIDE CLASS (2018–2023)



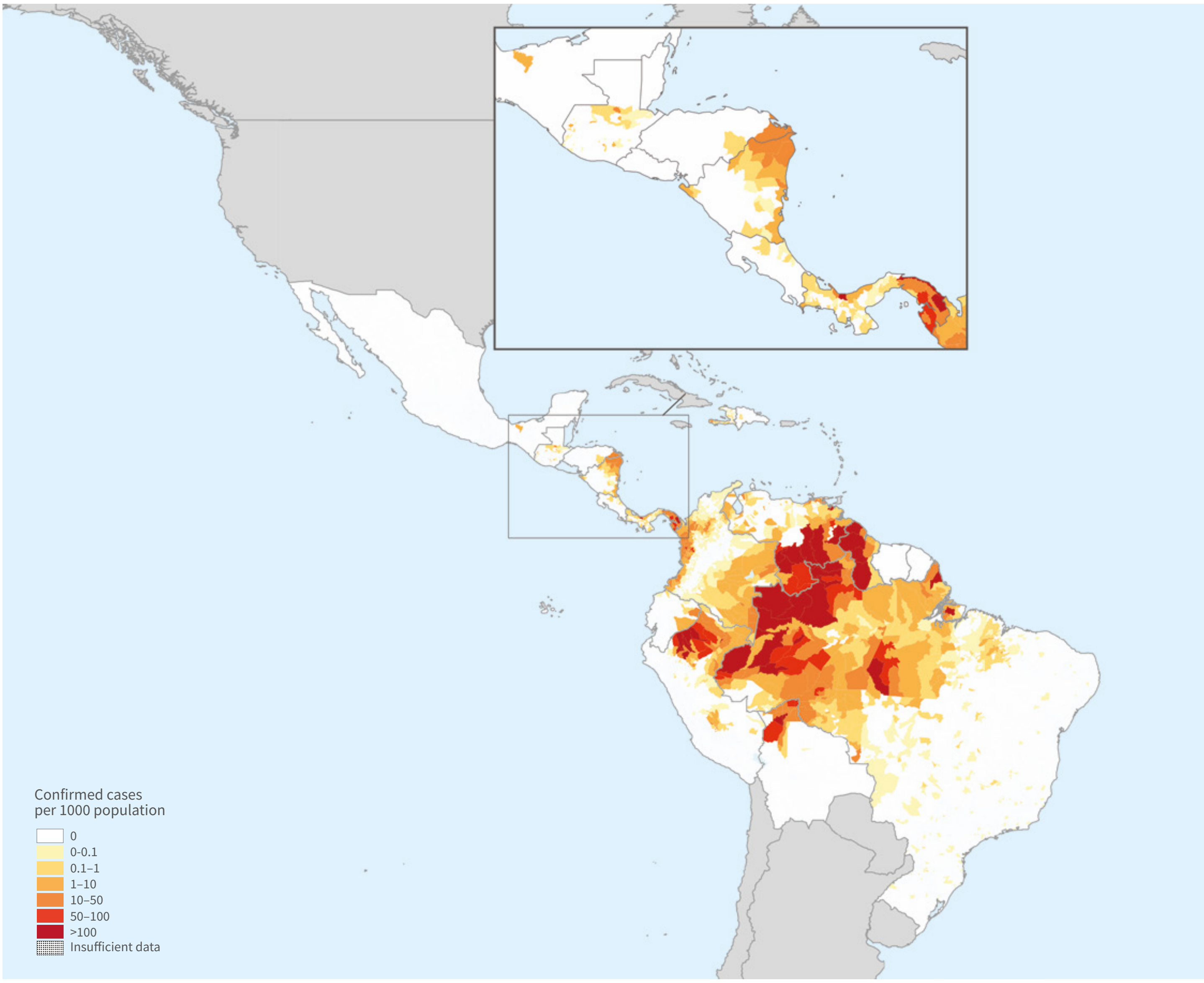
[a] Resistance is considered confirmed when it is detected to one insecticide in the class, in at least one malaria vector from one collection site.

on *P. vivax* infections in this region. Regarding insecticide resistance, bioassays conducted between 2018 and 2023 did not find resistance to carbamates in any of the six countries where it was tested. Resistance to organophosphates was confirmed in two of the seven countries where monitored. Resistance to pyrethroids was detected in eight of the 12 countries where it was monitored. Resistance to neonicotinoids was not tested.

Total funding for malaria has decreased by 44% since 2010, with peaks in 2011 and again in 2023. In 2023, funding totalled US$ 217 million, reflecting a 48% increase compared with 2022. This rise was primarily driven by a significant increase in domestic contributions, which grew from US$ 107 million to US$ 178 million (67%). This was mostly due to surges in funding from Brazil and Panama. Funding per person at risk in the region ranged from US$ 0.15 in Ecuador to US$ 28.26 in Suriname, remaining relatively stable compared with the previous 3-year cycle.

Since 2015, significant progress has been made in the region, with some countries approaching the elimination of *P. falciparum* malaria. This progress is largely attributed to increased access to high-quality malaria diagnosis and treatment at the community level, improved targeting of interventions to address remaining transmission foci and enhanced surveillance systems and processes to investigate cases and guide decision-making. In Mexico, the programme made significant progress towards strengthening its surveillance and response system, and the reduction in indigenous cases occurred despite an increase in imported cases. However, major challenges remain, especially in the countries with the highest burden in South America, where gaps persist in access to diagnosis and treatment in rural areas with a predominantly indigenous population and where gold mining is a main determinant of transmission. In remote regions of the Amazon basin, gold-mining activities attract a highly mobile and local population with limited access to health care, increasing vulnerability to malaria and risk of severe disease. This has sustained transmission in countries such as Guyana, Colombia, Brazil and the Bolivarian Republic of Venezuela, and disproportionately affected indigenous and Afro-descendant populations. Operational challenges are linked to underuse of RDTs and supply chain issues that hinder the delivery of necessary commodities to remote areas where malaria persists. Extreme events, as seen in Haiti, continue to affect the malaria burden, while migration and population mobility for economic and social reasons further demonstrate the interconnectedness of the region, where cases in one country can affect others. Addressing these challenges will be critical in moving the region closer to malaria elimination.

A. Confirmed malaria cases per 1000 population, 2023



Note: In the Bolivarian Republic of Venezuela, 2022 data were used.

Annex 3 – B. WHO Region of the Americas

EPIDEMIOLOGY

Malaria endemic countries and areas: Bolivia (Plurinational State of), Brazil, Colombia, Costa Rica, the Dominican Republic, Ecuador, French Guiana, Guatemala, Guyana, Haiti, Honduras, Mexico, Nicaragua, Panama, Peru, Suriname and Venezuela (Bolivarian Republic of)

Population denominator used to compute incidence and mortality rate in 2023: 154 million

Parasites: *P. vivax* (73%), *P. falciparum* and mixed (27%) and other (<1%)

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

FUNDING (US$), 2010–2023

259.4 million (2010), 222.3 million (2015), 217.1 million (2023); 2010–2023: 16% decrease

Proportion of domestic source[a] in 2023: 82%

Regional funding mechanisms: The Regional Malaria Elimination Initiative continued supporting countries in Central America, Colombia and the Dominican Republic throughout 2023. Additionally, the Global Fund provided grants to eight countries.

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

INTERVENTIONS, 2010–2023

Total ITNs distributed:[a] 978 000 (2010), 1.1 million (2015), 1.5 million (2023)

Number of people protected by IRS:[b] 7.0 million (2010), 3.9 million (2015), 937 000 (2023)

Number of RDTs distributed:[c] 83 700 (2010), 533 900 (2015), 1.3 million (2023)

Number of ACT courses distributed:[d] 148 400 (2010), 209 400 (2015), 99 600 (2023)

Number of any first-line antimalarial treatment courses (incl. ACT) distributed:[d] 1.1 million (2010), 652 400 (2015), 430 700 (2023)

[a] Includes pyrethroid–piperonyl butoxide (PBO) nets, G2 nets and Royal Guard nets in 2023; no data for Colombia, French Guiana, Guyana, Peru and the Plurinational State of Bolivia in 2023; [b] No data for Colombia, French Guiana, Guatemala, Panama and the Plurinational State of Bolivia in 2023; [c] No data for French Guiana, Nicaragua, Peru and the Plurinational State of Bolivia in 2023; [d] No data for Colombia, French Guiana and Peru in 2023.

REPORTED CASES AND DEATHS,[a] 2010–2023

Total (presumed and confirmed) cases:[a] 677 400 (2010), 488 600 (2015), 505 600 (2023)

Confirmed cases: 677 400 (2010), 488 600 (2015), 505 600 (2023)

Percentage of total cases confirmed: 100% (2010), 100% (2015), 100% (2023)

Indigenous cases: 677 373 (2010), 443 428 (2015), 453 398 (2023)

Imported cases: 11 (2010), 14 881 (2015), 5546 (2023)

Introduced cases: 23 (2010), 0 (2015), 4429 (2023)

Indigenous deaths: 190 (2010), 169 (2015), 116 (2023)

[a] Includes malaria endemic countries only; No data on indigenous deaths for French Guiana and Guyana in 2023.

ESTIMATED CASES AND DEATHS, 2010–2023

Cases: 818 000 (2010), 572 800 (2015), 548 100 (2023); 2010–2023: 33% decrease

Deaths: 492 (2010), 385 (2015), 342 (2023); 2010–2023: 30% decrease

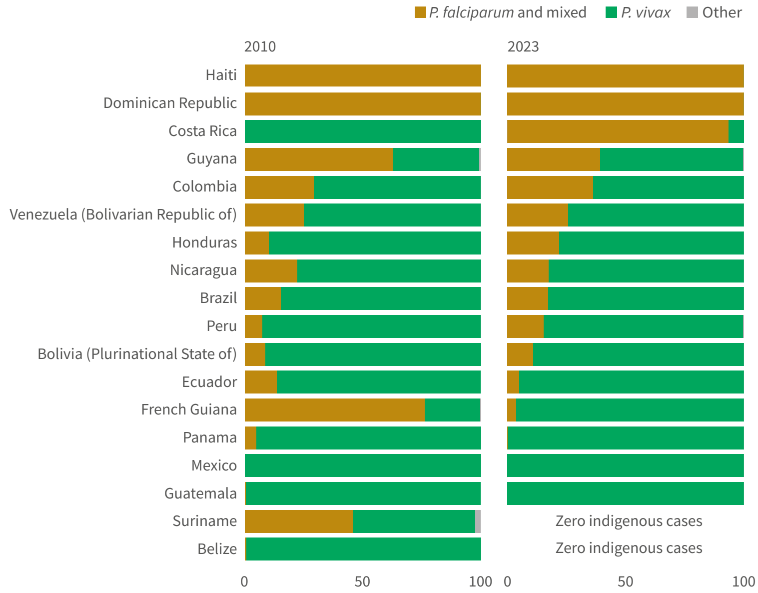
ACCELERATION TO ELIMINATION

Countries and territories with nationwide elimination programme: Belize, Bolivia (Plurinational State of), Brazil, Colombia, Costa Rica, the Dominican Republic, Ecuador, French Guiana, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Peru, Suriname and Venezuela (Bolivarian Republic of)

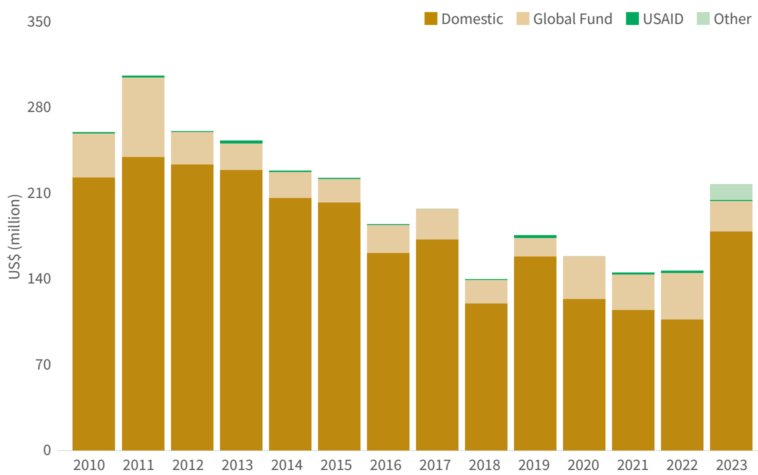
Countries and territories part of the E-2025 initiative: Belize, Costa Rica, the Dominican Republic, Ecuador, French Guiana, Guatemala, Honduras, Mexico, Panama and Suriname

Certified as malaria free since 2010: Argentina (2019), Belize (2023), El Salvador (2021) and Paraguay (2018)

B. Percentage of *Plasmodium* species from indigenous cases, 2010 and 2023



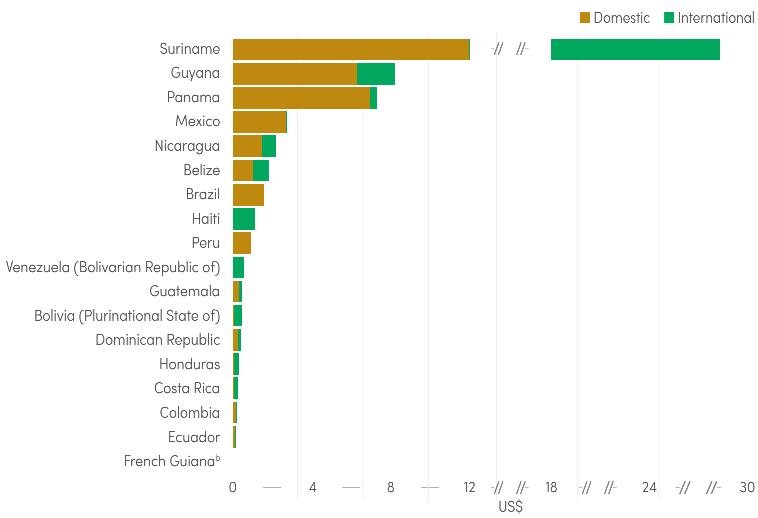
C. Malaria funding[a] by source, 2010–2023



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

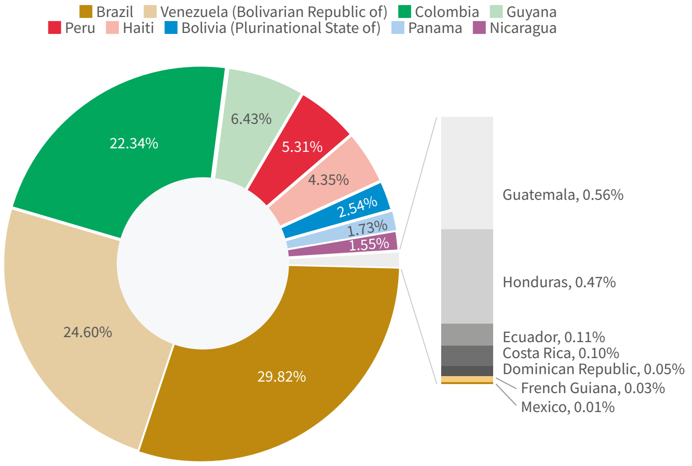
[a] Excludes patient service delivery costs and out-of-pocket expenditure; no domestic funding data were reported for the Bolivarian Republic of Venezuela, Colombia, French Guiana, Guatemala, Haiti, Honduras and Mexico in 2023.

D. Malaria funding[a] per person at risk, average 2021–2023



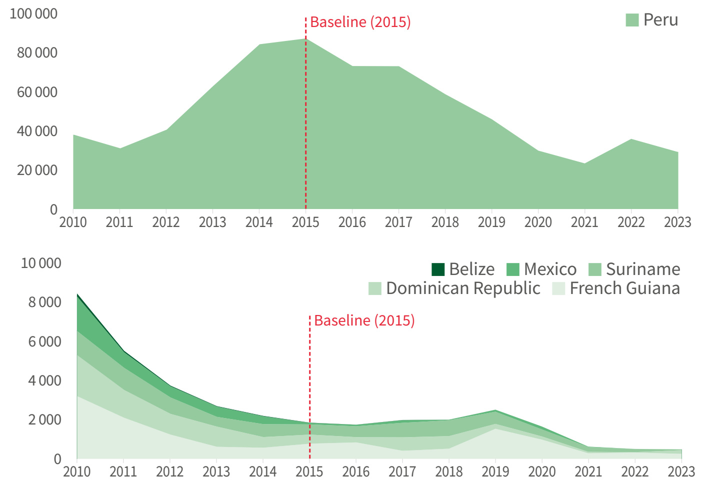
[a] Data are not collected on out-of-pocket expenditure and exclude patient service delivery costs; total funding includes negative disbursements due to under expenditure of international funding; [b] No data for French Guiana in 2021–2023.

E. Share of estimated malaria cases, 2023



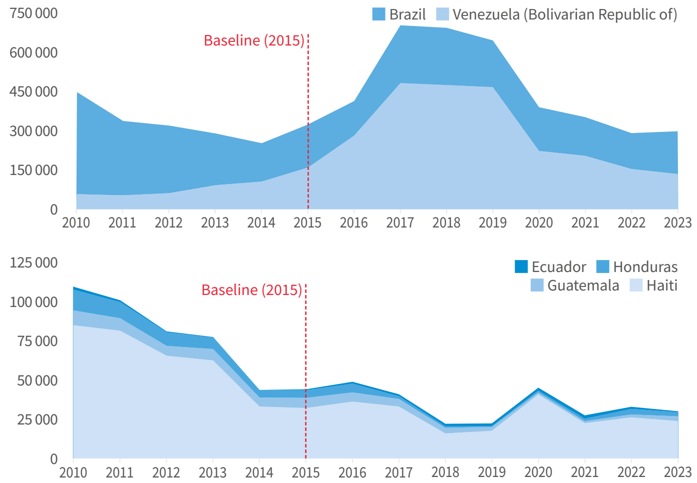
Notes: Belize and El Salvador were certified malaria free in 2023 and 2021, respectively; Suriname has reported zero indigenous cases since 2022.

F. Estimated number of cases in countries and areas that reduced incidence by ≥63%[a] in 2023 compared with 2015



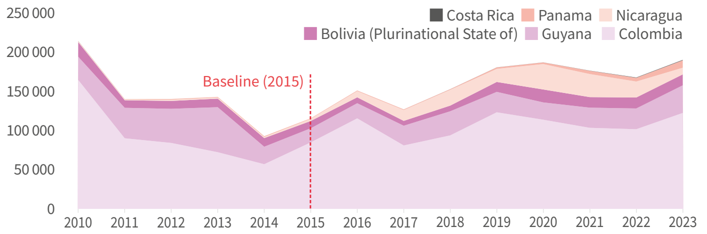
[a] 63% reduction represents the estimated expected reduction for 2023 between the GTS targets of 2020 (40%) and 2025 (75%).
Notes: Belize and El Salvador were certified malaria free in 2023 and 2021, respectively; Suriname has reported zero indigenous cases since 2022.

G. Estimated number of cases in countries that reduced incidence by <63%[a] in 2023 compared with 2015

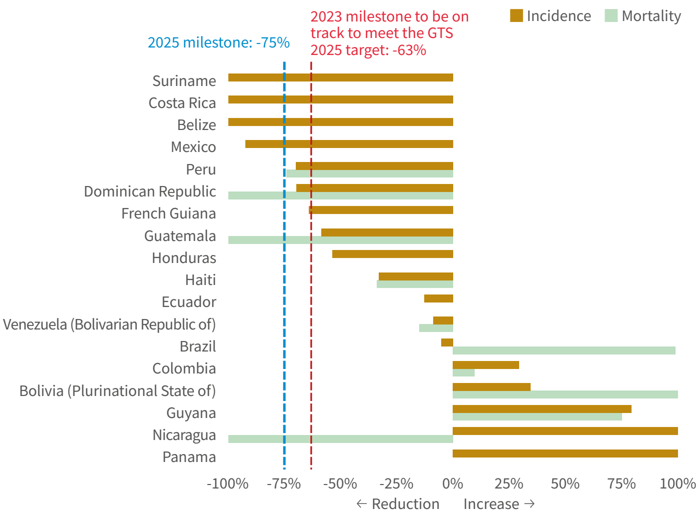


[a] 63% reduction represents the estimated expected reduction for 2023 between the GTS targets of 2020 (40%) and 2025 (75%).

H. Estimated number of cases in countries with an increase in incidence, 2015–2023

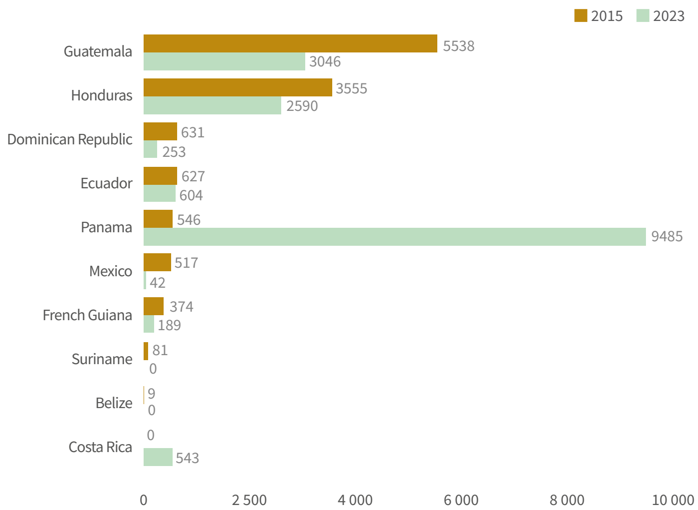


I. Change in estimated malaria incidence and mortality rate, 2015–2023



Notes: In Nicaragua and Panama, change in case incidence is more than 100%; in the Plurinational State of Bolivia, change in mortality is more than 100%; in Belize, Costa Rica, Ecuador, Honduras, Mexico, Panama and Suriname, there were zero indigenous deaths in 2015 and 2023.

J. Number of reported indigenous cases in E-2025 countries and areas, 2015 versus 2023



Note: Belize was certified malaria free in 2023.

Annex 3 – C. WHO Eastern Mediterranean Region

Fourteen countries in the WHO Eastern Mediterranean Region are free of indigenous malaria and are at the stage of preventing re-establishment of local transmission. There are six high malaria burden countries in the region: Afghanistan, Djibouti, Pakistan, Somalia, the Sudan and Yemen. Saudi Arabia has reported zero indigenous cases since 2021 and is undertaking continued vigilance for malaria in its general health services and providing diagnosis and treatment free of charge for all imported cases.

In 2024, Egypt was officially certified malaria free, making it the third country in the region to achieve this status after United Arab Emirates and Morocco. This achievement is the result of sustained efforts in minimizing human–mosquito contact dating back to the 1920s. Major advances were made through vector surveillance, environmental management and by strengthening the health care system, particularly with community engagement and cross-border collaborations, notably with the Sudan. Egypt's success in maintaining zero indigenous malaria cases underscores the effectiveness of its robust surveillance, health infrastructure and inclusive health policies that offer essential services to all.

Between 2015 and 2023, the estimated malaria incidence in the region more than doubled to 17.9 cases per 1000 population at risk, with an increase after 2020. The increase in estimated cases and deaths in the region between 2022 and 2023 was largely due to the malaria outbreak resulting from the catastrophic floods in Pakistan, which led to 4.3 million estimated cases and 4956 estimated deaths in 2023.

In 2023, the Islamic Republic of Iran reported 2528 locally acquired cases, after reporting zero indigenous cases for the 4 consecutive years between 2018 and 2021. The upsurge in cases in neighbouring Pakistan was a major contributing factor to this increase, particularly along the border area where there is frequent movement of people. Other contributing factors included flash flooding, the emergence and spread of *Aedes aegypti*, which diverted some control efforts and resources, as well as insufficient funding and difficulties in procuring essential malaria commodities due to sanctions. These factors increased the likelihood of transmission and further disrupted malaria elimination efforts.

Cases in Afghanistan have increased over the past 3 years (2022–2024), and therefore concerted efforts need to be made to ensure interventions and access to rapid diagnosis and treatment continue, to reverse this trend. Djibouti, Pakistan, Somalia, the Sudan, Yemen and the Islamic Republic of Iran are not on track to meet the GTS targets for 2025 (i.e. 75% reduction in incidence and mortality compared with 2015), with increases in malaria case incidence of 25% or more. These estimates need to be verified with ongoing subnational-level burden estimates, particularly in Somalia, Yemen and the Sudan, given the presence of factors affecting data quality and completeness. The Islamic Republic of Iran has reported zero malaria deaths since 2020, despite malaria elimination challenges resulting in the country not being on track to meet the malaria incidence reduction target.

The region is also facing biological threats to malaria interventions. *Pfhrp2* deletions have been previously detected in Djibouti, the Sudan and Yemen. No new countries from this region have reported *Pfhrp2* deletions since the *World malaria report 2023*. TES conducted according to the WHO standard protocol between 2015 and 2024 have shown high efficacy of AL and DHA-PPQ where monitored. However, a recent article reports the detection of the *PfKelch13* R622I mutation in the Sudan in 2016 and 2020. Close monitoring of the efficacy of first-line treatments and *PfKelch13* mutations is recommended in all countries in the region. Regarding insecticide resistance, between 2018 and 2023, among seven countries in the region, resistance to carbamates was confirmed in all six countries where it was tested. There was no testing of neonicotinoids. Resistance to organophosphates was confirmed in two of the six countries where it was tested during this period. Resistance to pyrethroids was detected in all seven countries during this period.

Reported funding in the WHO Eastern Mediterranean Region increased by 33% between 2010 and 2023. There was a notable rise from US$ 135 million in 2022 to US$ 210 million in 2023, driven largely by a significant increase in domestic funding, particularly in Pakistan (which rose from US$ 22 million to US$ 80 million), and contributions from the Global Fund. Over a 3-year average, funding per person at risk ranged from US$ 0.11 in Afghanistan to US$ 8.51 in Saudi Arabia.

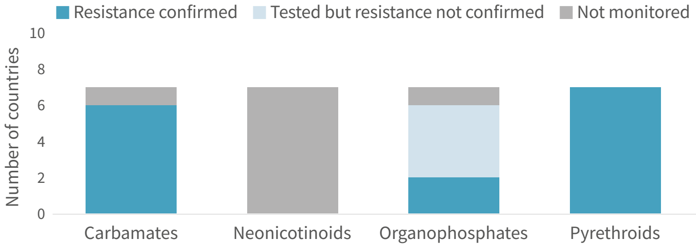
The recent increase in the malaria burden in this region can be attributed to multiple interconnected factors, primarily stemming from ongoing conflicts, particularly in the Sudan. These conflicts have resulted in political instability, which has severely weakened health systems and compromised the availability of human resources, especially at the subnational levels, in addition to increasing the cost of interventions and hampering access to many areas. This deterioration in governance and infrastructure has also led to suboptimal surveillance systems, making it difficult to monitor and respond effectively to malaria outbreaks and the increasing burden. Additionally, the impact of climate change has exacerbated the situation. For example, flooding in Pakistan has created new breeding grounds for mosquitoes, increasing the risk of malaria transmission. Migration due to conflict and instability has further complicated the issue, as it has led to the introduction of imported infections into neighbouring countries, contributing to a resurgence of malaria cases and re-establishment of local transmission. Moreover, the growing spread of *Anopheles stephensi* in Djibouti, Somalia, the Sudan and Yemen poses a significant and ongoing threat to malaria control efforts. In summary, addressing the multifaceted challenges posed by conflict, climate change and the spread of invasive and resistant vectors is crucial for effective malaria control in the region. Comprehensive strategies that strengthen health systems, improve case management, including radical treatment of *P. vivax*, improve surveillance and enhance vector control measures are essential to reverse the trend of an increasing malaria burden.

THERAPEUTIC EFFICACY STUDIES (CLINICAL AND PARASITOLOGICAL FAILURE AMONG PATIENTS WITH *P. FALCIPARUM* MALARIA, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	Percentile 25	Percentile 75
AL	2015–2024	33	0.0	0.0	8.0	0.0	0.0
AS+SP	2015–2017	10	0.0	0.0	16.4	0.0	2.5
DHA-PPQ	2015–2020	16	0.0	0.0	2.5	0.0	0.0

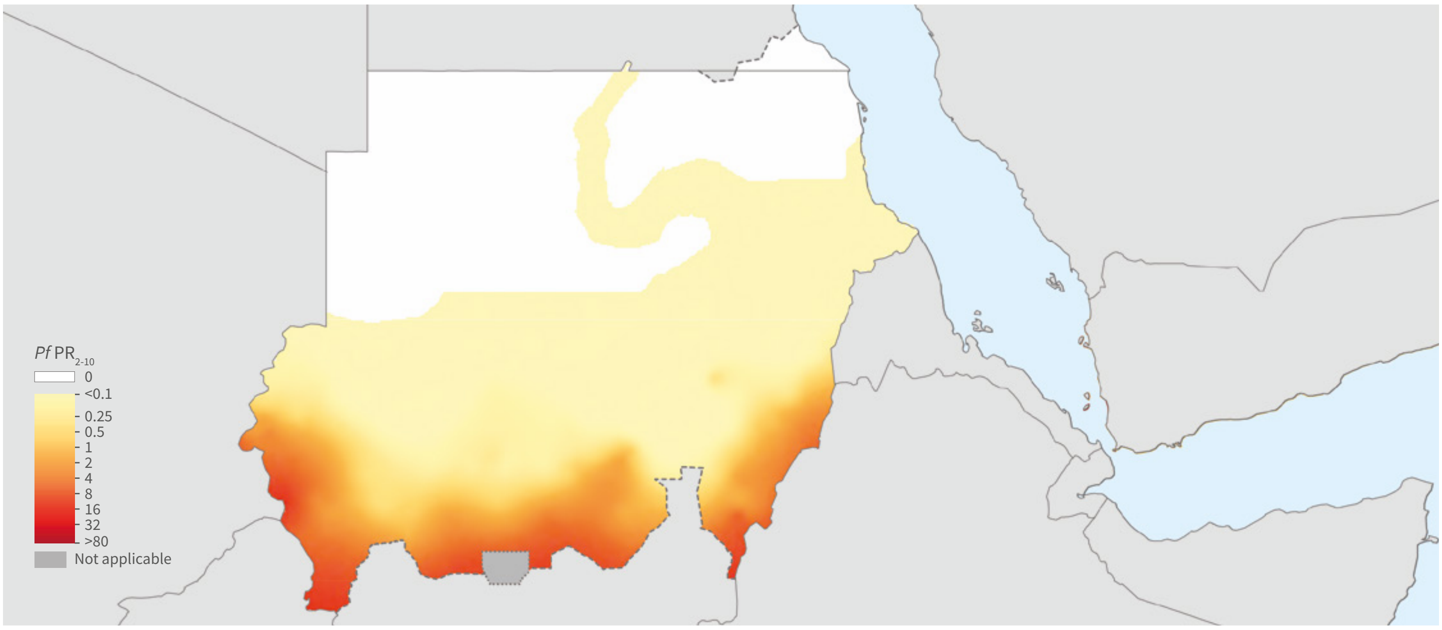
AL: artemether–lumefantrine; AS+SP: artesunate plus sulfadoxine–pyrimethamine; DHA-PPQ: dihydroartemisinin–piperaquine.

STATUS OF INSECTICIDE RESISTANCE[a] PER INSECTICIDE CLASS (2018–2023)

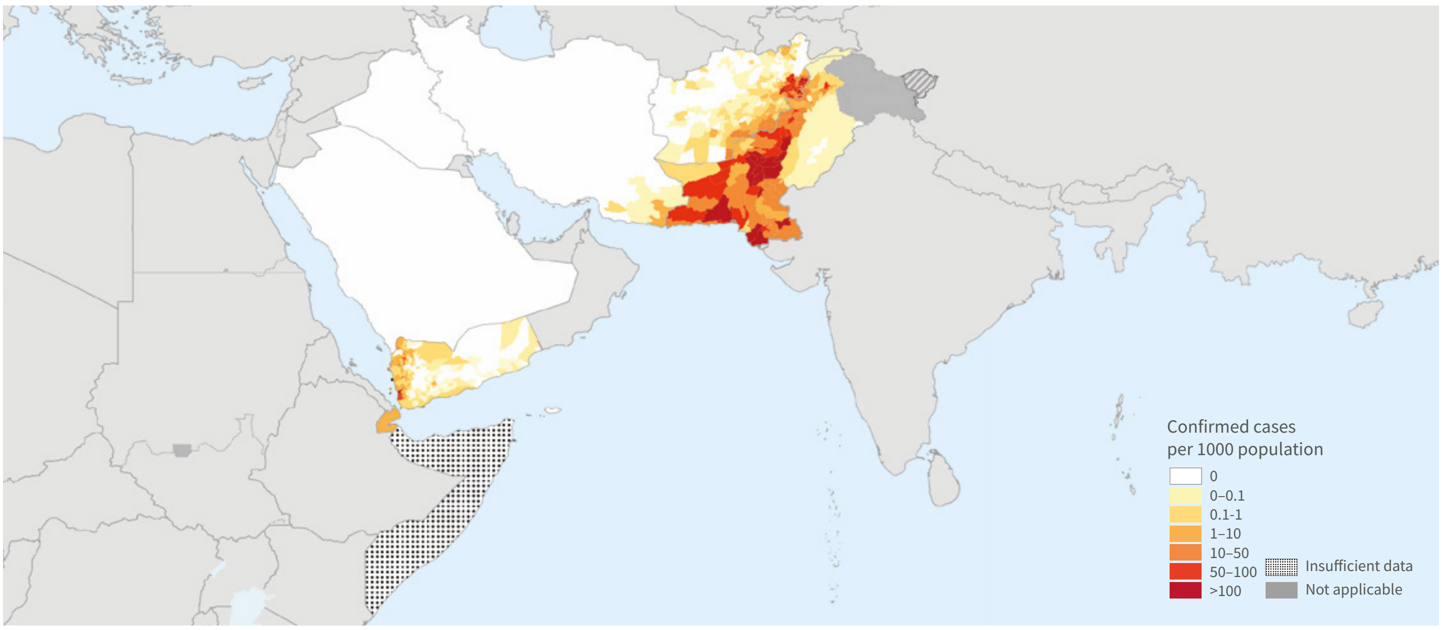


[a] Resistance is considered confirmed when it is detected to one insecticide in the class, in at least one malaria vector from one collection site.

A. *P. falciparum* parasite rate (*Pf* PR) and confirmed malaria cases per 1000 population, 2023



Note: Prevalence estimates from the 2018 Malaria Programme Review: courtesy of R. Snow.



Note: In Yemen, 2022 data were used.

Annex 3 – C. WHO Eastern Mediterranean Region

EPIDEMIOLOGY

Malaria endemic countries: Afghanistan, Djibouti, Iran (Islamic Republic of), Pakistan, Somalia, the Sudan and Yemen

Population denominator used to compute incidence and mortality rate in 2023: 572 million

Parasites: *P. vivax* (58%), *P. falciparum*[a] and mixed (42%) and other (<1%)

Vectors: *An. arabiensis, An. culicifacies, An. d'thali, An. fluviatilis, An. funestus, An. hyrcanus* s.l., *An. maculipennis, An. pulcherrimus, An. rhodesiensis, An. sacharovi, An. sergentii* s.l., *An. stephensi*[b], *An. subpictus* s.l. and *An. superpictus*

[a] There is underreporting of cases in the Sudan in 2023, which affects the proportion of *P. falciparum* cases; [b] *An. stephensi* has been detected in Djibouti, Somalia, the Sudan and Yemen.

FUNDING (US$), 2010–2023

157.8 million (2010), 187.9 million (2015), 209.7 million[a] (2023); 2010–2023: 33% increase

Proportion of domestic source[b] in 2023: 53%

Regional funding mechanism: the Middle East Response (MER) Initiative is supporting malaria interventions in Yemen by the Global Fund, in partnership with the International Organization for Migration as principal recipient and WHO for technical support.

[a] Includes country-reported data in funding received from WHO, UNICEF and other donors; annual disbursements to Yemen from the malaria component of the Global Fund MER Initiative are included in 2021–2023 ; [b] Domestic source excludes patient service delivery costs and out-of-pocket expenditure.

INTERVENTIONS,[a] 2010–2023

Countries that carried out ITN mass campaigns in 2023 (including carry-over from 2022): Afghanistan, Pakistan, Somalia and Yemen

Total ITNs distributed:[b] 2.9 million (2010), 5.8 million (2015), 4.8 million (2023)

Number of people protected by IRS:[c] 3.6 million (2010), 5.0 million (2015), 254 700 (2023)

Countries that implemented IPTp in 2023: Somalia and the Sudan

Number of RDTs distributed: 2.0 million (2010), 6.1 million (2015), 22.3 million (2023)

Number of ACT courses distributed:[d] 2.6 million (2010), 3.2 million (2015), 7.0 million (2023)

Number of any first-line antimalarial treatment courses (incl. ACT) distributed:[d] 2.6 million (2010), 4.0 million (2015), 7.5 million (2023)

[a] Includes malaria endemic countries only; [b] Includes PBO nets, G2 nets and Royal Guard nets in 2023; data reported to the Alliance for Malaria Prevention were used in Pakistan where data reported to WHO were missing or incomplete; [c] No data reported for Somalia, the Sudan and Yemen in 2023; [d] No data reported for Djibouti in 2023.

REPORTED CASES AND DEATHS,[a] 2010–2023

Total (presumed and confirmed) cases:[b] 6.4 million (2010), 5.4 million (2015), 4.5 million (2023)

Confirmed cases:[b] 1.2 million (2010), 1.0 million (2015), 3.5 million (2023)

Percentage of total cases confirmed: 18.3% (2010), 18.8% (2015), 77.6% (2023)

Deaths: 1145 (2010), 1016 (2015), 958 (2023)

[a] Includes malaria endemic countries only; [b] Due to instabilities, security issues, the incompleteness of reporting and the poor quality of data in Somalia, the Sudan and Yemen, trends in reported and estimated cases should be interpreted with caution.

ESTIMATED CASES AND DEATHS,[a] 2010–2023

Cases: 4.5 million (2010), 4.3 million (2015), 10.2 million (2023); 2010–2023: 129% increase

Deaths: 8620 (2010), 8200 (2015), 18 300 (2023); 2010–2023: 112% increase

[a] Estimates for global trend analysis. Country-level subnational analysis is ongoing for decision-making for strategy development for countries and the region.

ACCELERATION TO ELIMINATION

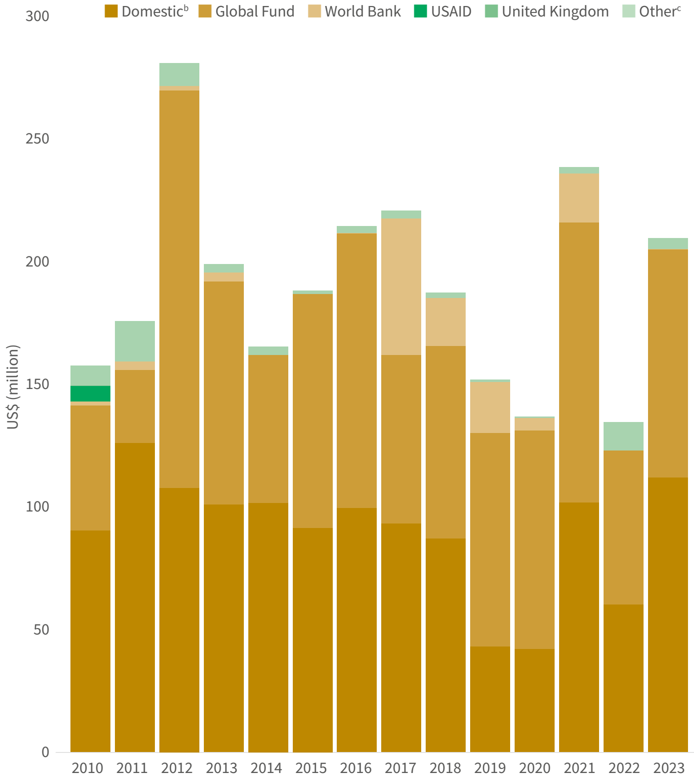
Countries with nationwide elimination programme: Iran (Islamic Republic of) and Saudi Arabia

Countries part of the E-2025 initiative: Iran (Islamic Republic of) and Saudi Arabia

Zero indigenous cases for 3 consecutive years (2021–2023): Saudi Arabia

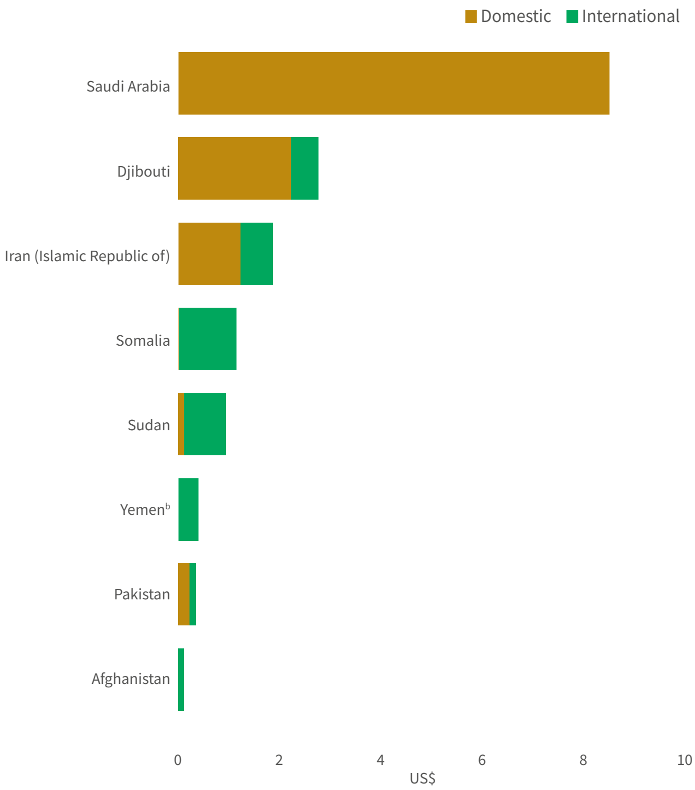
Certified as malaria free since 2010: Morocco (2010) and Egypt (2024)

B. Malaria funding[a] by source, 2010–2023



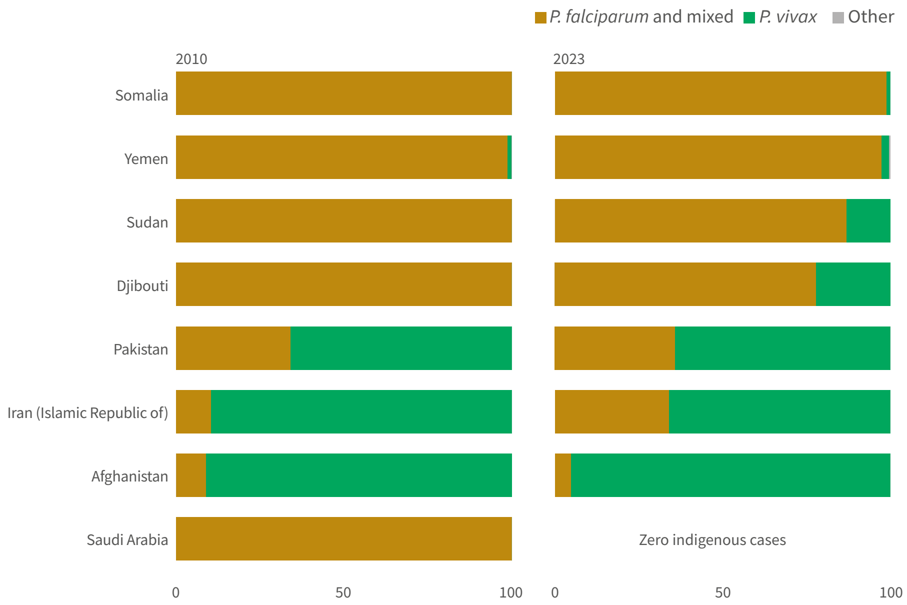
Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; USAID: United States Agency for International Development.
[a] Excludes patient service delivery costs and out-of-pocket expenditure; [b] No domestic funding data were reported for Afghanistan since 2019 and Yemen since 2015; [c] Sourced from the country-reported data of the funding from WHO, UNICEF and other donors.
Note: Annual disbursements to Yemen from the malaria component of the Global Fund MER Initiative are included in 2021–2023.

C. Malaria funding[a] per person at risk, average 2021–2023

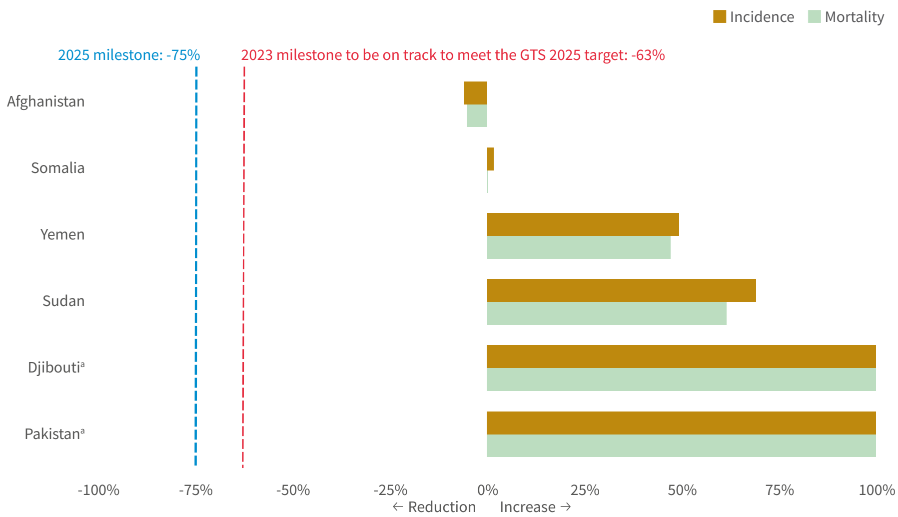


[a] Data are not collected on out-of-pocket expenditure and exclude patient service delivery costs; total funding includes negative disbursements due to under expenditure of international funding; and includes the country-reported data of the funding from WHO, UNICEF and other donors; [b] Annual disbursements to Yemen from the malaria component of the Global Fund MER Initiative are included in 2021–2023.

D. Percentage of *Plasmodium* species from reported indigenous cases, 2010 and 2023

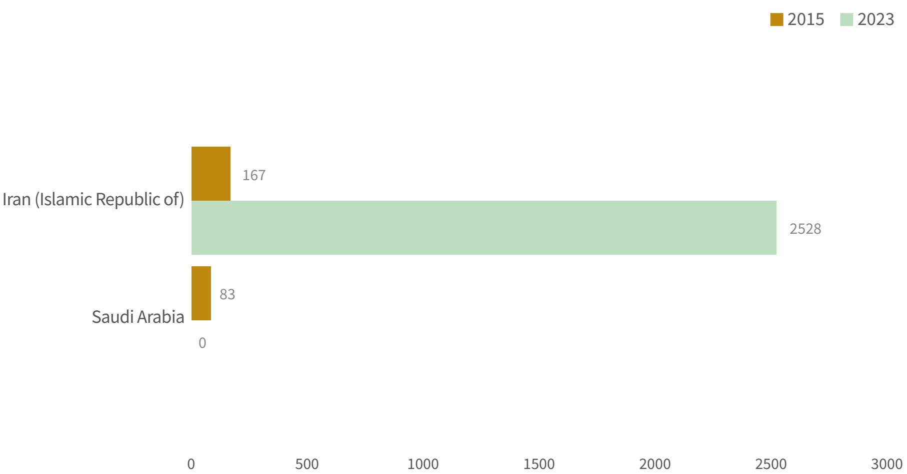


E. Change in estimated malaria incidence and mortality rate, 2015–2023



[a] In these countries, change in estimated incidence and mortality is more than 100%.

F. Reported indigenous cases in countries with national elimination activities, 2015 versus 2023



Note: In 2023, the Islamic Republic of Iran reported 2528 locally acquired cases, including introduced and indigenous cases.

Annex 3 – D. WHO South-East Asia Region

Malaria is endemic in nine of the WHO South-East Asia Region's 11 countries, with an estimated 4 million cases and 6030 deaths in 2023 – reductions of 83% and 84%, respectively, compared with 2010, representing the largest decline among all regions. All countries are on track to meet the GTS target of more than 75% reduction in estimated case incidence by 2025 compared with 2015, except for Bangladesh, the Democratic People's Republic of Korea, Thailand, Indonesia and Myanmar. Bangladesh, the Democratic People's Republic of Korea and Thailand have reduced estimated case incidence by 55%, 55% and 48%, respectively, in 2023 compared with 2015. Case incidence in Myanmar increased by 194% over the same period. In 2023, three countries accounted for 99% of the estimated cases in the region, with India being the largest contributor (51%), followed by Indonesia (27%) and Myanmar (21%). Between 2019 and 2023, there was an increase of almost 770 000 estimated cases in Myanmar due to political and social instability within the country, with cases increasing nearly tenfold from 78 000 to 847 000 cases. Maldives and Sri Lanka were certified malaria free in 2015 and 2016, respectively, and continue to maintain their malaria free status. Another noteworthy achievement in the region was India's official exit in 2024 from the HBHI group of countries, following substantial reductions in malaria incidence and mortality in its high endemic states.

Nearly all countries in the region are on track to meet the GTS 2025 target for a reduction in mortality rate by at least 75% in 2025 compared with 2015, except for Indonesia and Myanmar, where there was an increase in mortality rate of 6% and 29%, respectively. Bangladesh nearly reached the GTS 2025 target, with a reduction in mortality of 73% in 2023 compared with 2015. Bhutan, the Democratic People's Republic of Korea, Nepal and Timor-Leste all reported zero indigenous deaths in 2023.

Indonesia accounted for the highest proportion of reported cases in the region (46%), followed by India (25%) and Myanmar (25%). The gap between reported and estimated cases is due to adjustments made for care seeking and diagnostic testing rate. Reported malaria deaths in the region dropped to 230 in 2023 – a 90% reduction compared with 2010 (2421). Indonesia, India and Myanmar accounted for 52%, 36% and 7%, respectively, of the total reported deaths in the region. Fifty-one per cent of reported cases in the region are due to *P. vivax*. In 2023, *P. vivax* was the dominant species in the Democratic People's Republic of Korea (100%), Thailand (97%), Myanmar (81%) and Nepal (80%), while *P. falciparum* was the dominant species in Bangladesh (55%), Indonesia (59%) and India (61%).

Among the three lowest endemic countries in the region – Bhutan, Nepal and Timor-Leste – that are part of the E-2025 initiative, Timor-Leste has reported 3 consecutive years of zero indigenous cases as the country prepares to be certified malaria free, a first for the region since the inception of the initiative. Bhutan has reported zero indigenous cases since 2022 as it progresses towards 3 years of zero indigenous cases. Nepal's progress is marked by a decline in indigenous cases from 36 in 2022 to 15 in 2023. Among the other two countries under the E-2025 initiative, Thailand continues to experience the increasing trend in cases first observed in 2022, primarily driven by population movement across the Thai–Myanmar international border, while the Democratic People's Republic of Korea has been able to regain its lost ground in 2023, following 2 consecutive years of high malaria incidence.

The region is also facing biological threats to malaria interventions. *Pfhrp2* deletions have been previously detected in India and Myanmar, and a recent publication has reported the presence of *Pfhrp2/3* gene deletions in Papua Province in Indonesia (2013–2017). Based on available data, TES conducted according to the WHO standard protocol between 2015 and 2023 in this region have shown high efficacy of antimalarial treatment. Among 36 studies of AL (2015–2020), 14 studies of artesunate plus sulfadoxine–pyrimethamine (AS+SP) (2015–2017) and 12 studies of DHA-PPQ (2015–2020), all studies had treatment failures of less than 10%. In the Greater Mekong subregion (GMS), *PfKelch13* mutations associated with artemisinin partial resistance have reached a high prevalence. Among samples collected in Myanmar and western Thailand between 2015 and 2020, *PfKelch13* wild-type parasites were found in 65.5% of samples. More recent data are needed to establish current trends. Regarding insecticide resistance, between 2018 and 2023, among eight countries in this subregion, resistance to carbamates was confirmed in two of the four countries where it was tested. Resistance to organophosphates and pyrethroids was confirmed in four of the six countries where tested. No testing was conducted on neonicotinoids.

In 2023, total malaria funding was primarily sourced from international contributions (US$ 81 million, 65%), compared with domestic sources (US$ 43 million, 35%). Total funding has been steadily decreasing over the past 5 years, declining by 54% overall, with a sharp drop from US$ 184 million in 2022 to US$ 124 million in 2023 (a 33% decrease). The United Kingdom of Great Britain and Northern Ireland, which had significantly boosted its contributions by nearly 700% in 2022, provided no funding in 2023, while other donors maintained stable support levels. Over a 3-year average, malaria funding per person at risk ranged from US$ 0.06 in India to US$ 1.33 in Timor-Leste.

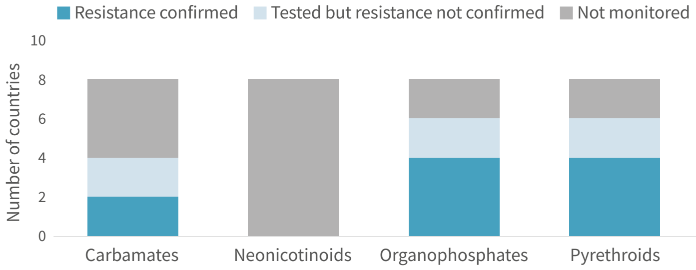
Challenges continue, including the high proportions of *P. vivax* in the region, *P. knowlesi* presence and transmission, and the continued threat of multiple ACT failures in the countries of the GMS, with the potential for deterioration due to the crisis in Myanmar.

THERAPEUTIC EFFICACY STUDIES (CLINICAL AND PARASITOLOGICAL FAILURE AMONG PATIENTS WITH *P. FALCIPARUM* MALARIA, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	Percentile 25	Percentile 75
AL	2015–2020	36	0.0	0.0	3.8	0.0	1.9
AS+SP	2015–2017	14	0.0	0.0	5.6	0.0	1.5
DHA-PPQ	2015–2020	12	0.0	0.0	3.9	0.0	2.0

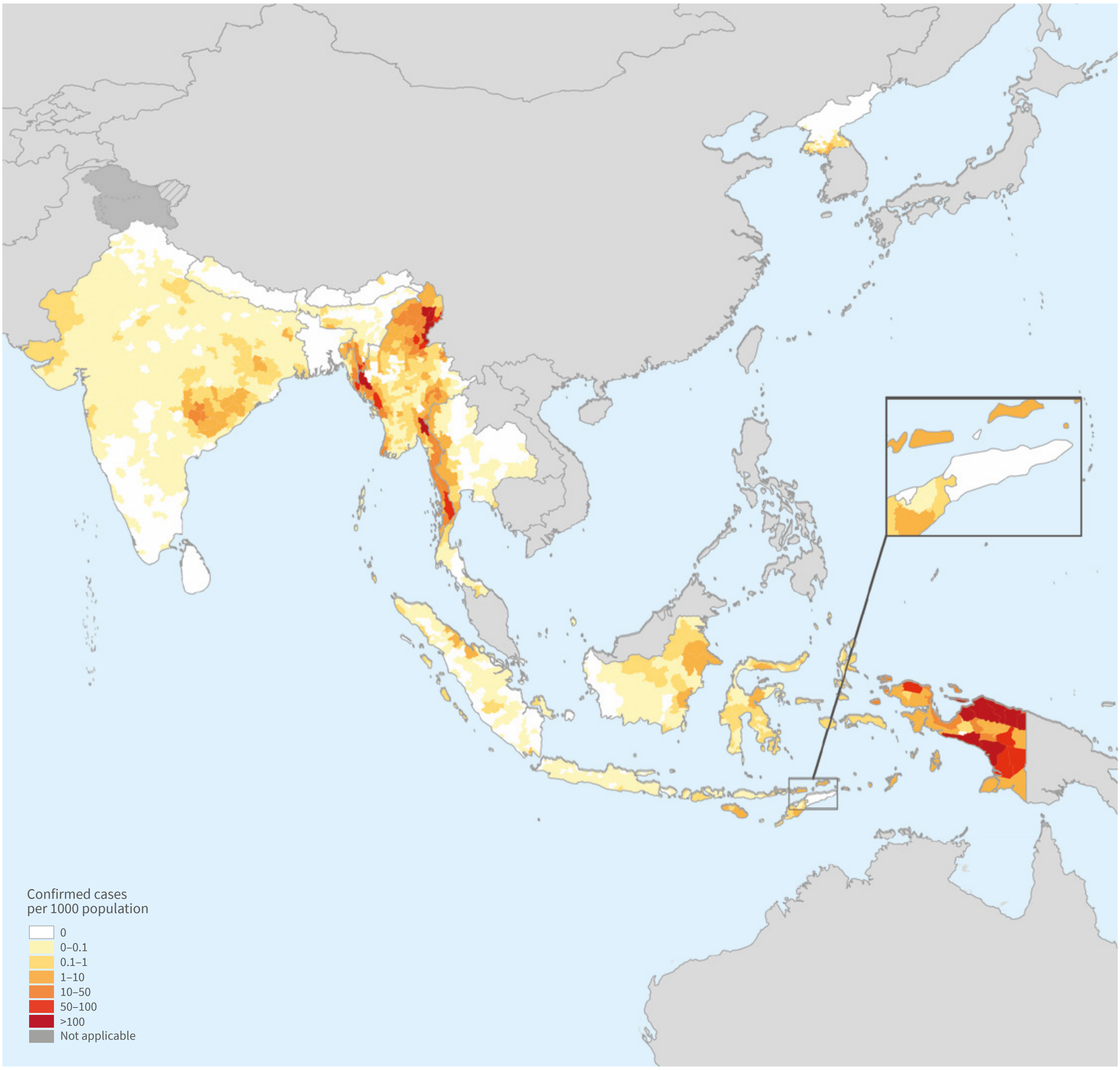
AL: artemether–lumefantrine; AS+SP: artesunate plus sulfadoxine–pyrimethamine; DHA-PPQ: dihydroartemisinin–piperaquine.

STATUS OF INSECTICIDE RESISTANCE[a] PER INSECTICIDE CLASS (2018–2023)



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

A. Confirmed malaria cases per 1000 population, 2023



Annex 3 – D. WHO South-East Asia Region

EPIDEMIOLOGY

Malaria endemic countries: Bangladesh, Bhutan, the Democratic People's Republic of Korea, India, Indonesia, Myanmar, Nepal and Thailand

Population denominator used to compute incidence and mortality rate in 2023: 1.7 billion

Parasites: *P. vivax* (51%), *P. falciparum* and mixed (48%) and other (1%)

Vectors: *An. aconitus, An. annularis, An. baimaii, An. barbirostris, An. culicifacies* s.l., *An. dirus* s.l., *An. farauti* s.l., *An. fluviatilis, An. lesteri, An. maculatus* s.l., *An. minimus* s.l., *An. philippinensis, An. pseudowillmori, An. punctulatus, An. sinensis* s.s., *An. stephensi, An. subalpinus, An. sundaicus* s.l. and *An. yatsushiroensis*

FUNDING (US$), 2010–2023

302.4 million (2010), 237.1 million (2015), 124.5 million (2023); 2010–2023: 59% decrease

Proportion of domestic source[a] in 2023: 35%

Regional funding mechanisms: Mekong Malaria Elimination (MME) programme in the GMS: Myanmar and Thailand

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

INTERVENTIONS, 2010–2023

Countries that carried out ITN mass campaigns in 2023 (including carry-over from 2022): Bangladesh and Myanmar

Total ITNs distributed:[a] 8.1 million (2010), 14.5 million (2015), 4.1 million (2023)

Number of people protected by IRS: 57.0 million (2010), 44.0 million (2015), 9.4 million (2023)

Number of RDTs distributed: 11.3 million (2010), 23.4 million (2015), 28.3 million (2023)

Number of ACT courses distributed: 3.4 million (2010), 2.8 million (2015), 791 000 (2023)

Number of any first-line antimalarial treatment courses (incl. ACT) distributed: 2.8 million (2010), 2.9 million (2015), 14.9 million (2023)

[a] Includes PBO nets, G2 nets and Royal Guard nets in 2023.

REPORTED CASES AND DEATHS,[a] 2010–2023

Total (presumed and confirmed) cases:[b,c] 3.1 million (2010), 1.7 million (2015), 912 000 (2023)

Confirmed cases:[b] 2.6 million (2010), 1.6 million (2015), 912 000 (2023)

Percentage of total cases confirmed:[c] 85.6% (2010), 98.9% (2015), 100% (2023)

Indigenous cases: 2 640 900 (2010), 1 630 555 (2015), 903 216 (2023)

Imported cases: 0 (2010), 10 610 (2015), 8059 (2023)

Deaths:[d] 2421 (2010), 620 (2015), 230 (2023)

[a] Includes malaria endemic countries only; [b] Includes *P. knowlesi* cases; [c] There is a small number of presumed cases reported from Indonesia which is not visible due to rounding; [d] Includes *P. knowlesi* deaths.

ESTIMATED CASES AND DEATHS, 2010–2023

Cases: 23.9 million (2010), 9.5 million (2015), 4.0 million (2023); 2010–2023: 83% decrease

Deaths: 37 800 (2010), 17 200 (2015), 6030 (2023); 2010–2023: 84% decrease

ACCELERATION TO ELIMINATION

Countries with subnational/territorial elimination programme: Bangladesh, India, Indonesia and Myanmar

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

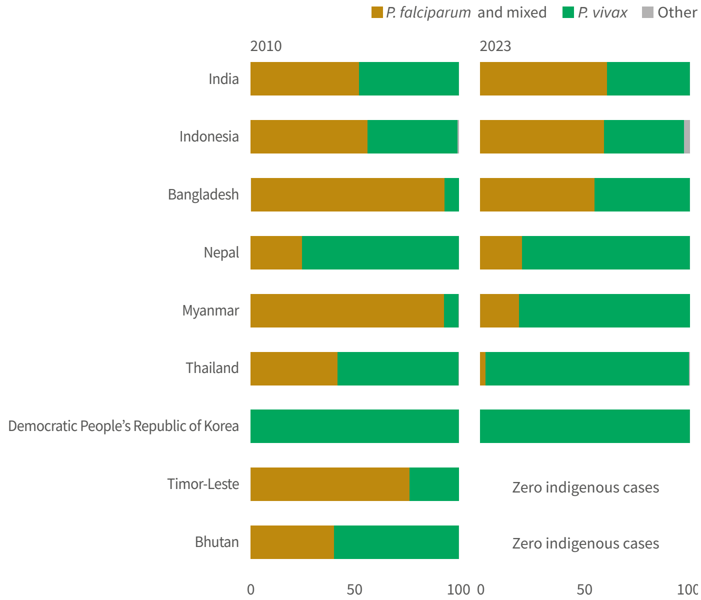
Countries part of the E-2025 initiative: Bhutan, the Democratic People's Republic of Korea, Nepal, Thailand and Timor-Leste

Zero indigenous cases for 3 or more consecutive years (2021–2023): Timor-Leste

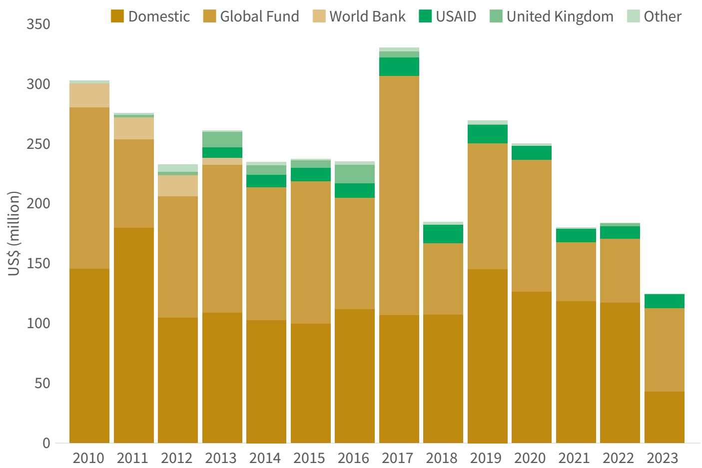
Zero indigenous cases for 2 consecutive years (2022–2023): Bhutan

Certified as malaria free since 2010: Maldives (2015) and Sri Lanka (2016)

B. Percentage of *Plasmodium* species from indigenous cases, 2010 and 2023

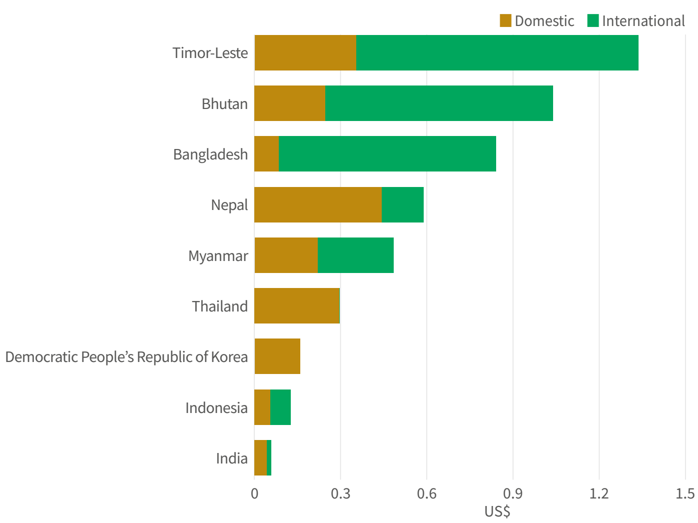


C. Malaria funding[a] by source, 2010–2023



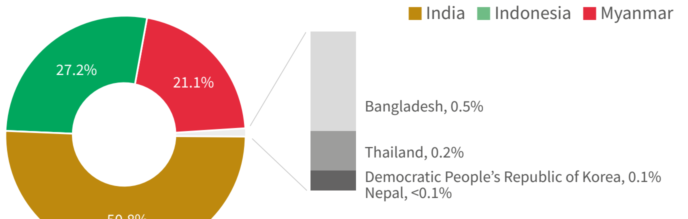
Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; USAID: United States Agency for International Development.
[a] Excludes patient service delivery costs and out-of-pocket expenditure; no domestic funding data were reported for the Democratic People's Republic of Korea in 2023.

D. Malaria funding[a] per person at risk, average 2021–2023



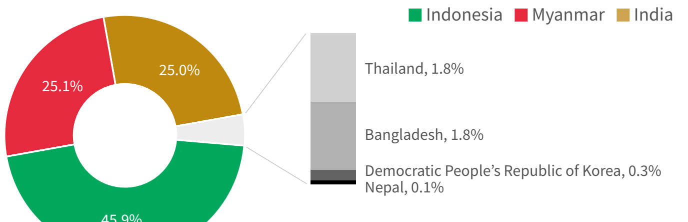
[a] Data are not collected on out-of-pocket expenditure and exclude patient service delivery costs; total funding includes negative disbursements due to under expenditure of international funding.

Ea. Share of estimated malaria cases, 2023



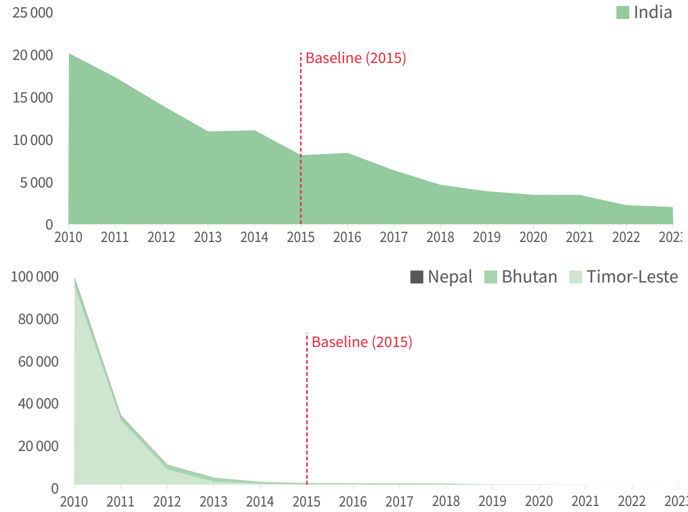
Note: Timor-Leste has had zero indigenous cases since 2021; Bhutan has had zero indigenous cases since 2022.

Eb. Share of reported confirmed cases, 2023



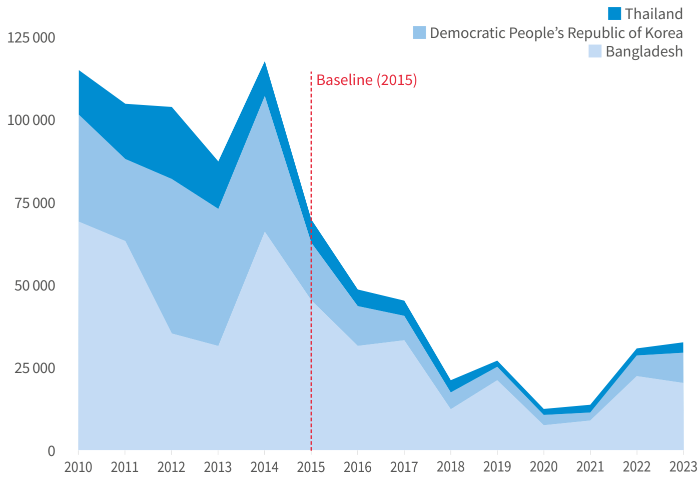
Note: Timor-Leste has had zero indigenous cases since 2021; Bhutan has had zero indigenous cases since 2022.

F. Estimated number of cases in countries that reduced incidence by ≥63%[a] in 2023 compared with 2015



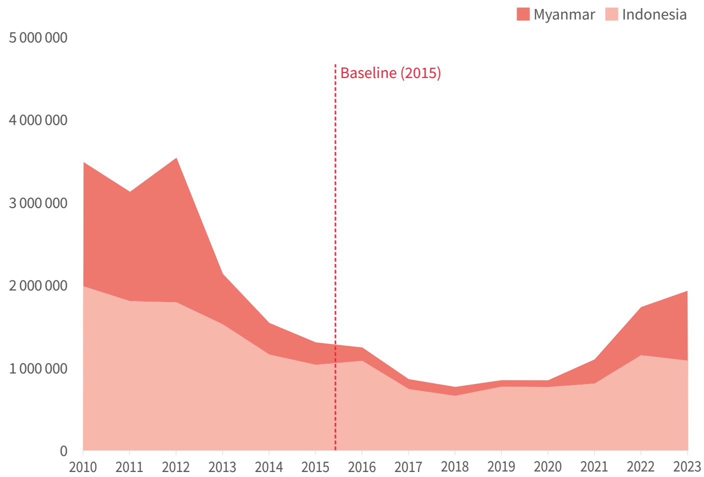
[a] 63% reduction represents the estimated expected reduction for 2023 between the GTS targets of 2020 (40%) and 2025 (75%).

G. Estimated number of cases in countries that reduced incidence by <63%[a] in 2023 compared with 2015



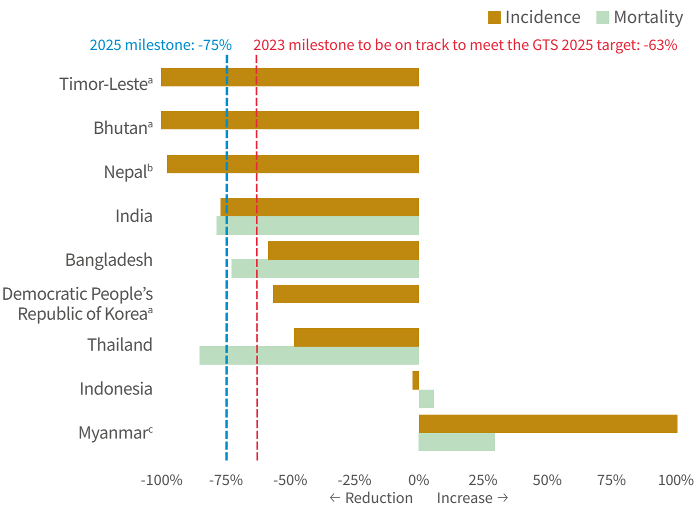
[a] 63% reduction represents the estimated expected reduction for 2023 between the GTS targets of 2020 (40%) and 2025 (75%).

H. Estimated number of cases in countries with an increase or no change[a] in incidence, 2015–2023



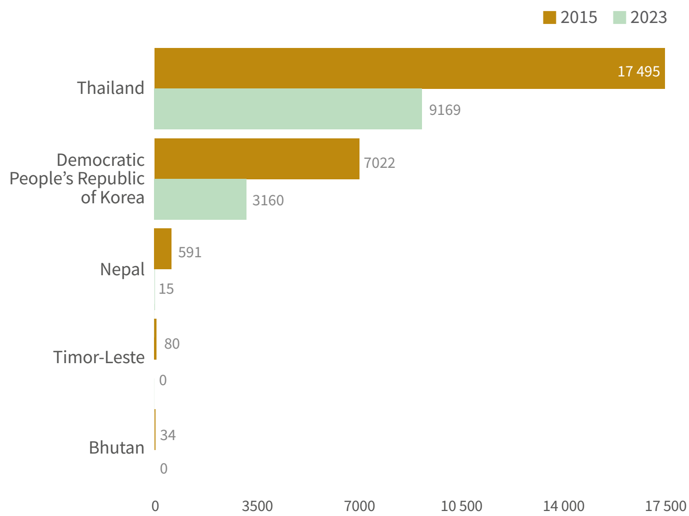
[a] A decrease or increase of less than 5% in 2023 compared with 2015 is categorized as no change.

I. Change in estimated malaria incidence and mortality rate, 2015–2023



[a] These countries have had zero indigenous deaths since 2015; [b] This country had zero indigenous deaths in 2015 and 2023; [c] Change in estimated incidence is more than 100%.

J. Reported indigenous cases in countries with national elimination activities, 2015 versus 2023



Annex 3 – E. WHO Western Pacific Region

Nine countries in the WHO Western Pacific Region are at risk of malaria, which is predominantly caused by *P. falciparum* (71%), with *P. vivax* accounting for just under a third of all reported cases (29%). In 2023, the region had more than 1.7 million estimated malaria cases and 3360 estimated deaths – a 5% increase and 3% decrease, respectively, compared with 2010. Most cases occurred in Papua New Guinea (88%), which, together with Solomon Islands (11%), comprised 99% of the estimated cases in the region.

Almost 1.1 million cases were reported in the public and private sectors and in the community, of which 88% were confirmed. This was a significant improvement over 2015, when only 61.6% of cases were confirmed. There were 292 indigenous malaria deaths reported in the region in 2023, and 300 deaths due to all *Plasmodium* species (including *P. knowlesi*), with most being in Papua New Guinea.

Four of the nine malaria endemic countries in the region in 2015 are on track to achieve the GTS target of more than a 75% reduction in case incidence by 2025 compared with 2015: Cambodia, the Lao People's Democratic Republic, Malaysia and Viet Nam. China was certified as malaria free in early 2021, and Malaysia reported zero indigenous cases of human malaria for the sixth consecutive year in 2023. Although still below the expected reduction in incidence to be on track to meet the GTS 2025 target, the Philippines experienced a 49% reduction between 2015 and 2023. Countries that have experienced an increase in estimated cases since 2015 are Papua New Guinea, the Republic of Korea, Solomon Islands and Vanuatu. In 2015, Vanuatu was affected by a major cyclone that severely disrupted malaria diagnostic services and care seeking. As a result, malaria cases in 2015 are likely to be underestimated, which confounds assessment of the country's progress towards the GTS targets relative to a 2015 baseline. All countries reduced the malaria mortality rate by at least 63% by 2023, except for Papua New Guinea, Solomon Islands and Vanuatu.

Malaysia is experiencing increasing cases of zoonotic malaria due to *P. knowlesi*, with an increase from 1600 cases in 2015 to 2872 cases in 2023. In 2023, Malaysia reported 14 indigenous deaths, all caused by *P. knowlesi*. Additionally, Cambodia reported 11 indigenous *P. knowlesi* cases for the first time, attributed to improved diagnostic capabilities. The Republic of Korea continues to face the challenge of *P. vivax* malaria transmission among military personnel along the northern border.

Three countries of the GMS – Cambodia, the Lao People's Democratic Republic and Viet Nam – aim to eliminate *P. falciparum* by 2024, supported through a regional artemisinin-resistance initiative financed by the Global Fund, and Cambodia aims to eliminate all species of malaria parasites by 2025. The remaining GMS countries aim to eliminate all species of malaria parasites by 2030. The percentage of reported indigenous cases in Cambodia due to *P. falciparum* has fallen significantly, from 62% in 2015 to 2.5% in 2023, owing to intensified efforts in community outreach and active case detection.

The region is also facing biological threats to malaria interventions. *Pfhrp2/3* deletions were previously detected in Cambodia (2009) and China (2013). No new countries from this region have reported *Pfhrp2/3* deletions. Regarding antimalarial drug efficacy, high treatment failure rates were previously reported between 2015 and 2019 from studies of AL in Cambodia and the Lao People's Democratic Republic, and of DHA-PPQ in Cambodia, the Lao People's Democratic Republic and Viet Nam. More recently, studies of AL from the Lao People's Democratic Republic (2021, 2022) and Papua New Guinea (2022) demonstrated treatment failure rates of less than 10%. The treatment failure rate of artesunate–pyronaridine in Viet Nam was less than 10% for both *P. falciparum* (2022) and *P. vivax* (2018). *PfKelch13* mutations were reported in Papua New Guinea (2016–2018). Surveillance of both antimalarial treatment efficacy and molecular markers of drug resistance is needed to fully establish current trends. Regarding insecticide resistance, bioassays were conducted between 2018 and 2023 in eight countries in this region. Resistance to carbamates or organophosphates was not found in either of the two countries where tests were carried out. Resistance to pyrethroids was detected in two of the four countries where it was monitored. Resistance to neonicotinoids was not tested in any of the eight countries. More testing of insecticide resistance is needed to establish current trends.

Total funding in the region has steadily declined since 2010, with an overall drop of 65% from US$ 247 million in 2010 to US$ 87 million in 2023. In 2023, 71% of the funding came from domestic sources, with the majority (79%) provided by Malaysia, while the Global Fund remained the primary international funding source. Over a 3-year average, funding per person at risk ranged from US$ 0.01 in Viet Nam (down from US$ 0.11 between 2020 and 2022) to US$ 36.70 in Malaysia. Notably, despite 90% of malaria cases occurring in Papua New Guinea, funding per person at risk was just US$ 1.45, with domestic funding contributing only US$ 0.01.

Efforts to control and eliminate malaria in the region are closely linked to promoting health equity, gender equality and human rights. Malaria disproportionately affects marginalized populations and those in situations of vulnerability, including women and children in remote areas, such as forest goers or communities in remote islands. Addressing region-specific inequities requires targeted and intensified interventions to ensure equitable access to prevention, treatment and resources, empowering communities and advancing gender equality in health outcomes.

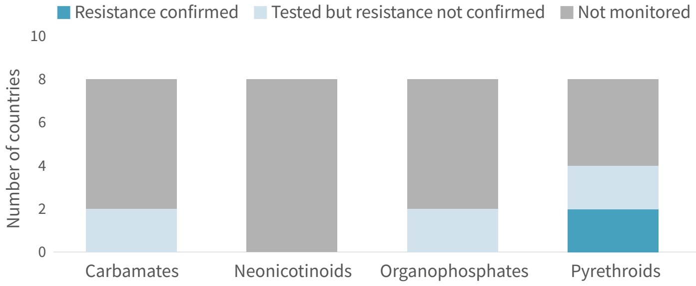
The GMS has made progress in reducing the malaria burden and moving closer to elimination. This has been achieved through improved surveillance systems, a more reliable supply of commodities, increased access to care – especially at the community level – and better targeted interventions for high-risk areas and populations. However, challenges remain in the region, including inadequate health care infrastructure, limited access to services, supply shortages (notably in Papua New Guinea, Solomon Islands and Vanuatu), suboptimal surveillance systems (e.g. low testing rates), environmental factors driving outbreaks and socioeconomic factors like migration contributing to rising cases. Increased domestic and international resources are essential for effectively combating malaria across the region.

THERAPEUTIC EFFICACY STUDIES (CLINICAL AND PARASITOLOGICAL FAILURE AMONG PATIENTS WITH *P. FALCIPARUM* MALARIA, %)

Medicine	Study years	No. of studies	Min.	Median	Max.	Percentile 25	Percentile 75
AL	2015–2023	21	0.0	0.0	17.2	0.0	4.8
AS-MQ	2015–2022	20	0.0	0.0	1.9	0.0	0.0
AS-PY	2017–2023	11	0.0	1.7	7.1	0.0	4.8
DHA-PPQ	2015–2019	24	0.0	16.8	68.1	0.0	33.2

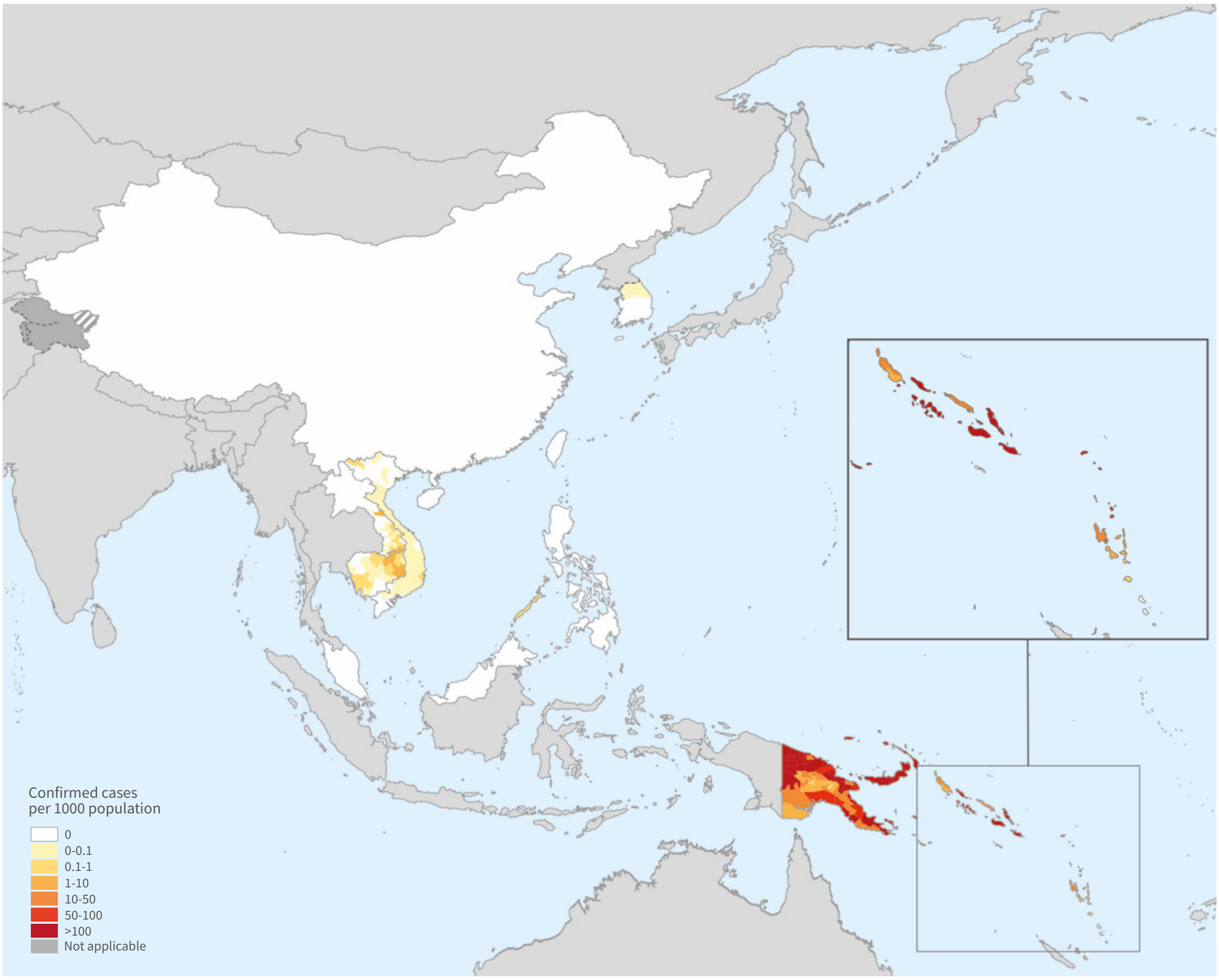
AL: artemether–lumefantrine; AS-MQ: artesunate–mefloquine; AS-PY: artesunate–pyronaridine; DHA-PPQ: dihydroartemisinin–piperaquine.

STATUS OF INSECTICIDE RESISTANCE[a] PER INSECTICIDE CLASS (2018–2023)



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

A. Confirmed malaria cases per 1000 population, 2023



Notes: In the Republic of Korea, 2022 data were used; the map does not include zoonotic cases caused by *P. knowlesi*.

Annex 3 – E. WHO Western Pacific Region

EPIDEMIOLOGY

Malaria endemic countries: Cambodia, the Lao People's Democratic Republic, Papua New Guinea, the Philippines, the Republic of Korea, Solomon Islands, Vanuatu and Viet Nam

Population denominator used to compute incidence and mortality rate in 2023: 769 million

Parasites: *P. falciparum* and mixed (71%), *P. vivax* (29%) and other (<1%)

Vectors: *An. balabacensis, An. bancroftii, An. belenrae, An. dirus* s.l., *An. epiroticus, An. farauti* s.l., *An. flavirostris, An. kleini, An. koliensis, An. lesteri, An. litoralis, An. longirostris, An. maculatus, An. maculipennis, An. mangyanus, An. minimus* s.s., *An. pullus, An. punctulatus* s.l., *An. sinensis, An. sineroides* and *An. sundaicus* s.l.

FUNDING (US$), 2010–2023

247.3 million (2010), 171.1 million (2015), 87.2 million (2023);
2010–2023: 65% decrease

Proportion of domestic source[a] in 2023: 71%

Regional funding mechanisms: MME programme in the GMS: Cambodia, the Lao People's Democratic Republic and Viet Nam (supported by RAI3E Global Fund)

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

INTERVENTIONS, 2010–2023

Countries that carried out ITN mass campaigns in 2023 (including carry-over from 2022): Cambodia, Papua New Guinea, Solomon Islands and Viet Nam

Total ITNs distributed:[a] 4.4 million (2010), 4.3 million (2015), 2.4 million (2023)

Number of people protected by IRS: 2.8 million (2010), 1.6 million (2015), 794 000 (2023)

Countries that implemented IPTp in 2023: Papua New Guinea and Solomon Islands

Number of RDTs distributed: 1.6 million (2010), 2.5 million (2015), 6.2 million (2023)

Number of ACT courses distributed:[b] 591 300 (2010), 1.3 million (2015), 39 200 (2023)

Number of any first-line antimalarial treatment courses (incl. ACT) distributed:[c] 956 000 (2010), 1.3 million (2015), 7.2 million (2023)

[a] Includes PBO nets, G2 nets and Royal Guard nets in 2023; [b] Data were not available for Papua New Guinea and Solomon Islands in 2023; [c] Data were not available for Solomon Islands in 2023.

REPORTED CASES AND DEATHS,[a] 2010–2023

Total (presumed and confirmed) cases:[a] 1.8 million (2010), 810 000 (2015), 1.1 million (2023)

Confirmed cases:[b] 307 900 (2010), 498 900 (2015), 978 000 (2023)

Percentage of total cases confirmed: 17.3% (2010), 61.6% (2015), 87.7% (2023)

Indigenous cases: 305 898 (2010), 496 712 (2015), 974 557 (2023)

Imported cases: 887 (2010), 599 (2015), 885 (2023)

Introduced cases: 108 (2010), 0 (2015), 91 (2023)

Deaths:[c] 912 (2010), 215 (2015), 300 (2023)

Indigenous deaths: 891 (2010), 215 (2015), 292 (2023)

[a] Includes malaria endemic countries only; [b] Includes *P. knowlesi* cases; [c] Includes *P. knowlesi* deaths.

ESTIMATED CASES AND DEATHS, 2010–2023

Cases: 1.67 million (2010), 1.24 million (2015), 1.74 million (2023);
2010–2023: 5% increase

Deaths: 3480 (2010), 2450 (2015), 3360 (2023); 2010–2023: 3% decrease

ACCELERATION TO ELIMINATION

Countries with subnational/territorial elimination programme: the Philippines

Countries with nationwide elimination programme: Cambodia, the Lao People's Democratic Republic, Malaysia, the Republic of Korea, Vanuatu and Viet Nam

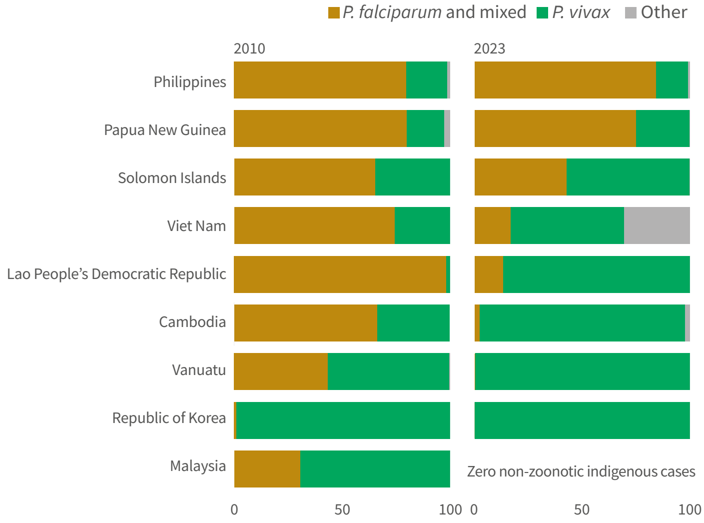
Countries part of the E-2025 initiative: Malaysia, the Republic of Korea and Vanuatu

Zero indigenous cases[a] for 3 or more consecutive years (2021–2023): Malaysia

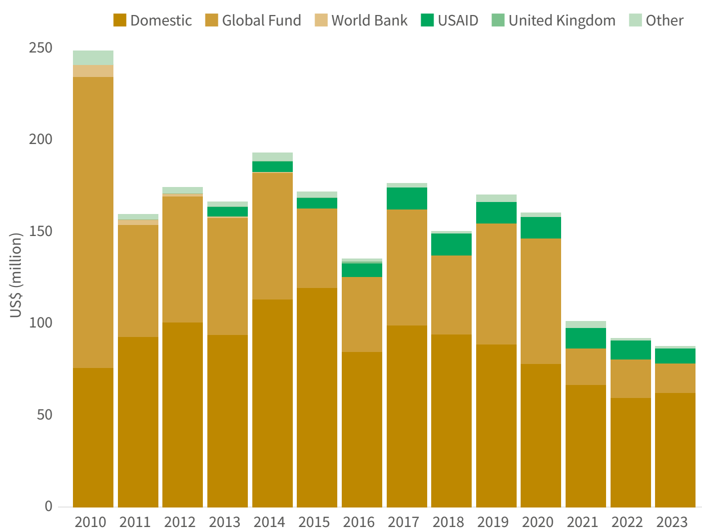
Certified as malaria free since 2010: China (2021)

[a] Does not include zoonotic cases caused by *P. knowlesi*.

B. Percentage of *Plasmodium* species from indigenous cases, 2010 and 2023

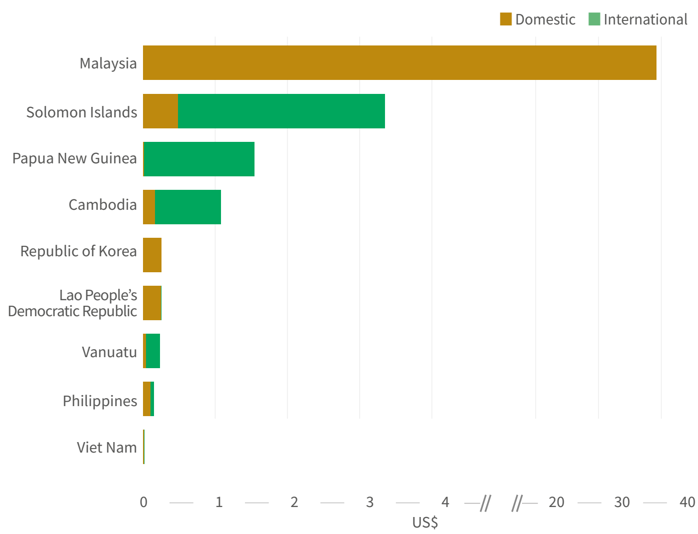


C. Malaria funding[a] by source, 2010–2023



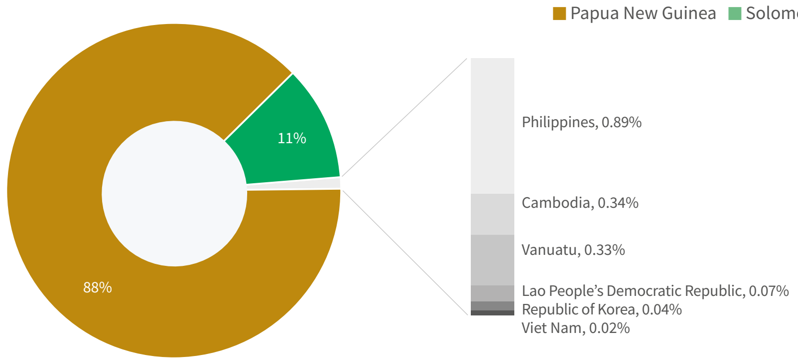
Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; USAID: United States Agency for International Development.
[a] Excludes patient service delivery costs and out-of-pocket expenditure.

D. Malaria funding[a] per person at risk, average 2021–2023



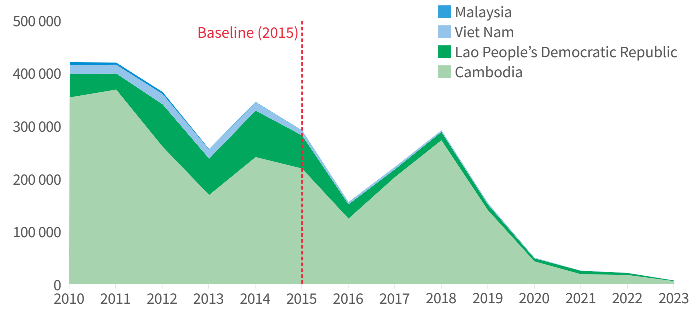
[a] Data are not collected on out-of-pocket expenditure and exclude patient service delivery costs; total funding includes negative disbursements due to under expenditure of international funding.

E. Share of estimated malaria cases, 2023



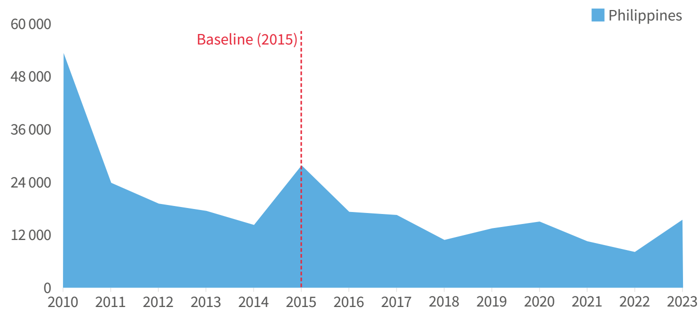
Note: Malaysia had zero non-zoonotic malaria cases; China was certified malaria free in 2021.

F. Estimated number of cases in countries that reduced incidence by ≥63%[a] in 2023 compared with 2015



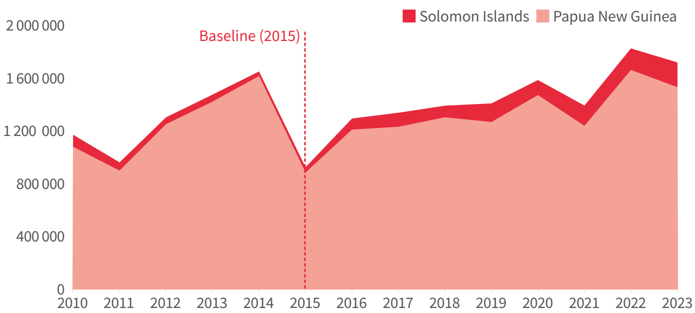
[a] 63% reduction represents the estimated expected reduction for 2023 between the GTS targets of 2020 (40%) and 2025 (75%).
Note: Malaysia had zero non-zoonotic malaria cases; China was certified malaria free in 2021.

G. Estimated number of cases in countries that reduced incidence by <63%[a] in 2023 compared with 2015

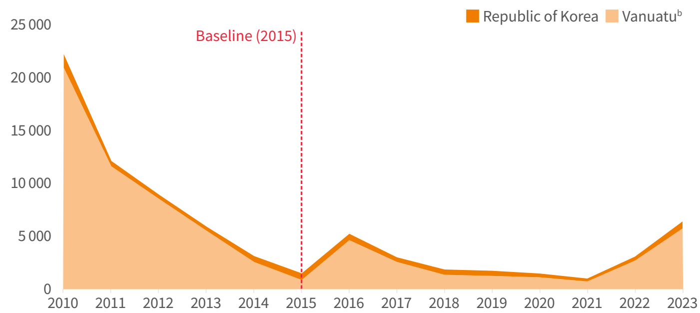


[a] 63% reduction represents the estimated expected reduction for 2023 between the GTS targets of 2020 (40%) and 2025 (75%).

Ha. Estimated number of cases in countries with an increase in incidence, 2015–2023

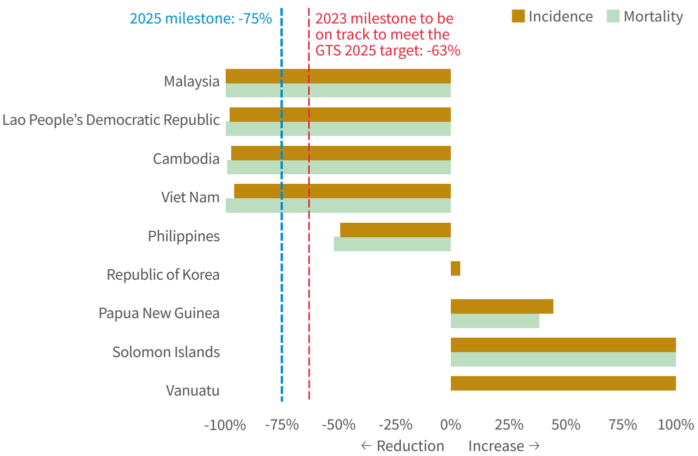


Hb. Estimated number of cases in countries with an increase or no change[a] in incidence, 2015–2023



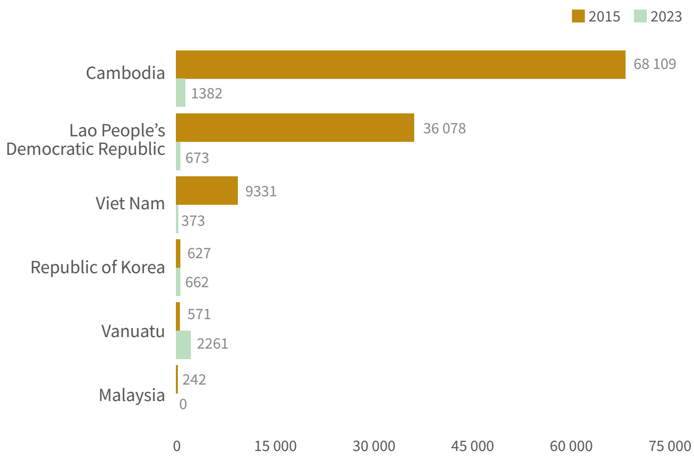
[a] A decrease or increase of less than 5% in 2023 compared with 2015 is categorized as no change; [b] Malaria cases in 2015 are likely to be underestimated; this confounds assessment of progress towards the GTS 2025 target relative to a 2015 baseline.

I. Change in estimated malaria incidence and mortality rate, 2015–2023



Notes: Change in estimated incidence is more than 100% in Solomon Islands and Vanuatu; there have been no reported indigenous deaths between 2015 and 2023 in the Republic of Korea and Vanuatu; malaria cases in 2015 are likely to be underestimated in Vanuatu; this confounds assessment of progress towards the GTS 2025 target relative to a 2015 baseline.

J. Reported indigenous cases in countries with national elimination activities, 2015 versus 2023



Notes: Malaria cases in 2015 are likely to be underreported in Vanuatu; Malaysia has had zero non-zoonotic indigenous cases since 2018.

Annex 4 – A. Policy adoption, 2023

WHO region Country/area	Insecticide-treated mosquito nets				Indoor residual spraying		Chemoprevention	
	ITNs are distributed free of charge	ITNs are distributed through ANC	ITNs are distributed through EPI/ well baby clinic	ITNs are distributed through mass campaigns	IRS is recommended by malaria control programme	DDT is used for IRS	IPTp is used to prevent malaria during pregnancy	SMC is used
AFRICAN								
Angola	⚪	⚪	⚪	⚪	⚪	🔴	⚫	🔴
Benin	⚫	⚫	⚫	⚫	🔴	🔴	⚫	⚫
Botswana	⚪	⚪	⚪	⚪	⚫	🔴	NA	NA
Burkina Faso[2]	⚫	⚪	⚪	⚫	⚪	🔴	⚫	⚫
Burundi[3]	⚪	⚪	⚪	⚪	⚫	🔴	⚫	🔴
Cameroon	⚫	⚫	⚫	⚫	🔴	🔴	⚫	⚫
Central African Republic[2]	⚫	⚫	⚫	⚫	🔴	🔴	⚫	🔴
Chad[2]	⚫	⚫	⚫	⚫	⚫	🔴	⚫	⚫
Comoros	⚫	⚫	⚫	⚫	⚫	🔴	🔴	NA
Congo	⚫	⚫	⚫	⚫	⚪	🔴	⚫	🔴
Côte d'Ivoire	⚫	⚫	⚫	⚪	⚪	🔴	⚫	⚫
Democratic Republic of the Congo	⚫	⚫	⚫	⚫	🔴	🔴	⚫	🔴
Equatorial Guinea	⚫	⚫	🔴	⚪	⚫	🔴	⚫	🔴
Eritrea	⚫	⚫	🔴	⚪	⚫	🔴	🔴	NA
Eswatini[4]	⚫	NA	NA	🔴	⚫	🔴	NA	NA
Ethiopia	⚫	🔴	🔴	⚫	⚫	🔴	🔴	NA
Gabon	⚪	⚪	⚪	🔴	🔴	🔴	⚫	🔴
Gambia	⚫	⚫	⚫	⚪	⚫	🔴	⚫	⚫
Ghana	⚫	⚫	⚫	⚪	⚫	🔴	⚫	⚫
Guinea	⚫	⚫	⚫	⚪	🔴	🔴	⚫	⚫
Guinea-Bissau	⚫	⚫	⚫	⚫	⚪	🔴	⚫	⚫
Kenya	⚫	⚫	⚫	⚫	⚫	🔴	⚫	🔴
Liberia	⚫	🔴	🔴	⚫	⚪	🔴	⚪	🔴
Madagascar	⚫	⚫	⚫	⚪	⚫	🔴	⚫	⚫
Malawi	⚫	⚫	⚫	⚫	⚪	🔴	⚫	🔴
Mali	⚫	⚫	⚫	⚫	⚪	🔴	⚫	⚫
Mauritania	⚫	⚫	⚫	⚫	🟡	🔴	⚫	⚫
Mayotte	⚪	🔴	🔴	⚪	⚪	🔴	NA	🔴
Mozambique	⚫	⚫	🔴	⚫	⚫	🔴	⚫	⚫
Namibia	⚫	🔴	NA	⚫	⚫	🔴	NA	NA
Niger	⚪	⚪	⚪	⚪	🔴	🔴	⚫	⚫
Nigeria[2]	⚫	⚫	⚫	⚫	⚪	🔴	⚫	⚫
Rwanda	⚫	⚫	⚫	⚫	⚫	🔴	NA	NA
Sao Tome and Principe[4]	⚪	⚪	NA	⚪	⚪	🔴	⚪	NA
Senegal	⚫	⚫	⚫	🔴	⚪	🔴	⚫	⚫
Sierra Leone	⚫	⚫	⚫	⚫	⚫	🔴	⚫	🔴
South Africa	🔴	🔴	🔴	🔴	⚫	⚫	🔴	NA
South Sudan[5]	⚫	⚫	⚫	⚫	⚪	🔴	⚫	⚫
Togo[2]	⚫	⚫	⚫	⚫	🔴	🔴	⚫	⚫
Uganda	⚫	⚫	⚫	⚫	⚫	🔴	⚫	⚫
United Republic of Tanzania[6]								
Mainland[2]	⚫	⚫	⚫	⚫	⚪	🔴	⚫	🔴
Zanzibar	⚫	⚫	⚫	⚫	⚫	🔴	🔴	🔴
Zambia	⚫	⚫	⚫	⚫	⚫	🔴	⚫	🔴
Zimbabwe	⚫	⚫	⚫	⚫	⚫	⚫	⚫	NA
AMERICAS								
Bolivia (Plurinational State of)	⚪	🔴	🔴	⚪	⚪	🔴	NA	NA
Brazil	⚫	🔴	🔴	⚫	⚫	🔴	NA	NA
Colombia	⚪	🔴	🔴	⚪	⚪	🔴	NA	NA
Costa Rica[4]	⚫	🔴	🔴	⚪	⚫	🔴	NA	NA
Dominican Republic	⚫	🔴	🔴	⚫	⚫	🔴	NA	NA
Ecuador[4]	⚫	🔴	🔴	⚪	⚫	🔴	NA	NA

Testing				Treatment				
Malaria diagnosis is free of charge in the private sector	Malaria diagnosis is free of charge in the public sector	RDTs are 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 low dose of primaquine with ACT to reduce transmissibility of *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	⚪	⚫	⚪	NA	NA
🔴	🔵	⚫	NA	⚫	⚪	NA	NA	NA
🔴	🟢	⚫	NA	⚫	⚪	⚫	NA	NA
🔴	🟤	⚫	NA	⚫	⚫	🔴	NA	NA
⚪	🔵	⚪	NA	⚫	⚫	🔴	NA	NA
⚪	🟢	⚫	NA	⚪	⚪	🔴	NA	NA
–	🟩	⚫	NA	⚪	⚪	⚪	NA	NA
🔴	🟤	⚫	NA	⚫	⚪	NA	NA	NA
🟡	🟢	⚫	NA	⚫	⚪	🟡	NA	NA
🔴	🔵	⚫	NA	⚫	⚪	NA	NA	NA
–	🟩	⚪	NA	⚫	🔴	🔴	NA	NA
NA	🟢	⚫	🔴	⚫	⚪	🔴	⚪	⚪
⚪	🟢	⚫	NA	⚫	⚪	⚫	NA	NA
🔴	🟢	⚪	🔴	⚫	⚫	⚪	⚫	🔴
🔴	🟤	🔴	NA	⚫	⚪	NA	NA	NA
🔴	🟢	⚫	NA	⚫	⚪	NA	NA	NA
NA	🟢	⚫	NA	⚫	⚪	🔴	NA	NA
⚫	🟢	⚫	NA	⚫	⚪	🔴	NA	NA
–	🟢	⚫	NA	⚫	⚪	⚫	NA	NA
🔴	🟢	⚫	NA	⚫	⚪	🔴	NA	NA
–	🟢	⚫	NA	⚪	⚪	🔴	NA	NA
🔴	🟢	⚪	NA	⚫	⚫	⚪	NA	NA
🔴	🟢	⚫	NA	⚪	🔴	🔴	NA	NA
🔴	🟢	⚫	NA	⚫	⚫	NA	NA	NA
🔴	🔵	🔴	NA	⚫	⚪	🟡	NA	NA
🔴	🟢	–	⚪	⚫	⚪	🔴	⚪	⚪
–	🟢	⚫	NA	⚫	⚪	🔴	NA	NA
–	🟢	⚫	NA	⚫	⚪	⚪	NA	NA
🔴	🔵	⚪	NA	⚫	⚫	🔴	NA	NA
–	🔴	⚫	NA	⚫	⚪	🔴	NA	NA
🔴	🟢	⚫	NA	⚫	⚪	NA	NA	NA
🔴	🟢	⚪	NA	⚫	⚪	⚪	NA	NA
⚫	🟢	⚫	NA	⚫	⚫	⚫	NA	NA
⚪	🟢	⚫	NA	⚫	⚪	🔴	NA	NA
🔴	🟢	⚪	NA	⚫	🔴	⚫	NA	NA
NA	🟢	⚫	NA	⚫	⚪	NA	NA	NA
⚫	🟢	⚫	NA	⚫	⚫	🔴	NA	NA
🔴	🟢	⚫	NA	⚫	⚪	🔴	NA	NA
🔴	🔵	⚫	NA	⚫	⚪	⚪	NA	NA
🔴	🟢	⚫	🔴	⚫	🔴	⚫	⚪	⚪
⚫	🟢	⚫	NA	⚫	⚫	🔴	NA	NA
🔴	🟢	⚫	NA	⚫	⚪	⚪	NA	NA
🔴	🟢	⚫	🔴	⚫	🔴	⚪	⚪	⚪
🔴	🟢	⚪	🔴	⚫	🔴	⚫	⚫	🔴
⚪	🟢	⚪	🔴	⚪	⚪	⚪	⚪	⚪
🔴	🟢	⚫	🔴	⚫	🔴	⚪	⚫	⚫
⚫	🟢	⚫	🔴	⚫	NA	⚪	⚫	⚫
🔴	🟢	⚫	🔴	⚫	⚪	⚫	⚫	🔴

Annex 4 – A. Policy adoption, 2023

WHO region Country/area	Insecticide-treated mosquito nets				Indoor residual spraying		Chemoprevention	
	ITNs are distributed free of charge	ITNs are distributed through ANC	ITNs are distributed through EPI/ well baby clinic	ITNs are distributed through mass campaigns	IRS is recommended by malaria control programme	DDT is used for IRS	IPTp is used to prevent malaria during pregnancy	SMC is used
AMERICAS								
French Guiana	● (light grey)	● (red)	● (red)	● (light grey)	● (light grey)	● (red)	NA	NA
Guatemala[4]	● (dark grey)	● (red)	● (red)	● (light grey)	● (red)	● (red)	NA	NA
Guyana	● (light grey)	● (light grey)	● (light grey)	● (light grey)	● (light grey)	● (red)	NA	NA
Haiti	● (dark grey)	● (dark grey)	● (red)	● (dark grey)	● (light grey)	● (red)	NA	NA
Honduras[4]	● (dark grey)	● (light grey)	● (red)	● (light grey)	● (dark grey)	● (red)	NA	NA
Mexico	● (dark grey)	● (red)	● (red)	● (dark grey)	● (dark grey)	● (red)	NA	NA
Nicaragua	● (dark grey)	● (red)	NA	● (dark grey)	● (dark grey)	● (red)	NA	NA
Panama[4]	● (dark grey)	● (red)	● (red)	● (light grey)	● (light grey)	● (red)	NA	NA
Peru	● (light grey)	● (red)	● (red)	● (light grey)	● (dark grey)	● (red)	NA	NA
Suriname	● (dark grey)	● (red)	● (red)	● (dark grey)	● (red)	● (red)	NA	NA
Venezuela (Bolivarian Republic of)	● (dark grey)	● (light grey)	● (red)	● (dark grey)	● (light grey)	● (red)	NA	NA
EASTERN MEDITERRANEAN								
Afghanistan	● (dark grey)	● (dark grey)	● (red)	● (dark grey)	● (dark grey)	● (red)	NA	NA
Djibouti	● (dark grey)	● (yellow)	● (red)	● (dark grey)	● (dark grey)	● (red)	NA	NA
Iran (Islamic Republic of)[4]	● (dark grey)	● (red)	● (red)	● (light grey)	● (dark grey)	● (red)	NA	NA
Pakistan[2]	● (dark grey)	● (light grey)	● (red)	● (dark grey)	● (light grey)	● (red)	NA	NA
Somalia	● (dark grey)	● (dark grey)	● (red)	● (dark grey)	● (light grey)	● (red)	● (dark grey)	● (red)
Sudan[4]	● (dark grey)	● (light grey)	● (light grey)	● (light grey)	● (light grey)	● (red)	● (light grey)	NA
Yemen	● (dark grey)	● (yellow)	● (yellow)	● (dark grey)	● (light grey)	● (red)	NA	NA
SOUTH-EAST ASIA								
Bangladesh	● (dark grey)	● (red)	● (red)	● (dark grey)	● (light grey)	● (red)	NA	NA
Bhutan	● (dark grey)	● (red)	● (red)	● (dark grey)	● (dark grey)	● (red)	NA	NA
Democratic People's Republic of Korea	● (light grey)	● (red)	● (red)	● (light grey)	● (light grey)	● (red)	NA	NA
India[4]	● (light grey)	● (light grey)	● (light grey)	● (light grey)	● (dark grey)	● (dark grey)	NA	NA
Indonesia	● (dark grey)	● (dark grey)	● (red)	● (light grey)	● (dark grey)	● (red)	NA	NA
Myanmar	● (dark grey)	● (light grey)	● (red)	● (dark grey)	● (dark grey)	● (red)	NA	NA
Nepal	● (dark grey)	● (dark grey)	● (yellow)	● (dark grey)	● (dark grey)	● (red)	NA	NA
Thailand	● (dark grey)	● (red)	● (red)	● (dark grey)	● (dark grey)	● (red)	NA	NA
WESTERN PACIFIC								
Cambodia	● (dark grey)	● (red)	● (red)	● (dark grey)	● (red)	● (red)	NA	NA
Lao People's Democratic Republic	● (dark grey)	● (dark grey)	● (red)	● (light grey)	● (dark grey)	● (red)	NA	NA
Papua New Guinea	● (dark grey)	● (dark grey)	● (red)	● (dark grey)	● (light grey)	● (red)	● (light grey)	NA
Philippines[4]	● (dark grey)	● (light grey)	● (red)	● (light grey)	● (dark grey)	● (red)	NA	NA
Republic of Korea	● (red)	NA	NA	● (red)	● (light grey)	● (red)	NA	NA
Solomon Islands	● (dark grey)	● (dark grey)	● (red)	● (dark grey)	● (dark grey)	● (red)	● (light grey)	NA
Vanuatu	● (dark grey)	● (light grey)	● (red)	● (dark grey)	● (light grey)	● (red)	NA	NA
Viet Nam	● (dark grey)	NA	NA	● (dark grey)	● (dark grey)	● (red)	NA	NA

ACT: artemisinin-based combination therapy; ANC: antenatal care; DDT: dichloro-diphenyl-trichloroethane; EPI: Expanded Programme on Immunization; G6PD: glucose-6-phosphate dehydrogenase; IM: intramuscular; IPTp: intermittent preventive treatment of malaria in pregnancy; IRS: indoor residual spraying; ITN: insecticide-treated mosquito net; *P.*: *Plasmodium*; RDT: rapid diagnostic test; SMC: seasonal malaria chemoprevention; WHO: World Health Organization.

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

[2] Data reported to the Alliance for Malaria Prevention were used where data reported to WHO were missing or incomplete.

[3] Due to missing data, the number of ITNs distributed through routine channels in 2022 was used.

[4] ITNs were distributed through routine channels; however, the channel of distribution was not specified.

[5] In May 2013, South Sudan was reassigned to the WHO African Region (WHA resolution 66.21, https://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R21-en.pdf).

[6] Where national data for the United Republic of Tanzania are unavailable, refer to Mainland and Zanzibar.

Testing				Treatment				
Malaria diagnosis is free of charge in the private sector	**Malaria diagnosis is free of charge in the public sector**	**RDTs are 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 low dose of primaquine with ACT to reduce transmissibility of *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	🟢	NA	🔴	NA	NA	NA	⚫	⚫
NA	🟢	⚫	🔴	⚫	⚪	⚪	⚪	🔴
⚫	🟢	⚫	🔴	⚫	🔴	⚪	⚪	⚪
⚫	🟢	⚫	⚫	⚫	⚫	⚪	⚫	⚫
⚪	🟢	⚫	⚪	⚫	⚪	⚫	⚫	🔴
🔴	🟢	⚫	⚫	⚫	🔴	⚫	⚫	⚫
🔴	🟢	⚫	⚫	⚫	🟡	⚫	⚫	⚫
⚫	🟢	⚫	⚫	⚫	🔴	⚫	⚫	🔴
⚫	🟢	⚪	🔴	⚫	⚫	⚪	⚫	🔴
⚪	🟢	⚫	🔴	⚫	⚪	⚫	⚫	⚪
NA	🟢	⚪	⚪	NA	NA	NA	⚪	⚪
🔴	🟢	🔴	⚫	⚪	⚪	⚪	⚫	🔴
🔴	🟢	⚫	⚫	⚫	⚫	⚪	⚫	⚫
NA	🟢	⚫	⚪	⚫	🔴	⚫	⚫	⚪

Data as of 4 October 2024

⚫ = Policy exists and has been implemented this year.

⚪ = Policy exists but is not implemented this year or no data exist to support implementation.

🔴 = Policy does not exist.

🟡 = Policy discontinued.

🟢 = Both microscopy and RDTs are free.

🟢 = Diagnosis is free but diagnostic test was not specified.

🔵 = Only RDTs are free.

🟤 = Neither microscopy nor RDTs are free.

NA = Policy not applicable.

– = Question not answered and there is no information from previous years.

Annex 4 – B. Antimalarial drug policy, 2023

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

WHO region Country/area	*P. falciparum*				*P. vivax*
	Uncomplicated unconfirmed	**Uncomplicated confirmed**	**Severe**	**Prevention during pregnancy**	**Treatment**
AMERICAS					
Dominican Republic	NA	CQ+PQ	AS	NA	CQ+PQ
Ecuador	AL+AM	AL+AM+PQ	AS	NA	CQ+PQ
French Guiana	NA	AL; DHA-PPQ	AS; AL+PQ; AT-PG; QN	NA	CQ+PQ
Guatemala	NA	AL	AS	NA	CQ+PQ
Guyana	NA	AL+PQ	AM; AS-QN; QN+CL	NA	CQ+PQ
Haiti	NA	CQ+PQ	AS	NA	CQ+PQ
Honduras	NA	CQ+PQ	AS	NA	CQ+PQ
Mexico	NA	AL; AL-PQ	AL; AL+PQ; AS	NA	CQ+PQ
Nicaragua	CQ+PQ	CQ+PQ	AS	NA	CQ+PQ
Panama	AL-PQ	AL+PQ	AS	CQ	CQ+PQ
Peru	AS+MQ+PQ	AS+MQ+PQ	AS+PQ+CL	NA	CQ+PQ
Suriname	NA	AL+PQ	AS	NA	CQ+PQ
Venezuela (Bolivarian Republic of)	NA	AL+PQ	AS	NA	CQ+PQ
EASTERN MEDITERRANEAN					
Afghanistan	CQ	AL+PQ	ART; AS; QN	NA	CQ+PQ
Djibouti	NA	AL	AS	NA	AL+PQ
Iran (Islamic Republic of)	NA	AL-PQ	AS	NA	CQ+PQ
Pakistan	CQ	AL-PQ	AS	NA	CQ+PQ
Somalia	AL	AL-PQ	AS	SP(IPT)	AL+PQ
Sudan	NA	AL	AS; QN	SP(IPT)	AL+PQ
Yemen	AL	AL	AS	NA	AL-PQ
SOUTH-EAST ASIA					
Bangladesh	NA	AL+PQ	AS; AL+PQ	NA	CQ+PQ
Bhutan	AL-PQ	AL-PQ	AM; AS; QN	NA	CQ+PQ
Democratic People's Republic of Korea	NA	NA	NA	NA	CQ+PQ
India	NA	AL+PQ; AS+SP+PQ	AM; AS; QN	NA	CQ+PQ
Indonesia	NA	DHA-PPQ+PQ	AS	NA	DHA-PPQ+PQ
Myanmar	NA	AL+PQ	ART+AL	NA	CQ+PQ
Nepal	AL	AL-PQ	AS	NA	CQ+PQ
Thailand	NA	DHA-PPQ+PQ; AS-PYR	AS;QN	NA	CQ+PQ
WESTERN PACIFIC					
Cambodia	AS+MQ	AS+MQ+PQ	AS; QN; ASMQ	NA	AS+MQ+PQ
Lao People's Democratic Republic	NA	AL+PQ	AS	NA	AL-PQ
Papua New Guinea	AL+PQ	AL+PQ	DHA-PPQ	SP(IPT)	AL-PQ
Philippines	NA	AL+PQ	AS	NA	AL+PQ
Republic of Korea	AT-PG; PYR-AS; MQ	PYR; MQ	AS; MQ; AT-PG	NA	CQ+PQ
Solomon Islands	AL+PQ	AL+PQ	AS	CQ	AL+PQ
Vanuatu	AL+PQ	AL+PQ	AS	CQ	AL+PQ
Viet Nam	AS-PYR; DHA-PPQ+PQ	DHA-PPQ+PQ	AS	NA	CQ+PQ

Data as of 20 September 2024

ACT: artemisinin-based combination therapy; AL: artemether–lumefantrine; AM: artemether; AQ: amodiaquine; ART: artemisinin; AS: artesunate; AT: atovaquone; CL: clindamycin; CQ: chloroquine; DHA: dihydroartemisinin; IPT: intermittent preventive treatment of malaria; MQ: mefloquine; NA: not applicable; *P.*: *Plasmodium*; PG: proguanil; PPQ: piperaquine; PQ: primaquine; PYR: pyronaridine; QN: quinine; SP: sulfadoxine–pyrimethamine; WHO: World Health Organization.

"–" refers to data not available.

[1] In May 2013, South Sudan was reassigned to the WHO African Region (WHA resolution 66.21, https://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R21-en.pdf).

Notes:
Co-blistered products are denoted by '+', e.g. artesunate + amodiaquine.
Co-formulated products are denoted by '–', e.g. artemether–lumefantrine.

Annex 4 – C. Funding for malaria control, 2021–2023

WHO region Country/area	Year	Contributions reported by donors				
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	United Kingdom[4]	Others
AFRICAN						
Algeria	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Angola	2021	2 413 738	21 072 066	–	–	–
	2022	−299 193	19 692 549	–	–	–
	2023	0	19 000 000	–	–	–
Benin	2021	12 583 773	18 299 426	–	–	5 445
	2022	25 410 636	17 619 649	–	–	8 998
	2023	10 512 596	17 000 000	–	–	8 998
Botswana	2021	360 280	–	–	–	–
	2022	4 445	–	–	–	–
	2023	4 288	–	–	–	–
Burkina Faso	2021	69 190 685	30 499 043	–	–	416 906
	2022	106 771 868	26 947 699	–	–	238 183
	2023	45 859 437	26 000 000	–	–	238 183
Burundi	2021	35 835 081	8 317 921	–	–	–
	2022	44 592 936	11 400 949	–	–	286 216
	2023	874 817	15 000 000	–	–	286 216
Cabo Verde	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Cameroon	2021	20 624 490	24 953 763	–	257 732	51 723
	2022	59 672 067	24 356 574	–	–	97 115
	2023	22 818 750	23 500 000	–	−7 923	97 115
Central African Republic	2021	20 102 491	–	–	–	–
	2022	21 391 388	–	–	–	–
	2023	29 438 291	–	–	–	–
Chad	2021	24 112 413	–	–	–	169 364
	2022	44 784 619	–	–	–	61 269
	2023	24 035 080	–	–	–	61 269
Comoros	2021	1 302 255	–	–	–	–
	2022	2 239 145	–	–	–	–
	2023	2 014 577	–	–	–	–
Congo	2021	5 262 703	–	–	–	–
	2022	18 501 040	–	–	–	–
	2023	14 598 458	–	–	–	–
Côte d'Ivoire	2021	43 891 884	27 726 403	–	–	278 373
	2022	21 258 275	25 911 249	–	–	299 579
	2023	49 876 779	25 000 000	–	–	299 579
Democratic Republic of the Congo	2021	149 122 376	60 443 559	–	338 049	–
	2022	214 338 749	56 486 522	–	440 824	54 499
	2023	153 235 982	54 500 000	–	198 017	54 499
Equatorial Guinea	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Eritrea	2021	4 364 103	–	–	–	–
	2022	6 776 426	–	–	–	43 302
	2023	12 446 596	–	–	–	43 302
Eswatini	2021	1 306 771	–	–	–	–
	2022	1 273 253	–	–	–	–
	2023	762 435	–	–	–	–

Contributions reported by countries

Government (NMP)	Global Fund	PMI/USAID	World Bank	Other bilaterals	WHO	UNICEF	Other contributions[7]
–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–
17 120 717	–	19 000 000	–	–	–	–	–
4 878 805 [6]	–	19 000 000	–	–	250 000	–	69 779 797
3 498 672 [6]	540 499	19 000 000	–	–	–	–	–
1 636 520	6 969 348	13 915 191	–	–	65 372	–	43 978
2 072 525	28 650 814	1 093 169	–	–	16 643	–	595 757
4 330 745	33 655 421	–	–	–	34 992	–	–
1 887 386	–	–	–	–	–	–	–
3 258 858	–	–	–	–	–	–	405 890
3 150 000	–	–	–	–	–	–	547 434
51 828 942	23 061 297	14 739 304	0	–	17 066	331 713	7 443 864
102 082 045	74 798 345	17 181 246	0	0	17 677	153 483	5 382 660
76 955 494 [7]	9 331 275	12 638 498	0	0	12 276	283 552	6 203 053
2 656 237	532 091	–	–	–	185 887	82 603	–
1 762 424	5 375 225	–	–	–	421 394	–	–
1 792 167	6 807 111	5 752 721	–	–	190 883	–	–
913 644	305 597	–	–	–	7 747	–	841 304
853 831	647 502	–	–	–	7 747	–	–
823 803	445 269	–	–	–	218 348	–	–
48 988 606	27 717 241	22 434 482	0	0	0	0	0
1 088 137	55 882 390	22 000 000	0	0	0	0	23 520
5 055 670	26 599 970	23 500 000	0	0	0	0	398 300
57 627	15 068	–	–	–	20 000	–	–
57 086	1 162 730	–	–	–	30 000	–	50 000
57 299	1 578 950	–	–	–	45 000	–	–
–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–
940 820 [7]	–	–	–	–	–	–	–
357 119	1 658 731	0	0	38 604	15 627	–	–
333 740	1 691 163	–	–	–	39 828	–	–
322 003	2 168 440	–	–	–	99 680	–	–
2 343 866	–	–	–	–	–	–	–
2 408 402	–	–	–	–	–	–	–
1 095 334	9 142 523	0	0	–	–	0	0
15 440 036	22 074 036	25 000 000	0	0	8 211	5 076 318	0
17 781 746 [7]	12 137 877	25 000 000	0	0	–	–	0
16 026 718 [7]	–	–	–	–	–	–	–
1 582 890	104 336 236	70 289 620	0	0	328 000	0	32 000 000
45 605 199	183 964 842	47 407 407	0	–	350 534	–	33 641 000
65 200 993	168 509 935	52 295 964	0	0	0	0	36 000 000
3 570 618 [7]	–	–	–	–	–	–	–
3 644 804 [7]	–	–	–	–	–	–	–
3 480 835 [7]	–	–	–	–	–	–	–
454 671 [7]	3 133 493	–	–	–	–	–	0
464 118 [7]	5 353 129	–	–	–	0	–	0
443 238 [7]	12 348 241	0	0	0	55 000	0	0
933 636	1 434 576	0	0	0	–	0	0
778 563	1 234 594	0	0	0	0	0	0
608 010	1 149 744	0	0	0	0	0	0

Annex 4 – C. Funding for malaria control, 2021–2023

WHO region Country/area	Year	Contributions reported by donors				
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	United Kingdom[4]	Others
AFRICAN						
Ethiopia	2021	23 980 070	39 926 021	–	–	–
	2022	52 265 866	37 312 198	–	–	–
	2023	36 918 591	36 000 000	–	–	–
Gabon	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Gambia	2021	13 188 897	–	–	–	–
	2022	10 206 535	–	–	–	–
	2023	6 422 247	4 000 000	–	–	–
Ghana	2021	59 936 450	31 053 572	–	242 302	–
	2022	41 446 758	29 020 599	–	38 303	–
	2023	59 988 365	28 000 000	–	–	–
Guinea	2021	39 656 075	16 635 842	–	–	–
	2022	25 611 340	17 619 649	–	–	–
	2023	23 130 273	17 000 000	–	–	–
Guinea-Bissau	2021	2 498 268	–	–	–	–
	2022	5 398 443	–	–	–	–
	2023	21 337 755	–	–	–	–
Kenya	2021	29 924 297	37 153 380	–	128 711	736 622
	2022	16 351 503	34 721 073	–	–	820 740
	2023	29 397 039	33 500 000	–	–	820 740
Liberia	2021	22 693 385	15 526 786	–	–	60 415
	2022	8 927 549	15 546 749	–	–	–
	2023	11 289 264	15 000 000	–	–	–
Madagascar	2021	16 734 951	28 835 459	–	–	19 674
	2022	17 398 886	26 947 699	–	–	–
	2023	58 927 984	26 000 000	–	–	–
Malawi	2021	67 702 459	26 617 347	–	–	–
	2022	45 041 553	24 874 799	–	–	–
	2023	24 360 416	24 000 000	–	–	–
Mali	2021	11 306 501	29 389 987	2 063 727	–	3 327
	2022	26 051 679	25 911 249	–	–	116 524
	2023	33 944 611	25 000 000	–	–	116 524
Mauritania	2021	–	–	–	–	–
	2022	–	–	–	–	1 668
	2023	–23 300	–	–	–	1 668
Mozambique	2021	27 172 462	32 162 628	–	–	10 697
	2022	90 528 475	30 057 049	–	–	23 151
	2023	82 149 887	29 000 000	–	–	23 151
Namibia	2021	–3 472	–	–	–	–
	2022	0	–	–	–	–
	2023	–93 315	–	–	–	–
Niger	2021	46 111 746	21 072 066	1 116 818	–	51 885
	2022	39 419 956	20 728 999	–	–	26 976
	2023	28 889 256	20 000 000	–	–	26 976
Nigeria	2021	130 903 349	82 070 153	43 189 986	5 285 321	–
	2022	156 691 796	75 660 846	29 277 182	68 101	–
	2023	92 191 176	73 000 000	29 277 182	8 054	–
Rwanda	2021	30 389 743	21 626 594	–	–	100 157
	2022	17 775 449	19 692 549	–	–	177 032
	2023	21 516 492	19 000 000	–	–	177 032

Contributions reported by countries							
Government (NMP)	Global Fund	PMI/USAID	World Bank	Other bilaterals	WHO	UNICEF	Other contributions[7]
29 785 527	22 014 812	36 000 000	–	–	–	–	–
2 003 274	37 680 694	35 000 000	–	–	–	–	–
4 033 646	57 657 819	35 000 000	–	–	–	–	–
348 656	0	0	0	44 064	24 141	15 195	–
805 035	59 006	0	0	–	55 748	–	35 000
330 372 [6]	0	0	0	0	59 417	0	–
1 220 567	15 802 151	–	–	–	–	–	–
1 140 661	7 225 542	–	–	–	–	–	–
1 180 614 [7]	–	–	–	–	–	–	–
13 287 206	35 593 618	28 000 000	0	0	300 000	0	0
192 440 957	31 270 091	28 000 000	0	0	300 000	0	0
194 956 838	57 473 415	28 000 000	0	0	300 000	0	0
9 141 810	0	15 000 000	0	0	0	0	–
8 253 196	35 327 716	15 000 000	0	0	185 000	0	8 321 822
7 962 947	35 327 716	15 000 000	27 000	0	45 000	0	–
–	4 499 347	–	–	–	–	–	–
–	4 499 347	–	–	–	–	–	–
–	9 924 495	–	–	–	–	–	–
5 515 995 [6]	–	33 500 000	0	0	0	0	0
11 096 298 [6]	31 121 864	33 500 000	0	0	0	0	0
10 306 859 [6]	46 834 624	31 000 000	–	–	–	–	–
22 025 486 [7]	–	–	–	–	–	–	–
22 483 106 [7]	–	–	–	–	–	–	–
21 471 656 [7]	–	–	–	–	–	–	–
7 761	30 712 141	–	–	–	45 200	–	–
16 169 [6]	–	–	–	–	74 600	199 800	–
11 965 [7]	30 118 000	26 000 000	–	–	100 000	284 422	–
144 229	16 143 765	24 000 000	0	0	0	300 000	0
338 839	8 608 483	23 000 000	0	0	0	300 000	0
100 000	–	23 000 000	0	0	0	–	0
6 905 027	16 113 605	25 000 000	0	0	33 766	1 588 792	0
20 690 609	2 414 325	25 000 000	680 071	0	17 132	158 581	0
1 448 925	16 256 926	19 602 954	0	0	43 270	1 555 813	0
–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–
1 000 000	–	–	–	–	–	–	–
1 631 341	15 473 237	29 000 000	–	1 138 630	–	–	2 525 488
1 524 542	141 882 820	2 795 300	–	1 363 895	70 000	–	1 265 934
1 559 341	–	29 000 000	0	–	0	0	10 645 377
12 592 217	1 160 669	–	–	–	–	–	–
12 944 631	1 276 736	–	–	–	–	–	–
12 768 424 [7]	640 801	–	–	–	–	–	–
39 683 353	28 962 663	18 000 000	0	0	68 000	0	0
43 298 355	33 392 683	3 772 631 289	0	–	133 552	244 839	1 795 695
26 588 412 [7]	9 874 179 534	5 463 497 518	–	–	29 008 108	409 500 000	–
6 766 161 [7]	66 425 495	77 000 000	–	–	–	–	–
6 906 741 [7]	120 468 411	740 000 000	–	–	–	–	–
6 596 026 [7]	114 510 812	50 226 903	–	–	–	–	–
33 879 026	22 490 626	18 000 000	–	–	–	–	–
34 761 531 [7]	–	–	–	–	–	–	–
29 748 620	22 491 628	19 000 000	–	–	–	–	–

Annex 4 – C. Funding for malaria control, 2021–2023

WHO region Country/area	Year	Contributions reported by donors				
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	United Kingdom[4]	Others
AFRICAN						
Sao Tome and Principe	2021	–	0	–	–	14 053
	2022	–	0	–	–	29 021
	2023	–	0	–	–	29 021
Senegal	2021	978 225	28 280 931	–	–	60 780
	2022	–850 975	24 874 799	–	–	207 915
	2023	0	24 000 000	–	–	207 915
Sierra Leone	2021	2 522 805	17 744 898	–	–	–
	2022	–122 995	16 583 199	–	–	–
	2023	0	16 000 000	–	–	–
South Africa	2021	–	–	–	223 840	–
	2022	–	–	–	39 752	–
	2023	–	–	–	–3 675	–
South Sudan[8]	2021	40 376 118	0	–	3 908 389	2 026 118
	2022	10 738 578	0	–	4 136 378	1 823 362
	2023	8 344 225	0	–	2 116 284	1 823 362
Togo	2021	17 500 617	–	–	–	–
	2022	18 359 639	–	–	–	8 455
	2023	24 221 206	12 000 000	–	–	8 455
Uganda	2021	66 167 993	37 707 908	–	319 706	3 327
	2022	85 115 546	35 239 298	–	–	100 461
	2023	115 366 156	34 000 000	–	–	100 461
United Republic of Tanzania	2021	101 946 334	46 580 357	–	–	1 180 533
	2022	97 331 732	45 603 798	–	–	1 178 618
	2023	70 125 667	44 000 000	–	–	1 178 618
Mainland	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Zanzibar	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Zambia	2021	40 055 853	33 271 684	–	–	–
	2022	19 207 385	31 093 499	–	–	–
	2023	28 964 061	30 000 000	–	–	–
Zimbabwe	2021	50 874 463	16 635 842	–	–	–
	2022	37 546 364	15 546 749	–	–	321
	2023	38 383 185	15 000 000	–	–	321
AMERICAS						
Belize	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Bolivia (Plurinational State of)	2021	1 364 052	–	–	–	–
	2022	3 858 370	–	–	–	–
	2023	1 086 549	–	–	–	–
Brazil	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Colombia	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–

Contributions reported by countries

Government (NMP)	Global Fund	PMI/USAID	World Bank	Other bilaterals	WHO	UNICEF	Other contributions[7]
2 166 464	3 282 933	0	0	–	59 812	–	–
159 722	–	–	–	–	–	–	–
1 163 093 [7]	–	–	–	–	–	–	–
81 319 190	16 233 123	22 500 000	0	0	0	0	37 370 100
39 183 254	4 876 402	22 500 000	0	0	0	0	10 428 852
35 807 525	21 951 092	24 000 000	0	0	75 000	0	8 000 000
109 413 [7]	–	14 500 000	–	–	–	–	–
238 013 [6]	6 691 624	15 000 000	–	–	10 762	500 460	–
631 439 [6]	–	16 000 000	–	–	21 000	–	–
24 730 357	5 504 950	0	0	0	0	0	0
20 202 302	5 201 402	0	0	0	0	0	0
18 561 436	1 081 248	–	–	–	–	–	–
2 118 639 [7]	5 044 295	–	–	–	–	–	–
2 162 658 [7]	189 768	–	–	–	–	–	–
2 065 366 [7]	53 272 089	–	–	–	–	–	–
–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–
2 078 063	29 470 279	–	–	643 577	–	–	10 296 776
1 610 721	67 076 251	31 000 000	–	–	–	–	–
1 505 273	69 735 582	31 000 000	–	–	–	–	–
2 169 554	–	31 000 000	–	–	–	–	–
90 128 968	2 569 360	1 180 198	–	–	–	–	6 883
89 873 360 [7]	–	–	–	–	–	–	–
86 707 999 [7]	–	–	–	–	–	–	–
90 072 127	–	–	0	0	0	0	0
89 645 007 [7]	–	–	–	–	–	–	–
86 698 414 [7]	–	–	–	–	–	–	–
56 840	2 569 360	1 180 198	0	0	0	0	6 883
228 354 [6]	678 783	786 325	0	0	0	0	0
9 585	1 515 930	854 696	0	0	0	0	0
16 241 497	29 446 626	30 000 000	–	–	250 000	–	2 888 256
34 551 769	17 804 222	28 000 000	–	–	250 000	–	1 393 654
21 114 563 [7]	42 603 805	30 000 000	–	–	250 000	–	–
1 941 425	42 425 446	11 208 490	–	–	–	–	–
1 814 326	21 732 515	11 208 490	–	–	32 500	–	–
1 042 000	12 249 072	9 499 998	–	–	–	–	55 000
232 501	41 109	0	0	0	0	0	0
344 884	47 095	112 000	0	0	0	0	0
267 590	297 702	–	–	–	–	–	570 185
373 383	1 400 000	–	–	–	–	–	–
237 150	2 519 076	60 000	–	–	–	–	–
492 788 [6]	2 652 370	–	–	–	–	–	–
45 545 217 [6]	–	40 000	–	–	–	–	–
63 313 441 [6]	–	150 000	–	–	–	–	–
93 381 458 [6]	–	70 000	–	–	–	–	–
2 258 407	–	84 662	–	–	–	–	795 345
2 267 234	0	81 000	0	0	0	0	583 702
2 262 821 [7]	–	84 000	–	–	–	–	626 372

Annex 4 – C. Funding for malaria control, 2021–2023

WHO region Country/area	Year	Contributions reported by donors				
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	United Kingdom[4]	Others
AMERICAS						
Costa Rica	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Dominican Republic	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Ecuador	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
El Salvador	2021	−6 673	–	–	–	–
	2022	0	–	–	–	–
	2023	–	–	–	–	–
French Guiana	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Guatemala	2021	1 507 758	–	–	–	–
	2022	3 335 452	–	–	–	–
	2023	0	–	–	–	–
Guyana	2021	1 563 684	–	–	–	–
	2022	904 883	–	–	–	–
	2023	937 173	–	–	–	–
Haiti	2021	8 275 342	–	–	–	–
	2022	18 939 367	–	–	–	–
	2023	7 183 174	–	–	–	–
Honduras	2021	708 238	–	–	–	–
	2022	743 212	–	–	–	–
	2023	2 261 983	–	–	–	–
Mexico	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Nicaragua	2021	1 743 174	–	–	–	–
	2022	6 895 351	–	–	–	–
	2023	3 494 885	–	–	–	–
Panama	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Peru	2021	–	–	–	–	339 174
	2022	–	–	–	–	120 386
	2023	–	–	–	–	120 386
Suriname	2021	1 010 772	–	–	–	–
	2022	1 038 431	–	–	–	–
	2023	1 565 296	–	–	–	–
Venezuela (Bolivarian Republic of)	2021	12 971 678	–	–	–	–
	2022	2 054 850	–	–	–	1 198 964
	2023	8 490 866	–	–	–	1 198 964

Contributions reported by countries

Government (NMP)	Global Fund	PMI/USAID	World Bank	Other bilaterals	WHO	UNICEF	Other contributions[7]
118 010	0	83 093	14 000	0	97 200	0	0
178 885	0	110 006	0	–	5 000	–	–
172 256	0	109 440	0	0	–	0	675 984
1 020 207	0	67 380	10 000	0	25 821	0	621 664
2 916 624	0	26 000	0	0	20 614	0	144 293
1 489 111	0	570	0	0	24 011	0	1 820 970
1 278 768 [7]	–	68 178	55 000	–	45 838	–	–
1 718 434 [6]	–	121 205	–	–	48 171	–	20 000
1 298 563	0	65 000	0	0	59 000	0	–
–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	614 145
–	0	0	0	0	16 340	0	0
–	–	–	–	–	7 275	–	–
–	–	–	–	–	–	–	–
3 807 552	–	–	236 937	–	–	–	236 936
4 111 817	–	62 000	1 209 104	–	103 997	–	–
3 959 684 [7]	–	–	–	–	–	–	1 985 871
9 793 112 [6]	485 999	901 000	–	–	–	–	207 741
5 557 827 [6]	266 582	331 000	–	0	–	0	198 201
194 002	576 767	33 000	–	–	–	–	–
–	3 590 047	144 000	–	–	–	–	–
–	–	248 000	–	–	–	–	–
–	13 186 980	151 952	–	–	–	–	–
602 564	1 438 564	–	–	–	10 000	–	1 903 289
818 555	873 673	110 000	0	–	–	–	–
710 559 [7]	–	63 000	–	–	–	–	3 032 637
8 279 952	0	0	–	0	20 100	0	0
6 531 914	0	0	0	0	0	0	0
7 405 933 [7]	–	31 000	–	–	–	–	–
8 494 416	1 722 062	–	–	–	–	–	1 474 595
8 335 229	3 521 510	–	–	–	–	–	–
9 452 410	1 905 662	0	–	123 248	0	0	558 022
6 916 088	198 000	20 930	0	0	99 636	0	179 472
5 647 618	175 674	27 893	28 750	0	–	0	2 752 783
49 001 450	734 142	0	0	0	0	0	2 872 612
24 100 533	–	35 661	–	–	–	–	–
3 407 506 [6]	–	99 000	–	–	–	–	–
8 237 764 [6]	–	46 000	–	–	–	–	–
1 632 474	849 957	76 565	–	15 000	63 835	–	0
1 525 601	849 957	188 568	–	–	57 105	–	–
148 515 [6]	1 800 155	74 000	–	–	290 700	–	254 000
–	7 475 893	0	0	0	6 000	0	0
–	4 158 168	0	0	0	32 469	0	0
–	–	–	–	–	–	–	–

Annex 4 – C. Funding for malaria control, 2021–2023

WHO region Country/area	Year	Contributions reported by donors				
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	United Kingdom[4]	Others
EASTERN MEDITERRANEAN						
Afghanistan	2021	9 651 853	–	–	–	–
	2022	−627 376	–	–	–	–
	2023	0	–	–	–	–
Djibouti	2021	–	–	559 075	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Iran (Islamic Republic of)	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Pakistan	2021	13 841 615	–	–	–	–
	2022	13 457 397	–	–	–	–
	2023	52 260 848	–	–	–	–
Saudi Arabia	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Somalia	2021	13 991 789	–	–	–	18 499
	2022	26 301 201	–	–	–	15 374
	2023	20 251 679	–	–	–	15 374
Sudan	2021	74 747 549	0	–	–	244 439
	2022	23 396 189	0	–	–	330 454
	2023	17 077 987	0	–	–	330 454
Yemen	2021	–	–	19 358 615	–	–
	2022	–	–	102 256	–	–
	2023	–	–	102 256	–	–
SOUTH-EAST ASIA						
Bangladesh	2021	6 969 769	–	–	–	–
	2022	20 913 909	–	–	–	–
	2023	13 491 826	–	–	–	–
Bhutan	2021	477 856	–	–	–	–
	2022	598 425	–	–	–	–
	2023	296 808	–	–	–	–
Democratic People's Republic of Korea	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
India	2021	27 037 314	–	–	–	–
	2022	2 494 725	–	–	–	–
	2023	32 026 844	–	–	–	–
Indonesia	2021	12 115 320	–	–	–	576 957
	2022	25 220 549	–	–	–	22 036
	2023	21 250 906	–	–	–	22 036
Myanmar	2021	–	11 090 561	–	339 404	281 463
	2022	–	10 364 500	–	2 691 404	59 192
	2023	–	12 000 000	–	–	59 192
Nepal	2021	1 322 145	–	–	–	–
	2022	1 417 021	–	–	–	–
	2023	1 013 823	–	–	–	–
Sri Lanka	2021	0	–	–	–	–
	2022	1 554 548	–	–	–	–
	2023	0	–	–	–	–

Contributions reported by countries

Government (NMP)	Global Fund	PMI/USAID	World Bank	Other bilaterals	WHO	UNICEF	Other contributions[7]
–	12 150 115	–	–	–	46 378	–	–
–	6 880 085	–	–	–	1 044 643	–	–
–	5 304 375	–	–	–	400 832	–	–
1 713 739[6]	1 349 614	–	0	0	153 658	0	–
2 084 704[6]	1 349 614	–	–	–	661 775	–	–
1 899 222[7]	–	–	–	–	–	–	–
1 242 143	0	0	0	0	923 878	0	85 000
1 088 272	0	0	0	0	200 000	0	120 000
1 050 000	0	0	0	0	306 000	0	120 004
57 625 046	13 601 348	0	0	0	–	0	0
22 419 755	13 831 926	0	0	0	5 523 000	–	–
80 044 800[7]	51 755 819	0	0	0	–	–	–
33 271 684	0	0	0	0	0	0	0
27 984 149	0	0	0	0	0	0	0
27 000 000	0	0	0	0	0	0	0
269 725	21 735 290	0	0	0	28 680	0	0
298 549	20 251 086	0	0	0	29 064	0	0
302 453	9 989 488	0	0	0	–	0	0
7 737 798	8 892 637	–	–	–	1 249 098	–	–
6 632 368	67 363 488	–	–	–	2 316 517	–	–
1 877 316	25 563 712	–	–	–	2 709 236	177 000	589 474
–	2 162 232[9]	–	–	–	–	–	–
–	2 080 274[9]	–	–	–	1 703 444	–	–
–	3 529 061[9]	–	–	–	–	–	–
2 737 328[7]	22 847	0	944 146	0	78 781	0	0
1 282 680	5 761 497	0	0	0	450 000	0	0
557 891	13 498 323	0	0	0	–	0	0
145 726	397 061	–	–	–	–	–	94 108
146 333	252 337	0	0	0	0	0	98 637
132 792	215 329	0	0	0	28 622	0	–
2 516 448	513 556	–	–	–	–	–	–
2 361 033	19 822	–	–	–	–	–	–
–	–	–	–	–	–	–	–
70 085 011[7]	35 570 992	–	–	–	–	–	–
71 541 156[7]	37 020 933	–	–	–	–	–	–
26 291 051[6]	18 320 863	–	–	–	–	–	–
18 954 018[7]	14 063 928	–	–	–	100 000	41 228	–
19 347 822[7]	21 137 669	–	–	–	90 778	108 653	142 991
6 885 681[6]	19 335 077	–	–	–	80 962	217 000	–
14 804 408[7]	19 518 115	–	–	–	50 000	–	–
15 111 997[7]	41 296 701	–	–	–	50 000	–	–
981 663[6]	36 336 152	–	–	–	50 000	–	–
4 948 022	1 079 644	0	0	0	40 000	0	0
3 337 838	1 294 219	–	–	–	40 000	–	–
3 116 637	842 531	–	–	–	170 693	–	–
–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–

Annex 4 – C. Funding for malaria control, 2021–2023

WHO region Country/area	Year	Contributions reported by donors				
		Global Fund[1]	PMI/USAID[2]	World Bank[3]	United Kingdom[4]	Others
SOUTH-EAST ASIA						
Thailand	2021	–	–	–	–	2 736
	2022	–	–	–	–	520
	2023	–	–	–	–	520
Timor-Leste	2021	1 156 371	0	–	–	1 796
	2022	1 428 367	0	–	–	341
	2023	1 198 120	0	–	–	341
WESTERN PACIFIC						
Cambodia	2021	–	11 090 561	–	–	1 413 343
	2022	–	10 364 500	–	–	479 362
	2023	–	8 000 000	–	–	479 362
China	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Lao People's Democratic Republic	2021	–	–	–	–	–
	2022	–	–	–	–	12 275
	2023	–	–	–	–	12 275
Malaysia	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Papua New Guinea	2021	15 519 503	–	–	–	1 539 534
	2022	14 327 708	–	–	–	523 420
	2023	12 113 774	–	–	–	523 420
Philippines	2021	1 923 386	–	–	–	435 851
	2022	3 284 658	–	–	–	–
	2023	3 314 885	–	–	–	–
Republic of Korea	2021	–	–	–	–	–
	2022	–	–	–	–	–
	2023	–	–	–	–	–
Solomon Islands	2021	2 250 170	–	–	–	131 462
	2022	3 293 101	–	–	–	20 889
	2023	604 461	–	–	–	20 889
Vanuatu	2021	–	–	–	–	127 731
	2022	–	–	–	–	20 889
	2023	–	–	–	–	20 889
Viet Nam	2021	–	–	–	–	–
	2022	–	–	–	–	194 211
	2023	–	–	–	–	194 211

Global Fund: Global Fund to Fight AIDS, Tuberculosis and Malaria; NGO: nongovernmental organization; NMP: national malaria programme; PMI: United States President's Malaria Initiative; UNICEF: United Nations Children's Fund; United Kingdom: United Kingdom of Great Britain and Northern Ireland government; USAID: United States Agency for International Development; WHO: World Health Organization.

"–" refers to not applicable or data not available.

[1] Source: Global Fund.

[2] Source: www.foreignassistance.gov.

[3] Source: Organisation for Economic Co-operation and Development creditor reporting system database.

[4] Source: Final UK aid spend.

[5] Other contributions as reported by countries: NGOs, foundations, etc.

[6] Budget, not expenditure.

Contributions reported by countries

Government (NMP)	Global Fund	PMI/USAID	World Bank	Other bilaterals	WHO	UNICEF	Other contributions[7]
4 065 823	8 379 275	1 156 640	–	–	15 362	–	347 033
3 394 503	4 344 253	1 386 500	–	–	127 865	–	103 048
4 553 606	8 472 914	864 025	–	–	67 292	–	53 216
285 430 [6]	–	–	–	–	40 000	–	10 414
462 085 [6]	0	0	0	0	119 300	0	4 056
617 917 [6]	–	0	0	0	200 000	0	7 527
2 565 148	11 561 139	3 942 850	–	520 000	246 523	–	0
2 150 795	13 706 674	4 032 596	–	0	392 621	–	0
1 066 195	12 663 420	2 485 110	0	0	163 727	0	0
–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–
1 825 393	3 718 049	859 788	0	0	711 542	0	1 278 402
701 557	5 890 875	870 860	0	0	915 902	0	2 346 764
288 081	5 004 166	719 000	–	–	213 245	–	1 924 694
54 089 603	0	0	0	0	0	0	0
49 901 055	0	0	0	0	0	0	0
48 817 003	–	–	–	–	–	–	–
78 188	11 996 849	–	–	–	45 000	–	–
115 046	14 146 533	–	–	–	45 000	–	9 695 115
79 543	13 033 875	–	–	–	45 000	–	–
4 871 227	3 918 641	–	–	–	–	–	–
4 727 167	2 560 992	–	–	–	–	–	–
10 150 177	2 284 351	–	–	–	–	–	–
943 495	0	0	0	0	0	0	0
878 279	–	–	–	–	–	–	–
808 931	–	–	–	–	–	–	–
307 153	1 227 347	–	–	13 600	14 025	–	–
407 421 [7]	1 259 059	0	0	–	–	–	–
359 016 [6]	1 138 838	0	0	0	0	0	0
19 298 [6]	329 022	0	0	0	–	0	–
11 962	468 501	0	0	0	28 890	0	0
7 999	980 384	0	0	0	42 000	0	18 000
1 710 180	2 418 471	–	–	–	–	–	755 652
334 338	13 435 794	–	–	–	0	–	70 434
337 141	5 423 469	0	0	0	50 000	0	20 000

Data as of 4 November 2024

[7] WHO NMP funding estimates.

[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 Sudanese high transmission areas (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] Annual disbursements to Yemen from the malaria component of the Global Fund Middle East Response Initiative are included in 2021–2023.

Note: Negative disbursements reflect recovery of funds on behalf of the financing organization.

Note: All contributions reported by donors are displayed in constant 2023 US dollars.

Annex 4 – D. Commodities distribution and coverage for malaria endemic countries, 2021–2023

WHO region Country/area	Year	No. of ITNs delivered	Modelled percentage of population with access to an ITN	No. of people protected by IRS	No. of RDTs distributed	Any first-line treatment courses delivered (including ACT)	No. of malaria cases treated with any first-line treatment courses (including ACT)	ACT treatment courses delivered	No. of malaria cases treated with ACT
AFRICAN									
Angola	2021	875 247	11.42	620 815	6 481 900	4 215 061	7 793 251	4 215 061	7 793 251
	2022	7 373 106	30.96	863 135	18 119 755	4 250 515[$]	7 858 802	4 250 515[†]	7 858 802
	2023	–	26.95	–	1 467 278	1 316 833	1 316 833	1 316 833	1 316 833
Benin	2021	662 290	66.03	927 007	2 298 798	2 985 960	2 985 960	2 985 960	2 985 960
	2022	778 924	30.25	–	3 060 466	3 395 018	3 395 018	3 060 466	3 060 466
	2023	8 542 592	63.15	–	3 469 211	2 360 667	1 907 605	1 907 605[#]	1 907 605
Botswana	2021	–	–	24 620	–	6 102[$]	519	6 102[†]	519
	2022	–	–	–	–	1 011[$]	86	1 011[†]	86
	2023	–	–	115 923	–	–	–	–	–
Burkina Faso	2021	1 353 233	53.00	591 249	9 794 711	8 892 174	11 030 942	8 892 174	11 030 942
	2022	15 685 633[‡]	84.31	–	16 410 865	9 104 729	10 693 078	9 104 729	10 693 078
	2023	525 333[‡]	83.84	–	12 164 230	9 604 009	9 886 094	9 604 009	9 886 094
Burundi	2021	802 309	44.95	914 778	9 563 340	11 404 672	5 953 811	5 693 645	5 693 645
	2022	7 432 731	65.96	1 075 211	12 793 380	13 327 115	7 077 860	12 559 933	6 768 576
	2023	884 289**	66.89	1 088 258	8 947 140	3 697 747	3 612 436	3 308 419	3 488 013
Cameroon	2021	1 030 131[‡]	61.09	–	2 027 275	1 816 440	1 439 118	1 816 440	1 359 417
	2022	11 796 503	67.87	–	3 107 869	4 432 753	2 430 345	3 880 857	1 878 449
	2023	2 998 988	72.81	–	2 928 814	4 066 464	2 315 998	3 949 184	2 240 309
Central African Republic	2021	121 607	77.21	–	2 736 457	3 753 972	2 223 562	3 753 972	2 223 562
	2022	1 534 570[‡]	75.63	–	2 771 175	2 460 689	2 460 689	2 460 689	2 460 689
	2023	3 156 206[‡]	87.98	–	2 467 178	3 449 396	3 449 396	3 449 396	3 449 396
Chad	2021	731 254	55.47	613 037	1 788 058	1 012 958	1 012 958	1 012 958	1 012 958
	2022	450 442	23.30	1 104 986	2 073 184	1 243 864	1 243 864	1 243 864	1 243 864
	2023	10 593 986[‡]	60.37	749 291	2 716 597	–	–	–	–
Comoros	2021	30 891	80.59	127 487	31 467	10 547	10 547	10 547	10 547
	2022	14 660	63.96	–	120 595	11 100	11 100	11 100	11 100
	2023	91 099	50.60	8 140	45 890	–	–	–	–
Congo	2021	36 873	71.53	–	197 080	187 940	187 940	187 940	187 940
	2022	3 465 585	86.86	–	319 053	282 026	349 345	282 026	349 345
	2023	687 878	92.16	–	453 401	389 920	389 920	467 977	467 977
Côte d'Ivoire	2021	21 736 998	66.86	–	7 338 750	7 073 535	6 422 581	7 073 535	6 234 917
	2022	3 755 051	61.73	228 432	7 868 431	7 769 130	8 079 217	7 769 130	6 671 931
	2023	4 075 288	50.15	–	7 811 948	6 367 590	7 184 401	6 367 590	6 917 363
Democratic Republic of the Congo	2021	22 579 391	68.47	–	26 740 915	19 260 604	18 535 664	19 260 604	18 535 664
	2022	35 545 472	75.76	–	34 941 153	24 059 399	23 153 840	24 059 399	23 153 840
	2023	45 768 542	84.65	–	36 124 215	26 230 824	25 243 535	26 230 824	25 243 535
Equatorial Guinea	2021	–	34.39	–	–	–	–	–	–
	2022	–	29.25	152 472	–	40 476	7 496	33 075	33 075
	2023	59 717	29.01	120 894	114 713	155 562	–	155 562	–
Eritrea	2021	69 347	53.18	444 318	437 525	89 680	42 056	89 680	42 056
	2022	101 173	45.80	503 111	275 147	139 825[$]	65 572	139 825[†]	65 572
	2023	138 288	41.68	577 953	596 300	198 270	92 980	199 320	92 980
Eswatini	2021	–	–	67 346	52 400	484	484	474	474
	2022	8 267	–	26 540	51 725	367	367	367	367
	2023	210	–	43 318	72 000	641	641	641	641
Ethiopia	2021	7 897 450	19.73	6 690 048	7 004 725	7 090 882	1 144 562	5 725 330	1 126 731
	2022	8 595 938[‡]	20.35	–	7 685 700	4 870 125	2 634 520	4 870 125[†]	2 634 520
	2023	19 799 526	28.52	3 315 640	6 748 275	7 022 670	3 798 951	6 403 619	3 464 072
Gabon	2021	–	13.50	–	38 093	255 700	–	103 866	103 866
	2022	14 130	13.73	–	37 481	85 741[$]	85 741	85 741[#]	85 741
	2023	–	13.02	–	49 014	102 520	102 520	102 520	102 520
Gambia	2021	262 065	53.13	423 511	773 375	151 189	72 247	151 045	72 247
	2022	1 719 337	85.28	172 010	488 650	97 592	110 988	97 592	110 988
	2023	191 769	89.99	344 935	455 573	120 700	118 584	120 700	118 584

WHO region Country/area	Year	No. of ITNs delivered	Modelled percentage of population with access to an ITN	No. of people protected by IRS	No. of RDTs distributed	Any first-line treatment courses delivered (including ACT)	No. of malaria cases treated with any first-line treatment courses (including ACT)	ACT treatment courses delivered	No. of malaria cases treated with ACT
AFRICAN									
Ghana	2021	17 845 229	75.64	2 128 109	10 663 060	5 948 832	5 728 505	5 948 832	5 728 505
	2022	3 340 175	78.46	2 232 692	10 483 525	4 898 867	5 142 790	4 898 867	5 142 790
	2023	3 306 810	67.63	2 393 545	8 148 330	7 713 760	5 470 051	7 713 760	5 470 051
Guinea	2021	945 879	50.03	–	3 803 960	2 446 547	2 358 447	2 446 547	2 358 447
	2022	9 498 167	73.24	–	4 161 365	2 118 957	2 118 957	2 118 957	2 118 957
	2023	909 319	75.78	–	5 000 500	11 364 446	4 016 785	11 364 446	4 016 785
Guinea-Bissau	2021	72 748	20.04	–	–	176 172	176 172	176 172	176 172
	2022	75 578	29.95	–	350 222	156 057	156 057	156 057	156 057
	2023	1 417 279	33.30	–	297 303	111 659	111 659	98 693	98 693
Kenya	2021	17 912 956	60.71	2 083 177	5 930 410	4 428 207	3 618 614	4 169 317	3 618 614
	2022	1 724 157	59.75	1 614 938	8 128 865	6 404 240	5 005 921	5 363 280	4 078 547
	2023	2 699 483	48.65	1 502 836	5 990 085	6 086 525	5 005 921	6 086 525	5 005 921
Liberia	2021	3 026 693	58.19	–	2 158 290	785 485	835 087	785 485	785 485
	2022	245 464	60.40	–	794 026	555 691[$]	593 895	555 691[#]	555 691
	2023	3 200 000	57.22	–	678 329	–	–	–	–
Madagascar	2021	13 569 611	54.48	885 814	4 345 213	1 918 587	1 947 787	1 918 587	1 921 755
	2022	2 308 865	72.20	990 154	4 224 253	1 612 781	1 612 781	1 612 781	1 612 781
	2023	593 425	56.95	932 715	6 021 735	2 689 480	2 689 480	2 689 480	2 689 480
Malawi	2021	9 134 777	59.16	2 407 351	13 075 023	8 433 158	6 723 831	8 433 158	6 723 831
	2022	1 206 639	62.40	2 363 146	10 711 306	5 438 760	4 257 729	5 438 760	4 257 729
	2023	2 872 414	47.09	–	13 715 298	–	–	–	–
Mali	2021	3 113 190	72.51	233 663	3 267 184	1 924 709	3 153 865	1 924 709	2 126 004
	2022	1 457 284	60.02	273 864	5 386 462	5 386 462	5 386 462	2 446 785	2 446 785
	2023	12 333 973	73.00	–	5 181 450	3 938 480	3 938 480	2 908 108	2 908 108
Mauritania	2021	10 029	44.50	–	–	439 943	–	20 760	–
	2022	–	10.69	–	–	–	–	–	–
	2023	1 592 095	38.68	–	113 869	19 775	–	9 782	–
Mayotte	2021	–	–	–	–	–	–	–	–
	2022	–	–	–	–	–	–	–	–
	2023	–	–	–	–	38	38	38	38
Mozambique	2021	1 606 570	63.97	6 484 733	24 986 825	18 756 461	9 979 416	18 756 461	9 979 416
	2022	6 978 504	49.90	5 683 813	27 978 200	17 178 580	12 281 121	17 178 580	12 281 121
	2023	12 929 990	61.35	7 123 505	33 056 800	21 506 297	21 506 297	21 506 297	21 506 297
Namibia	2021	–	–	288 039	263 202	13 738	13 738	13 738	13 738
	2022	–	–	833 498	362 797	11 849	11 849	11 849	11 849
	2023	2 095	–	54 710	334 205	13 732	13 732	13 732	13 732
Niger	2021	5 356 900	73.16	–	5 624 653	5 064 124	3 349 226	5 064 124	3 349 226
	2022	11 041 701[‡]	84.82	–	6 010 843	4 075 610	4 478 917	4 075 610	4 478 917
	2023	–	86.83	–	4 561 428	3 882 524	3 930 358	3 882 524	3 930 358
Nigeria	2021	19 366 570	46.71	–	40 314 426	40 314 426	22 634 148	40 314 426	22 634 148
	2022	43 876 340	52.08	–	19 102 990	19 110 886	23 704 759	19 110 886	23 704 759
	2023	23 977 306[‡]	55.59	–	29 665 403	40 049 797	25 283 482	40 049 797	24 810 663
Rwanda	2021	585 928	67.64	5 170 303	2 300 270	1 087 155	1 059 628	1 087 155	1 059 628
	2022	5 087 493	69.08	5 231 805	2 057 026	790 539	822 300	790 539	822 300
	2023	2 652 505	69.94	5 326 004	1 710 235	558 220	548 518	558 220	558 220
Sao Tome and Principe	2021	8 143	–	27 174	156 757	2 515	2 515	2 515	2 515
	2022	130 258	–	–	224 319	3 979	3 979	3 979	3 979
	2023	7 702	–	–	226 022	2 278[^]	2 278	2 278[#]	2 278
Senegal	2021	1 342 541	48.21	803 093	4 736 075	1 177 667	536 850	1 177 667	520 738
	2022	7 673 253	65.34	570 283	4 258 375	759 738	335 939	759 738	335 939
	2023	267 703	63.60	–	4 075 050	156 172	156 172	156 172	156 172
Sierra Leone	2021	452 249	71.23	629 659	2 947 058	6 706 736[$]	3 394 004	6 706 736[†]	3 394 004
	2022	1 964 404	56.24	652 232	5 085 629	3 530 769	3 205 820	1 711 129	3 205 820
	2023	5 365 289	79.98	753 214	3 679 345	2 183 438	2 183 438	2 183 438	2 183 438

Annex 4 – D. Commodities distribution and coverage for malaria endemic countries, 2021–2023

WHO region Country/area	Year	No. of ITNs delivered	Modelled percentage of population with access to an ITN	No. of people protected by IRS	No. of RDTs distributed	Any first-line treatment courses delivered (including ACT)	No. of malaria cases treated with any first-line treatment courses (including ACT)	ACT treatment courses delivered	No. of malaria cases treated with ACT
AFRICAN									
South Africa	2021	–	–	1 704 233	385 700	16 853[$]	5 889	16 853	5 889
	2022	–	–	1 621 439	392 200	28 632[$]	7 280	28 632	7 176
	2023	–	–	1 338 147	655 150	27 970[$]	9 907	27 970	9 907
South Sudan[1]	2021	1 685 771	67.69	263 856	92 482	2 736 840	1 618 709	1 634 805	1 618 709
	2022	1 083 679	53.58	–	148 887	2 090 105	2 090 105	401 196	401 196
	2023	6 304 044	74.45	–	1 169 306	4 595 251	4 595 251	663 179	663 179
Togo	2021	453 410	54.95	–	2 332 983	1 772 609	1 772 609	1 772 609	1 772 609
	2022	513 230	56.99	–	2 911 059	2 143 050	2 143 050	2 143 050	2 143 050
	2023	6 638 973[‡]	85.67	–	3 245 720	2 252 079	2 252 079	2 266 996	2 266 996
Uganda	2021	1 410 031	74.70	4 466 905	31 081 269	31 746 773	13 522 685	31 746 773	14 772 475
	2022	2 571 399	55.09	6 876 371	39 905 700	31 783 140	17 895 617	31 783 140	17 895 617
	2023	30 542 014	77.77	6 043 526	35 313 900	29 151 090	14 581 251	29 151 090	14 581 251
United Republic of Tanzania[2]	2021	8 264 964	65.11	2 869 266	28 277 414	11 665 860	5 874 588	11 665 860	5 868 238
	2022	10 189 596	59.27	1 144 624	18 461 070	7 485 114	4 616 655	7 456 200	4 612 098
	2023	11 899 511[‡]	57.51	288 926	23 335 415	4 495 416	3 218 740	4 496 021	3 219 345
Mainland	2021	7 513 065	–	2 655 998	27 850 825	11 665 860	5 868 238	11 665 860	5 868 238
	2022	10 072 101	–	914 608	17 989 050	7 456 200	4 612 098	7 456 200	4 612 098
	2023	11 767 322[‡]	–	–	22 803 250	4 477 680	3 201 004	4 477 680	3 201 004
Zanzibar	2021	751 899	–	213 268	426 589	–	6 350	–	–
	2022	117 495	–	230 016	472 020	28 914	4 557	–	–
	2023	384 344	–	288 926	532 165	17 736	17 736	18 341	18 341
Zambia	2021	821 850	52.17	10 744 047	37 006 526	19 431 927	7 159 243	19 431 927	7 159 243
	2022	916 872	29.66	–	41 192 375	20 919 990	5 899 632	20 919 990	5 899 632
	2023	14 273 122	69.98	8 800 546	12 967 600	27 759 360	7 828 398	27 759 360	7 828 398
Zimbabwe	2021	1 227 112	44.84	3 113 471	2 289 531	133 926	–	133 926	–
	2022	3 068 781[‡]	55.64	3 048 913	1 761 655	138 899	137 260	138 899	137 260
	2023	918 911	56.88	2 694 692	1 178 340	587 722	–	240 818	–
AMERICAS									
Bolivia (Plurinational State of)	2021	23 500	–	–	–	9 959	9 959	9 959	9 959
	2022	129 000	–	179 128	15 288	10 362	10 320	622	646
	2023	–	–	–	–	10 298	10 298	10 298	10 298
Brazil	2021	144 250	–	202 715	154 050	148 240	137 289	86 390[#]	34 952
	2022	38 144	–	246 745	253 100	131 253[^]	131 253	106 460	43 072
	2023	67 782	–	215 334	12 254	142 817	142 817	49 393	49 393
Colombia	2021	208 296	–	245 984	95 867	73 974	36 531	36 531	36 531
	2022	–	–	–	125 000	78 295	78 295	62 321	62 321
	2023	–	–	–	60 659	–	–	–	–
Costa Rica	2021	3 300	–	27 756	–	504[^]	504	12[#]	12
	2022	–	–	16 557	–	444	444	13	13
	2023	8 432	–	15 635	7 905	1 916	627	24	6
Dominican Republic	2021	28 500	–	107 375	26 839	291	291	3	3
	2022	22 471	–	20 201	28 243	992	337	57	7
	2023	71 098	–	55 594	261 000	1 032	269	60	18
Ecuador	2021	43 159	–	1 435 556	54 450	5 380	2 450	1 493	499
	2022	26 126	–	168 165	92 801	6 950	–	1 483	–
	2023	41 739	–	28 365	85 293	4 335	757	1 118	46
French Guiana	2021	–	–	–	–	–	–	–	–
	2022	–	–	–	–	–	–	–	–
	2023	–	–	–	–	–	–	–	–
Guatemala	2021	381 291	–	12 401	161 675	1 265	1 265	–	–
	2022	180 156	–	–	73 000	1 831	1 831	32	32
	2023	32 250	–	–	34 547	3 053	3 053	0	0

WHO region Country/area	Year	No. of ITNs delivered	Modelled percentage of population with access to an ITN	No. of people protected by IRS	No. of RDTs distributed	Any first-line treatment courses delivered (including ACT)	No. of malaria cases treated with any first-line treatment courses (including ACT)	ACT treatment courses delivered	No. of malaria cases treated with ACT
AMERICAS									
Guyana	2021	95 058	–	–	26 622	36 844	36 844	14 010	14 010
	2022	–	–	–	42 025	38 076	21 738	11 847	8 015
	2023	–	–	–	106 100	58 116	28 715	14 838	11 260
Haiti	2021	19 159	–	–	180 751	9 513	9 513	–	–
	2022	23 275	–	–	206 960	12 396	12 396	–	–
	2023	689 718	–	–	157 340	13 624	13 624	–	–
Honduras	2021	18 863	–	124 554	14 605	1 657	–	12	0
	2022	70 165	–	101 386	46 758	4 719	3 580	14	0
	2023	20 475	–	29 320	60 175	3 174*	2 408	9[†]	30
Mexico	2021	17 673	–	142 618	4 500	275	275	0	0
	2022	4 447	–	29 018	4 600	245	245	0	0
	2023	10 638	–	31 527	7 100	710	710	104	104
Nicaragua	2021	61 766	–	237 663	–	23 323[^]	23 323	1 521	1 521
	2022	188 294	–	309 674	–	16 108	16 108	1 231	1 231
	2023	144 588	–	484 465	–	6 769[^]	6 769	102[#]	102
Panama	2021	–	–	20 719	40 000	3 539	3 539	0	0
	2022	–	–	6 297	38 500	12 386	6 064	83	83
	2023	23 928	–	–	59 100	54 642	11 664	204	19
Peru	2021	20 267	–	–	–	18 140	18 140	3 595[#]	3 595
	2022	–	–	–	–	360 373	26 652	4 170[#]	4 170
	2023	–	–	76 760	–	–	–	–	–
Suriname	2021	10 059	–	–	14 625	76[^]	76	8[#]	8
	2022	17 877	–	–	5 175	61[^]	61	7[#]	7
	2023	5 480	–	–	10 794	101[^]	101	8[#]	8
Venezuela (Bolivarian Republic of)	2021	36 362	–	–	257 626	194 057	194 057	32 582	32 582
	2022	251 337	–	–	270 082	151 458	151 458	22 059	22 059
	2023	425 401	–	–	419 338	130 077	130 077	23 416	23 416
EASTERN MEDITERRANEAN									
Afghanistan	2021	195 273	–	–	468 330	11 681[$]	84 873	11 681	82 141
	2022	2 131 863	–	–	377 150	9 517[$]	124 429	9 517	120 424
	2023	576 330	–	38 568	421 020	7 849	–	7 849	–
Djibouti	2021	19 984	21.03	116 961	100 000	76 380	56 081	76 380	56 081
	2022	247 839	30.05	67 077	163 843	53 163[$]	39 034	53 163[†]	39 034
	2023	54 000	24.87	63 664	173 687	–	–	–	–
Iran (Islamic Republic of)	2021	8 135	–	47 762	25 025	2 856	999	2 856	151
	2022	4 514	–	117 347	39 223	24 648	5 677	24 648	1 335
	2023	5 907	–	152 440	162 500	10 002	10 002	3 997	3 997
Pakistan	2021	147 880	–	307 272	3 721 655	422 798	365 626	123 617	87 825
	2022	6 217 715	–	–	4 377 545	1 037 376	355 888	500 926	85 486
	2023	2 019 054[‡]	–	–	13 075 375	2 141 055	734 522	1 634 958	279 015
Somalia	2021	79 895	21.01	80 622	647 500	180 840	–	180 840	–
	2022	2 794 142	28.62	–	311 658	–	–	–	11 550
	2023	447 808	28.48	–	507 700	11 901	–	11 901	–
Sudan	2021	791 079	63.96	3 870 477	4 490 200	6 923 194	3 993 620	6 923 194	3 993 620
	2022	18 758 082	75.21	23 307	2 759 325	6 419 778	3 819 140	6 419 778	3 819 140
	2023	10 000	77.50	–	7 850 900	5 270 168	–	5 270 168	–
Yemen	2021	1 769 759	–	1 499 738	–	–	–	–	–
	2022	900 955	–	1 529 755	859 825	294 729	169 373	294 729	–
	2023	1 700 733	–	–	150 000	58 170[$]	–	58 170[$]	–

Annex 4 – D. Commodities distribution and coverage for malaria endemic countries, 2021–2023

WHO region Country/area	Year	No. of ITNs delivered	Modelled percentage of population with access to an ITN	No. of people protected by IRS	No. of RDTs distributed	Any first-line treatment courses delivered (including ACT)	No. of malaria cases treated with any first-line treatment courses (including ACT)	ACT treatment courses delivered	No. of malaria cases treated with ACT
SOUTH-EAST ASIA									
Bangladesh	2021	961 156	–	–	823 336	7 294	7 294	5 340	5 340
	2022	741 258	–	–	1 678 200	12 360	12 360	12 042	12 042
	2023	1 375 518	–	–	2 147 000	16 665	16 665	8 807	8 807
Bhutan	2021	13 294	–	120 166	28 345	656	23	0	5
	2022	12 702	–	118 341	1 064	–	0	–	0
	2023	95 919	–	51 430	2 146	336	10	336	10
Democratic People's Republic of Korea	2021	–	–	–	–	2 357	2 357	–	–
	2022	–	–	–	374 627	2 136	2 136	–	–
	2023	–	–	–	0	–	–	–	–
India	2021	16 197 740	–	16 159 858	–	335 062	161 753	335 062	101 566
	2022	1 259 541	–	11 565 430	5 486 970	501 339	176 522	429 665	101 070
	2023	1 123 125	–	8 446 529	20 868 262	218 484	218 484	10 244	10 244
Indonesia	2021	50 350	–	131 818	2 894 125	3 583 329	299 148	3 583 329	299 148
	2022	2 564 666	–	161 335	2 153 150	3 619 541	412 783	3 619 541	412 783
	2023	78 950	–	161 107	1 017 750	14 605 122	377 662	697 058	377 662
Myanmar	2021	315 874	–	1 618	–	33 157[$]	15 127	33 157[†]	15 127
	2022	553 019	–	21 566	1 815 650	26 416	30 573	26 416	30 573
	2023	837 377	–	21 122	3 651 400	67 463	42 188	67 463	42 188
Nepal	2021	134 085	–	43 500	325 075	15 647	391	9 539	92
	2022	122 581	–	415 160	287 974	24 630	512	11 580	119
	2023	103 274	–	489 746	227 050	8 790	665	3 900	150
Thailand	2021	130 873	–	159 097	144 925	361 459	3 254	4 505	86
	2022	50 000	–	169 676	125 750	25 146	10 140	5 646	321
	2023	532 941	–	261 496	421 725	6 410	16 250	2 810	585
WESTERN PACIFIC									
Cambodia	2021	603 528	–	–	851 240	100 483	4 270	100 483	4 270
	2022	324 372	–	–	988 755	66 720	4 106	66 720	4 106
	2023	228 123	–	–	1 392 210	21 534	1 384	21 534	1 384
Lao People's Democratic Republic	2021	46 353	–	5 606	749 710	16 252	3 852	16 252	3 870
	2022	1 045 215	–	0	398 970	5 948	2 152	5 948	2 323
	2023	238 155	–	1 179	776 534	695	695	695	695
Papua New Guinea	2021	1 626 031	–	–	3 398 965	1 368 984	164 757	1 488 984	164 757
	2022	1 057 089	–	–	3 567 954	1 578 510	899 510	1 578 510	899 510
	2023	1 338 532	–	–	3 332 262	7 158 010	7 158 010	–	–
Philippines	2021	205 704	–	497 569	262 895	3 999	3 999	3 735	3 735
	2022	392 126	–	545 352	241 880	3 150	3 150	3 150	3 150
	2023	239 736	–	648 095	143 346	14 618	6 029	14 618	6 146
Republic of Korea	2021	–	–	–	–	294	294	–	–
	2022	–	–	–	–	420	420	–	–
	2023	–	–	–	–	747	747	–	–

WHO region Country/area	Year	No. of ITNs delivered	Modelled percentage of population with access to an ITN	No. of people protected by IRS	No. of RDTs distributed	Any first-line treatment courses delivered (including ACT)	No. of malaria cases treated with any first-line treatment courses (including ACT)	ACT treatment courses delivered	No. of malaria cases treated with ACT
WESTERN PACIFIC									
Solomon Islands	2021	182 926	–	–	93 613	328 587[$]	118 643	328 587[†]	118 643
	2022	–	–	–	125 316	336 932[$]	121 656	336 932[†]	121 656
	2023	46 507	–	50 369	195 294	–	–	–	–
Vanuatu	2021	37 090	–	–	2 164	42 501	304	42 501	304
	2022	62 359	–	–	76 562	1 141	1 141	1 141	1 141
	2023	52 907	–	–	27 646	2 227[^]	2 227	2 227[#]	2 227
Viet Nam	2021	1 486 700	–	262 297	389 745	9 569	467	193	209
	2022	151 093	–	304 446	372 093	14 208	455	271	271
	2023	217 600	–	94 357	287 330	448	448	124	124

Data as of 14 October 2024

ACT: artemisinin-based combination therapy; IRS: indoor residual spraying; ITN: insecticide-treated mosquito net; RDT: rapid diagnostic test; WHO: World Health Organization.

"–" refers to data not available.

[1] In May 2013, South Sudan was reassigned to the WHO African Region (WHA resolution 66.21, https://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R21-en.pdf).

[2] Where national data for the United Republic of Tanzania are unavailable, refer to Mainland and Zanzibar.

[$] ACT treatment courses delivered are used to replace missing data for any first-line treatment courses delivered (including ACT).

[†] ACT treatment courses delivered are calculated.

[#] The number of malaria cases treated with ACT has been used as a proxy for ACT treatment courses delivered, or the country reports the number of patients treated rather than the number of treatment courses delivered.

[‡] Data reported to the Alliance for Malaria Prevention were used where data reported to WHO were missing or incomplete.

** ITN distribution data from last year were used.

[^] The number of malaria cases treated with any first-line treatment courses (including ACT) has been used as a proxy for any first-line treatment courses delivered (including ACT), or the country reports the number of patients treated rather than the number of treatment courses delivered.

* Any first-line courses delivered (including ACT) are calculated.

Annex 4 – E. Household survey results, 2017–2023, a. Compiled through STATcompiler for the WHO African Region

WHO region Country	Survey	% 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 the past 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								
Benin	2017–2018 DHS	91.5	60.5	8.7	92.0	63.8	77.2	71.1
Burkina Faso	2021 DHS	82.8	41.4	–	–	–	64.1	61.3
Cameroon	2022 MIS	72.3	48.5	–	–	–	64.2	53.6
Côte d'Ivoire	2021 DHS	72.1	51.2	–	–	–	65.0	51.8
Gambia	2019–2020 DHS	77.3	36.3	–	–	–	60.8	37.8
Ghana	2022 DHS	66.7	47.4	6.7	69.0	51.4	61.1	39.7
Guinea	2021 MIS	63.3	22.0	–	–	–	41.9	33.4
Kenya	2022 DHS	54.2	37.1	–	–	–	49.6	42.7
Liberia	2022 MIS	72.3	32.8	–	–	–	52.4	43.9
Madagascar	2021 DHS	69.1	30.1	–	–	–	48.4	48.8
Mali	2021 MIS	90.9	44.0	–	–	–	72.2	67.7
Mauritania	2019–2021 DHS	32.2	8.0	–	–	–	19.5	10.9
Mozambique	2022–2023 DHS	56.5	32.0	–	–	–	44.8	38.6
Niger	2021 MIS	96.0	58.1	–	–	–	80.2	78.2
Nigeria	2021 MIS	56.0	25.4	–	–	–	43.1	36.4
Rwanda	2019–2020 DHS	66.4	34.3	–	–	–	50.8	47.7
Senegal	2020–2021 MIS	75.3	33.8	3.3	76.3	36.1	57.8	46.4
Sierra Leone	2019 DHS	67.9	25.0	–	–	–	46.8	50.6
Uganda	2018–2019 MIS	83.0	53.9	10.1	84.2	58.7	71.5	59.2
United Republic of Tanzania	2022 DHS	67.4	35.0	–	–	–	53.4	53.4
Zambia	2018 DHS	78.3	40.9	35.3	83.3	60.4	59.9	46.4

ACT: artemisinin-based combination therapy; DHS: demographic and health survey; IPTp: intermittent preventive treatment of malaria in pregnancy; IRS: indoor residual spraying; ITN: insecticide-treated mosquito net; MIS: malaria indicator survey; RDT: rapid diagnostic test; WHO: World Health Organization.

"–" refers to not applicable or data not available.

Sources: Nationally representative household survey data from DHSs and MISs, compiled through STATcompiler (https://www.statcompiler.com/).

% of ITNs	% of pregnant women		% of children aged <5 years				% of children aged <5 years with fever in the past 2 weeks			
that were used last night	who slept under an ITN	who took 3+ doses of IPTp	who slept under an ITN	with moderate or severe anaemia	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
73.4	79.3	13.7	76.3	43.8	36.3	39.1	53.1	17.7	17.5	37.0
90.7	71.0	56.8	67.4	42.8	28.0	14.0	74.9	65.0	–	26.9
63.3	62.8	45.8	57.5	32.6	26.2	–	55.6	26.5	–	19.3
58.4	64.2	34.6	58.5	42.0	37.3	26.0	59.1	38.4	–	38.6
55.0	44.2	52.2	44.0	20.7	0.4	–	64.2	27.3	3.5	46.7
49.0	47.7	60.2	49.0	21.1	16.5	8.6	57.1	40.0	–	35.0
72.0	39.4	50.3	38.2	45.5	33.7	17.4	61.1	28.0	31.4	11.9
71.4	44.9	12.5	51.2	–	–	–	69.5	33.4	–	84.0
65.4	52.6	62.6	50.3	23.9	17.7	10.2	60.4	44.8	–	50.1
77.3	54.9	31.0	55.6	20.2	7.5	–	44.6	19.9	15.3	54.7
90.6	75.9	34.4	73.4	48.7	19.4	–	60.0	23.3	31.2	14.8
42.0	11.7	10.2	11.9	54.9	1.1	–	31.4	5.8	15.3	19.0
72.3	46.5	25.3	42.5	44.4	32.3	–	63.6	51.2	–	18.5
81.1	90.1	25.0	85.7	49.2	28.9	–	67.0	31.9	39.2	77.0
75.1	49.6	31.0	41.2	43.1	39.6	22.3	62.8	24.3	20.3	73.9
78.0	56.1	–	55.6	15.2	2.7	0.9	62.3	40.7	8.1	92.4
81.4	52.5	37.7	46.5	67.3	–	–	63.0	21.7	2.7	1.7
89.5	63.8	35.7	59.1	37.9	–	–	75.4	61.3	55.9	31.9
74.3	65.4	41.0	60.3	25.0	18.2	9.8	87.0	50.7	62.5	87.7
81.7	58.4	31.7	58.9	33.4	7.9	–	77.6	50.4	–	31.4
64.2	48.9	58.7	51.6	29.5	–	–	77.2	63.0	34.9	96.9

Data as of 9 October 2024

Annex 4 – E. Household survey results, 2017–2023, b. Compiled through WHO calculations for the WHO African Region

WHO region Country	Survey	Fever prevalence	Health sector where treatment was sought							Diagnostic testing coverage in each health sector	
		Overall	Public excluding community health workers	Community health workers	Formal medical private excluding pharmacies	Pharmacies or accredited drug stores	Informal private	No treatment seeking	Trained provider	Public excluding community health workers	Community health workers
AFRICAN											
Benin	2017 DHS	20 (18, 21)	22 (20, 24)	0 (0, 0)	9 (8, 11)	9 (8, 11)	14 (12, 16)	46 (43, 49)	40 (37, 43)	52 (47, 57)	–
Burkina Faso	2021 DHS	22 (21, 24)	71 (68, 73)	0 (0, 0)	2 (1, 3)	0 (0, 0)	3 (2, 4)	24 (22, 27)	73 (71, 75)	85 (83, 87)	–
Cameroon	2022 MIS	31 (29, 34)	21 (18, 25)	0 (0, 0)	20 (16, 24)	7 (5, 10)	11 (9, 13)	44 (38, 49)	46 (41, 52)	66 (57, 74)	–
Côte d'Ivoire	2021 DHS	17 (16, 19)	43 (39, 46)	1 (0, 2)	4 (3, 5)	10 (8, 13)	11 (9, 13)	35 (31, 38)	56 (52, 60)	71 (67, 76)	36 (15, 65)
Gabon	2019 DHS	23 (21, 25)	31 (26, 36)	0 (0, 0)	6 (4, 8)	38 (33, 44)	4 (3, 7)	24 (20, 27)	72 (69, 76)	29 (22, 39)	–
Gambia	2019 DHS	15 (14, 17)	45 (41, 49)	0 (0, 1)	7 (5, 10)	13 (10, 16)	1 (0, 2)	35 (31, 39)	64 (60, 68)	42 (37, 48)	–
Ghana	2022 DHS	15 (14, 16)	41 (38, 45)	1 (0, 2)	13 (10, 16)	0 (0, 0)	9 (7, 12)	37 (33, 40)	55 (51, 59)	85 (81, 89)	–
Guinea	2021 MIS	23 (21, 25)	43 (37, 48)	4 (3, 6)	6 (4, 10)	5 (3, 7)	7 (5, 10)	38 (33, 43)	56 (51, 61)	54 (48, 60)	42 (26, 61)
Kenya	2022 DHS	17 (16, 18)	41 (38, 43)	0 (0, 1)	17 (15, 19)	12 (11, 14)	1 (1, 2)	30 (28, 33)	69 (66, 71)	50 (46, 53)	–
Liberia	2022 MIS	37 (34, 40)	26 (21, 31)	3 (2, 5)	16 (13, 20)	12 (9, 15)	8 (5, 12)	36 (32, 41)	56 (51, 61)	81 (75, 87)	57 (29, 81)
Madagascar	2021 DHS	12 (11, 13)	35 (32, 38)	0 (0, 0)	8 (6, 10)	1 (0, 1)	2 (2, 3)	55 (51, 58)	43 (40, 47)	46 (41, 51)	–
Malawi	2017 MIS	40 (38, 43)	38 (34, 43)	3 (2, 5)	6 (4, 8)	2 (1, 4)	7 (5, 10)	46 (41, 51)	48 (43, 52)	76 (70, 82)	73 (37, 93)
Mali	2021 MIS	27 (25, 30)	36 (32, 39)	5 (3, 8)	7 (5, 9)	5 (4, 7)	13 (11, 16)	35 (32, 38)	52 (49, 56)	54 (50, 59)	25 (15, 38)
Mauritania	2020 DHS	17 (16, 18)	25 (22, 28)	0 (0, 1)	2 (1, 3)	4 (3, 5)	2 (1, 2)	68 (65, 71)	31 (28, 34)	11 (8, 15)	–
Mozambique	2022 DHS	10 (9, 11)	60 (56, 64)	2 (1, 4)	3 (2, 4)	1 (0, 2)	1 (0, 3)	34 (30, 38)	65 (61, 69)	77 (74, 81)	63 (30, 87)
Niger	2021 MIS	36 (33, 38)	53 (49, 58)	1 (1, 2)	1 (0, 1)	1 (1, 2)	11 (8, 15)	33 (28, 38)	56 (52, 61)	59 (53, 64)	13 (3, 46)
Nigeria	2021 MIS	37 (35, 38)	26 (24, 28)	3 (2, 4)	6 (5, 7)	13 (12, 15)	16 (14, 19)	36 (33, 39)	48 (45, 51)	54 (49, 58)	28 (19, 39)
Rwanda	2019 DHS	19 (18, 20)	44 (41, 46)	11 (9, 13)	5 (3, 6)	5 (4, 6)	1 (1, 2)	37 (34, 40)	62 (59, 65)	64 (59, 68)	68 (61, 75)
Senegal	2023 DHS	22 (20, 23)	33 (30, 37)	0 (0, 1)	3 (2, 4)	0 (0, 0)	9 (7, 11)	56 (52, 59)	36 (32, 39)	34 (29, 39)	–
Sierra Leone	2019 DHS	17 (16, 18)	66 (62, 69)	1 (1, 3)	2 (1, 3)	6 (5, 8)	1 (1, 2)	25 (22, 27)	74 (71, 77)	78 (74, 82)	31 (13, 58)
Togo	2017 MIS	24 (22, 27)	26 (22, 31)	5 (4, 8)	7 (5, 9)	3 (2, 5)	16 (12, 21)	43 (37, 49)	42 (37, 47)	78 (71, 84)	76 (60, 87)
Uganda	2018 MIS	27 (24, 30)	33 (29, 37)	7 (5, 9)	38 (34, 41)	12 (10, 15)	1 (1, 1)	13 (11, 15)	86 (84, 88)	84 (79, 88)	77 (68, 83)
United Republic of Tanzania	2022 DHS	11 (10, 12)	49 (45, 53)	0 (0, 0)	11 (8, 15)	12 (9, 15)	9 (7, 12)	22 (18, 26)	70 (65, 75)	69 (63, 74)	–
Zambia	2018 DHS	16 (15, 17)	69 (66, 72)	3 (2, 5)	4 (3, 6)	0 (0, 1)	1 (0, 2)	23 (20, 26)	76 (73, 79)	78 (73, 82)	83 (64, 93)

"–" refers to not applicable or data not available.

Notes:
The analysis is presented as point estimate (95% confidence interval).
Figures with fewer than 30 children in the denominator were removed.

Diagnostic testing coverage in each health sector				Antimalarial treatment coverage in each health sector							ACT use among antimalarial treatment in each health sector		
Formal medical private excluding pharmacies	**Pharmacies or accredited drug stores**	**Informal private**	**Trained provider**	**Public excluding community health workers**	**Community health workers**	**Formal medical private excluding pharmacies**	**Pharmacies or accredited drug stores**	**Self-treatment**	**No treatment seeking**	**Trained provider**	**Public**	**Private**	**Informal private**
30 (23, 38)	9 (6, 14)	8 (5, 12)	37 (33, 40)	38 (34, 44)	–	34 (27, 41)	23 (17, 30)	12 (9, 17)	7 (5, 9)	34 (30, 37)	44 (36, 52)	31 (24, 39)	40 (26, 55)
56 (33, 77)	–	19 (12, 30)	84 (82, 86)	76 (73, 78)	–	50 (34, 67)	–	20 (11, 33)	11 (8, 14)	75 (72, 77)	49 (45, 53)	63 (46, 78)	46 (18, 77)
51 (41, 61)	15 (9, 24)	11 (7, 18)	51 (44, 57)	65 (57, 73)	–	61 (53, 69)	37 (26, 49)	46 (36, 56)	29 (23, 36)	58 (52, 64)	67 (56, 77)	70 (62, 77)	59 (43, 74)
69 (52, 82)	16 (8, 27)	14 (8, 25)	60 (56, 65)	51 (46, 56)	59 (25, 86)	70 (48, 85)	18 (11, 27)	14 (8, 24)	7 (5, 11)	46 (42, 51)	39 (32, 47)	44 (30, 59)	21 (4, 62)
24 (8, 53)	5 (3, 10)	3 (1, 14)	17 (12, 22)	42 (34, 51)	–	35 (14, 64)	30 (24, 36)	15 (3, 48)	12 (7, 20)	35 (30, 40)	60 (46, 73)	50 (37, 62)	–
54 (33, 73)	27 (19, 36)	5 (0, 47)	40 (35, 45)	5 (3, 8)	–	5 (1, 18)	6 (3, 14)	0 (0, 0)	1 (0, 4)	5 (3, 7)	71 (51, 85)	42 (13, 77)	–
29 (21, 39)	–	8 (5, 14)	72 (67, 76)	68 (62, 74)	–	57 (45, 69)	–	53 (38, 68)	15 (11, 20)	66 (60, 71)	78 (72, 84)	78 (67, 86)	76 (51, 90)
35 (21, 52)	7 (2, 19)	7 (3, 18)	47 (42, 53)	55 (48, 61)	70 (49, 85)	26 (15, 42)	23 (12, 40)	24 (14, 38)	9 (6, 13)	50 (44, 56)	53 (46, 60)	53 (36, 70)	29 (11, 57)
53 (47, 59)	15 (11, 19)	10 (4, 22)	44 (41, 47)	29 (26, 32)	–	30 (25, 35)	21 (17, 26)	17 (7, 36)	5 (4, 7)	28 (25, 30)	89 (85, 92)	76 (67, 83)	–
55 (44, 66)	19 (11, 31)	6 (2, 13)	60 (54, 66)	77 (71, 83)	84 (60, 95)	79 (70, 86)	66 (54, 76)	55 (38, 70)	47 (39, 54)	75 (71, 79)	88 (80, 93)	80 (73, 86)	89 (73, 96)
26 (17, 37)	8 (0, 71)	4 (1, 11)	42 (38, 46)	32 (27, 37)	–	13 (7, 22)	8 (0, 71)	10 (7, 14)	6 (4, 9)	28 (24, 32)	55 (46, 63)	57 (25, 84)	–
76 (61, 86)	10 (2, 38)	4 (1, 14)	73 (67, 78)	55 (48, 62)	72 (46, 89)	55 (39, 69)	22 (4, 64)	21 (9, 41)	7 (5, 11)	54 (48, 61)	98 (94, 99)	97 (81, 99)	100 (100, 100)
26 (18, 35)	7 (3, 14)	2 (1, 4)	43 (39, 47)	60 (55, 64)	61 (51, 69)	56 (46, 66)	21 (14, 32)	8 (5, 12)	5 (4, 7)	55 (51, 59)	29 (24, 34)	38 (29, 48)	51 (30, 71)
25 (11, 49)	16 (7, 34)	2 (0, 14)	13 (10, 17)	48 (42, 54)	–	60 (22, 89)	51 (35, 66)	44 (18, 74)	2 (2, 4)	49 (43, 55)	21 (15, 29)	15 (6, 35)	–
18 (6, 43)	11 (1, 67)	–	74 (70, 77)	35 (29, 40)	78 (50, 93)	3 (0, 24)	9 (1, 61)	–	3 (1, 6)	35 (30, 40)	85 (79, 90)	–	–
58 (21, 87)	7 (2, 25)	1 (0, 2)	56 (51, 62)	61 (55, 67)	62 (38, 82)	64 (24, 91)	35 (18, 55)	26 (17, 37)	9 (6, 12)	61 (55, 66)	80 (74, 84)	68 (48, 82)	66 (43, 83)
40 (33, 47)	14 (9, 21)	8 (6, 11)	39 (35, 43)	65 (59, 70)	56 (40, 71)	62 (53, 70)	57 (49, 65)	28 (23, 34)	10 (8, 12)	61 (57, 66)	73 (66, 79)	75 (69, 80)	76 (66, 83)
67 (54, 78)	31 (21, 42)	19 (4, 56)	62 (58, 66)	9 (6, 12)	40 (32, 49)	10 (5, 20)	7 (3, 16)	0 (0, 0)	1 (0, 2)	13 (11, 17)	92 (84, 97)	91 (30, 100)	–
33 (18, 54)	–	9 (5, 15)	33 (29, 38)	13 (10, 17)	–	3 (1, 12)	–	2 (0, 13)	2 (1, 3)	12 (10, 16)	19 (10, 33)	–	–
78 (50, 93)	23 (13, 36)	18 (6, 44)	73 (69, 76)	73 (68, 77)	71 (39, 91)	81 (59, 92)	57 (44, 69)	46 (17, 77)	23 (18, 30)	72 (67, 76)	31 (27, 36)	33 (23, 45)	16 (1, 80)
45 (31, 60)	5 (1, 25)	4 (2, 11)	66 (60, 72)	70 (60, 79)	83 (69, 91)	54 (37, 70)	32 (14, 57)	10 (5, 17)	7 (4, 10)	66 (59, 73)	82 (74, 88)	56 (38, 73)	47 (18, 78)
48 (43, 53)	20 (15, 28)	34 (15, 60)	58 (54, 62)	72 (66, 76)	90 (84, 93)	72 (67, 77)	54 (42, 66)	62 (34, 84)	30 (23, 37)	70 (66, 74)	89 (84, 93)	87 (82, 91)	76 (17, 98)
81 (70, 89)	31 (20, 45)	24 (15, 36)	65 (59, 70)	42 (36, 48)	–	41 (27, 56)	33 (21, 48)	44 (33, 55)	12 (8, 18)	40 (35, 45)	96 (92, 98)	92 (85, 96)	97 (78, 100)
79 (65, 89)	–	5 (0, 39)	78 (73, 82)	42 (37, 47)	86 (72, 93)	54 (41, 67)	–	27 (5, 70)	10 (7, 13)	44 (40, 49)	97 (95, 98)	94 (76, 99)	–

Data as of 9 October 2024

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

Sources: Nationally representative household survey data from DHSs and MISs, compiled through WHO calculations.

Annex 4 – F. Population denominator for case incidence and mortality rate, and estimated malaria cases and deaths, 2000–2023

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AFRICAN								
Algeria[1,2,3]	2000	1 815 294	–	34	–	–	2	–
	2005	1 944 837	–	1	–	–	0	–
	2010	2 125 696	–	1	–	–	1	–
	2015	2 350 747	–	0	–	–	0	–
	2020	2 587 032	–	0	–	–	0	–
	2021	2 629 266	–	0	–	–	0	–
	2022	2 671 341	–	0	–	–	0	–
	2023	2 711 686	–	0	–	–	0	–
Angola	2000	16 194 868	3 436 000	5 281 275	7 669 000	20 200	22 365	25 000
	2005	19 291 160	4 604 000	6 072 049	7 807 000	18 100	20 668	23 800
	2010	23 294 825	2 960 000	3 992 908	5 262 000	9 970	12 185	15 000
	2015	28 157 798	3 854 000	4 958 976	6 277 000	9 120	12 090	16 500
	2020	33 451 132	4 929 000	8 188 826	12 890 000	11 600	17 198	27 000
	2021	34 532 429	5 215 000	8 586 519	13 280 000	13 100	20 493	33 900
	2022	35 635 029	4 960 000	8 452 563	13 320 000	13 000	20 286	33 700
	2023	36 749 906	4 855 000	8 251 449	13 010 000	11 200	16 169	25 300
Benin	2000	7 221 619	2 204 000	2 978 792	3 910 000	6 060	6 403	6 770
	2005	8 426 143	3 478 000	4 233 604	5 126 000	12 600	13 391	14 300
	2010	9 797 484	3 244 000	4 059 622	5 020 000	8 660	9 282	9 970
	2015	11 360 681	3 488 000	4 462 888	5 656 000	9 230	10 069	11 000
	2020	13 070 169	3 799 000	4 943 904	6 351 000	8 700	10 320	12 300
	2021	13 413 417	3 717 000	5 083 406	6 848 000	8 590	11 115	14 300
	2022	13 759 500	3 565 000	5 199 849	7 351 000	8 230	10 942	14 500
	2023	14 111 034	3 224 000	5 127 891	7 722 000	7 840	9 928	12 700
Botswana[2]	2000	1 112 071	13 000	19 146	32 000	–	36	–
	2005	1 219 801	840	1 466	2 800	–	11	–
	2010	1 347 911	1 300	2 229	3 900	–	8	–
	2015	1 460 725	350	455	610	–	5	–
	2020	1 568 540	1 200	1 778	2 900	–	11	–
	2021	1 592 107	820	1 073	1 500	–	5	–
	2022	1 617 599	420	551	760	–	6	–
	2023	1 644 352	590	778	1 100	–	4	–
Burkina Faso	2000	11 925 545	5 672 000	7 121 621	8 835 000	41 900	44 696	47 600
	2005	13 932 123	5 819 000	7 363 398	9 204 000	30 900	33 283	35 800
	2010	16 176 498	7 399 000	9 194 223	11 260 000	34 500	37 944	41 700
	2015	18 777 487	6 210 000	7 848 131	9 775 000	18 100	21 478	25 500
	2020	21 478 689	5 375 000	8 122 685	11 720 000	12 900	18 937	28 600
	2021	21 995 243	5 527 000	8 326 915	12 050 000	12 400	16 733	23 500
	2022	22 509 038	5 348 000	8 019 213	11 590 000	11 800	16 436	23 800
	2023	23 025 776	5 382 000	8 139 355	11 700 000	11 300	16 146	24 000
Burundi	2000	6 470 193	1 849 000	2 697 194	3 770 000	10 900	11 803	12 800
	2005	7 587 299	1 618 000	2 165 548	2 824 000	6 480	6 993	7 580
	2010	9 376 444	1 131 000	1 592 543	2 171 000	4 400	4 701	5 050
	2015	11 047 580	1 553 000	2 196 843	3 017 000	4 830	5 437	6 240
	2020	12 617 036	2 607 000	3 890 955	5 571 000	5 440	7 289	10 500
	2021	12 965 481	2 359 000	3 848 232	5 982 000	5 370	7 226	10 600
	2022	13 321 097	1 948 000	3 564 978	6 022 000	5 320	7 146	10 500
	2023	13 689 449	1 627 000	3 354 726	6 270 000	5 100	6 302	8 350
Cabo Verde[1,2,3]	2000	117 862	–	144	–	–	0	–
	2005	126 130	–	68	–	–	2	–
	2010	132 543	–	47	–	–	1	–
	2015	133 222	–	7	–	–	0	–
	2020	133 816	–	0	–	–	0	–
	2021	134 328	–	0	–	–	0	–
	2022	135 132	–	0	–	–	0	–
	2023	135 805	–	0	–	–	0	–

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AFRICAN								
Cameroon	2000	14 912 631	4 473 000	5 852 175	7 545 000	16 900	17 946	19 100
	2005	17 074 594	5 842 000	7 409 917	9 228 000	19 200	20 550	22 000
	2010	19 668 066	4 481 000	5 809 649	7 396 000	11 600	12 439	13 300
	2015	22 763 414	4 447 000	6 224 449	8 462 000	11 300	12 214	13 200
	2020	26 210 558	5 091 000	6 653 806	8 556 000	11 300	13 523	16 500
	2021	26 915 758	5 503 000	7 061 846	8 973 000	10 700	12 961	16 100
	2022	27 632 771	5 601 000	7 266 387	9 312 000	10 400	12 779	16 200
	2023	28 372 687	5 284 000	7 343 057	10 010 000	9 710	11 602	14 300
Central African Republic	2000	3 833 416	1 178 000	1 649 775	2 233 000	3 730	4 050	4 440
	2005	4 288 810	1 448 000	1 934 490	2 538 000	6 420	7 050	7 730
	2010	4 492 995	1 265 000	1 804 734	2 499 000	5 020	5 592	6 220
	2015	4 629 320	1 057 000	1 636 030	2 431 000	3 790	4 335	4 960
	2020	5 026 628	1 013 000	1 572 324	2 342 000	3 340	4 053	4 930
	2021	5 112 100	1 018 000	1 591 901	2 398 000	4 120	5 107	6 380
	2022	5 098 039	957 000	1 561 896	2 402 000	4 010	5 101	6 530
	2023	5 152 420	963 000	1 574 284	2 417 000	3 900	5 052	6 560
Chad	2000	8 418 885	1 470 000	2 280 614	3 374 000	9 280	9 872	10 500
	2005	10 214 998	1 479 000	2 450 828	3 872 000	9 860	10 532	11 300
	2010	12 177 752	2 353 000	2 981 132	3 728 000	12 200	13 325	14 500
	2015	14 487 229	1 832 000	3 106 067	4 828 000	11 300	12 898	14 600
	2020	17 036 068	2 140 000	3 550 585	5 511 000	10 800	14 082	18 600
	2021	17 633 053	2 247 000	3 650 155	5 592 000	10 700	13 801	18 200
	2022	18 253 229	2 316 000	3 826 101	5 911 000	10 500	13 796	18 700
	2023	19 107 520	2 356 000	3 946 418	6 198 000	10 400	13 707	18 900
Comoros[1]	2000	536 079	24 000	35 580	48 000	30	89	180
	2005	592 677	24 000	35 616	48 000	–	92	–
	2010	654 836	–	36 538	–	43	92	140
	2015	726 682	–	1 884	–	2	4	7
	2020	802 163	–	4 546	–	5	11	17
	2021	818 174	–	10 537	–	12	26	41
	2022	834 188	–	20 675	–	24	52	81
	2023	850 387	–	21 049	–	25	53	82
Congo	2000	3 151 345	776 000	1 109 642	1 541 000	2 030	2 160	2 300
	2005	3 696 393	770 000	1 138 135	1 631 000	2 080	2 204	2 340
	2010	4 462 290	636 000	963 481	1 411 000	1 760	1 854	1 950
	2015	5 097 580	701 000	1 061 130	1 550 000	1 810	2 018	2 290
	2020	5 752 790	953 000	1 347 457	1 850 000	1 940	2 238	2 790
	2021	5 892 183	907 000	1 324 656	1 876 000	1 930	2 219	2 770
	2022	6 035 104	845 000	1 297 445	1 916 000	1 950	2 236	2 820
	2023	6 182 885	842 000	1 327 964	1 999 000	1 970	2 244	2 810
Côte d’Ivoire	2000	17 699 004	6 973 000	8 669 288	10 690 000	28 200	30 028	32 100
	2005	20 068 457	7 654 000	9 610 842	11 870 000	27 600	29 484	31 600
	2010	22 488 064	8 430 000	10 295 755	12 480 000	29 900	32 193	34 600
	2015	25 246 342	4 054 000	6 101 705	8 815 000	8 950	9 667	10 500
	2020	28 915 449	5 752 000	8 047 540	10 990 000	10 000	11 551	13 300
	2021	29 639 736	6 103 000	8 126 271	10 570 000	9 670	11 248	13 100
	2022	30 395 002	5 972 000	8 098 618	10 700 000	9 440	11 144	13 300
	2023	31 165 654	5 301 000	7 835 921	11 240 000	9 200	10 771	12 700
Democratic Republic of the Congo	2000	50 507 441	18 540 000	23 198 802	28 650 000	85 300	93 208	102 000
	2005	58 775 724	22 130 000	27 581 968	34 040 000	102 000	112 534	124 000
	2010	68 563 037	21 140 000	26 169 279	31 880 000	72 300	85 123	99 700
	2015	81 035 531	18 650 000	24 367 802	31 290 000	46 600	60 443	77 700
	2020	95 989 998	24 120 000	32 048 791	41 610 000	50 100	75 025	115 000
	2021	99 148 932	24 830 000	32 658 597	42 530 000	45 600	70 300	111 000
	2022	102 396 968	24 370 000	32 494 208	42 600 000	44 300	70 024	114 000
	2023	105 789 731	24 830 000	33 140 568	43 540 000	43 200	67 464	110 000

Annex 4 – F. Population denominator for case incidence and mortality rate, and estimated malaria cases and deaths, 2000–2023

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AFRICAN								
Equatorial Guinea	2000	703 279	159 000	236 826	338 000	460	485	520
	2005	947 367	246 000	340 609	461 000	570	614	670
	2010	1 189 085	240 000	340 929	474 000	550	602	670
	2015	1 453 923	324 000	485 981	701 000	660	781	940
	2020	1 716 468	266 000	416 315	626 000	650	790	1 030
	2021	1 758 786	265 000	417 371	627 000	660	795	1 050
	2022	1 803 545	263 000	423 878	662 000	660	800	1 070
	2023	1 847 549	253 000	422 756	658 000	640	757	970
Eritrea[4]	2000	2 247 031	14 000	42 691	88 000	24	98	240
	2005	2 661 214	16 000	27 680	42 000	23	59	120
	2010	2 945 186	53 000	83 471	118 000	64	161	290
	2015	3 105 546	41 000	64 020	89 000	51	128	240
	2020	3 291 270	103 000	158 889	221 000	140	372	690
	2021	3 350 183	60 000	92 938	129 000	84	211	390
	2022	3 409 447	90 000	139 422	193 000	120	316	580
	2023	3 470 389	141 000	219 981	306 000	190	459	840
Eswatini[1,2]	2000	291 595	340	788	1 400	–	83	–
	2005	302 126	–	279	–	–	17	–
	2010	311 262	–	268	–	–	8	–
	2015	319 987	–	318	–	–	5	–
	2020	333 964	–	233	–	–	2	–
	2021	337 846	–	505	–	–	5	–
	2022	341 296	–	214	–	–	4	–
	2023	344 541	–	597	–	–	7	–
Ethiopia	2000	45 839 815	5 394 000	8 987 535	14 170 000	8 770	23 008	45 000
	2005	53 289 879	2 824 000	8 003 991	23 440 000	4 490	16 609	52 300
	2010	61 566 189	3 071 000	9 488 499	27 090 000	4 850	18 953	56 900
	2015	70 629 651	3 497 000	9 304 899	16 470 000	4 620	21 355	52 500
	2020	80 864 016	2 347 000	4 227 742	6 343 000	3 420	9 424	18 500
	2021	83 054 240	2 100 000	3 783 896	5 686 000	2 880	8 041	15 800
	2022	85 261 314	2 832 000	5 106 067	7 654 000	3 830	10 570	20 700
	2023	87 510 350	5 298 000	9 559 569	14 290 000	6 800	18 567	35 900
Gabon	2000	1 275 572	279 000	420 619	613 000	340	362	390
	2005	1 463 495	141 000	214 915	315 000	240	256	270
	2010	1 719 879	228 000	400 246	663 000	340	363	400
	2015	2 040 989	243 000	473 905	838 000	350	392	450
	2020	2 322 539	283 000	527 769	907 000	370	427	530
	2021	2 376 722	287 000	535 939	916 000	370	428	520
	2022	2 430 747	293 000	550 748	947 000	370	430	530
	2023	2 484 788	307 000	569 819	975 000	370	433	540
Gambia	2000	1 455 084	333 000	450 671	587 000	440	456	470
	2005	1 667 037	330 000	449 027	579 000	460	470	490
	2010	1 926 629	333 000	448 540	582 000	540	563	590
	2015	2 224 529	345 000	450 479	566 000	630	664	700
	2020	2 515 733	149 000	210 897	302 000	580	610	650
	2021	2 576 009	125 000	160 958	201 000	580	619	660
	2022	2 636 470	196 000	251 831	313 000	590	626	680
	2023	2 697 845	183 000	236 079	295 000	590	632	690
Ghana	2000	19 637 087	6 670 000	8 483 332	10 580 000	19 000	19 744	20 600
	2005	22 449 438	5 432 000	7 174 200	9 284 000	14 300	14 843	15 400
	2010	25 474 994	7 656 000	9 368 088	11 320 000	16 200	16 891	17 600
	2015	28 696 067	6 104 000	7 870 561	9 899 000	12 700	13 260	13 900
	2020	31 887 809	5 365 000	7 199 634	9 534 000	10 700	11 311	12 200
	2021	32 518 665	5 249 000	7 037 833	9 322 000	10 700	11 373	12 300
	2022	33 149 152	5 244 000	7 017 976	9 203 000	10 700	11 463	12 500
	2023	33 787 914	4 728 000	6 551 533	8 786 000	10 800	11 464	12 400

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AFRICAN								
Guinea	2000	8 428 831	2 705 000	3 616 058	4 733 000	13 800	14 603	15 500
	2005	9 245 844	2 101 000	3 143 778	4 511 000	9 240	9 803	10 400
	2010	10 396 086	3 468 000	4 320 306	5 328 000	12 900	13 854	14 900
	2015	11 767 070	3 251 000	4 402 690	5 878 000	11 100	12 092	13 200
	2020	13 371 183	2 698 000	4 416 575	6 876 000	9 240	11 118	13 600
	2021	13 710 513	2 740 000	4 477 687	6 958 000	8 960	10 381	12 300
	2022	14 055 137	2 693 000	4 369 811	6 883 000	8 670	10 283	12 400
	2023	14 405 468	2 716 000	4 433 772	6 793 000	8 420	10 188	12 600
Guinea-Bissau	2000	1 234 740	312 000	505 338	775 000	1 890	2 045	2 230
	2005	1 381 585	57 000	129 551	253 000	780	827	880
	2010	1 566 346	120 000	198 084	309 000	800	874	960
	2015	1 786 456	70 000	161 652	321 000	740	838	960
	2020	2 013 255	82 000	190 077	375 000	760	954	1 260
	2021	2 058 841	92 000	218 592	445 000	820	1 027	1 370
	2022	2 105 529	78 000	233 425	555 000	820	1 024	1 380
	2023	2 153 339	72 000	223 937	549 000	750	885	1 100
Kenya	2000	30 642 890	5 205 000	6 767 570	8 612 000	11 300	11 766	12 200
	2005	35 796 484	3 691 000	5 007 985	6 687 000	9 850	10 157	10 500
	2010	41 598 566	2 035 000	2 767 704	3 680 000	9 440	9 664	9 900
	2015	47 088 526	2 375 000	3 266 324	4 410 000	10 200	10 423	10 700
	2020	52 217 333	2 359 000	3 230 232	4 332 000	10 800	11 384	12 000
	2021	53 219 165	2 149 000	3 389 408	5 092 000	11 100	11 669	12 400
	2022	54 252 460	1 803 000	3 368 731	5 793 000	11 200	11 811	12 600
	2023	55 339 002	1 628 000	3 294 221	5 964 000	11 100	11 478	11 900
Liberia	2000	2 928 116	765 000	1 232 397	1 908 000	5 530	5 890	6 270
	2005	3 301 014	848 000	1 339 253	2 018 000	3 730	3 969	4 230
	2010	4 058 890	1 007 000	1 356 147	1 793 000	2 580	2 750	2 940
	2015	4 659 431	1 195 000	1 562 919	2 025 000	3 120	3 423	3 780
	2020	5 149 463	881 000	1 502 129	2 441 000	3 360	4 628	6 580
	2021	5 259 323	779 000	1 186 549	1 757 000	3 010	3 902	5 330
	2022	5 373 294	736 000	1 017 190	1 376 000	2 940	3 846	5 360
	2023	5 493 031	614 000	1 026 103	1 600 000	2 840	3 541	4 690
Madagascar	2000	16 516 338	88 000	905 987	1 995 000	190	2 239	5 810
	2005	19 159 706	27 000	662 852	1 506 000	62	1 638	4 330
	2010	22 183 340	572 000	987 619	1 589 000	930	2 441	4 910
	2015	25 426 702	1 935 000	2 720 036	3 666 000	2 820	6 724	11 900
	2020	28 953 556	2 665 000	4 016 745	5 503 000	4 210	10 281	18 800
	2021	29 691 083	3 162 000	4 938 471	6 852 000	4 940	12 640	23 600
	2022	30 437 260	2 276 000	3 563 507	4 950 000	3 530	9 121	17 200
	2023	31 195 932	3 973 000	6 239 943	8 662 000	6 200	15 974	29 900
Malawi	2000	11 315 942	4 052 000	5 113 178	6 354 000	18 000	18 912	19 900
	2005	12 840 031	3 783 000	4 764 584	5 941 000	11 200	11 742	12 300
	2010	14 826 463	4 536 000	5 668 712	6 969 000	10 600	11 179	11 900
	2015	17 085 587	3 153 000	4 083 083	5 185 000	6 850	7 341	7 880
	2020	19 533 887	2 581 000	4 273 140	6 688 000	6 290	7 423	9 330
	2021	20 047 258	2 858 000	4 423 441	6 577 000	6 320	7 456	9 400
	2022	20 568 728	3 092 000	4 663 893	6 693 000	6 340	7 525	9 670
	2023	21 104 482	2 979 000	4 810 053	7 481 000	6 350	7 376	9 200
Mali	2000	11 559 290	3 100 000	4 565 653	6 579 000	21 400	22 690	24 000
	2005	13 538 647	3 946 000	5 683 984	8 192 000	19 700	20 957	22 200
	2010	15 945 198	4 268 000	5 957 047	8 204 000	18 600	19 905	21 300
	2015	18 593 022	5 034 000	7 097 168	10 060 000	17 100	18 935	21 000
	2020	21 713 835	5 354 000	7 586 538	10 780 000	12 700	16 288	21 100
	2021	22 388 630	5 463 000	7 744 735	11 010 000	11 900	14 352	17 600
	2022	23 072 640	5 627 000	7 988 199	11 360 000	11 500	14 277	17 900
	2023	23 769 127	5 808 000	8 229 337	11 700 000	11 200	14 203	18 300

Annex 4 – F. Population denominator for case incidence and mortality rate, and estimated malaria cases and deaths, 2000–2023

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AFRICAN								
Mauritania	2000	2 613 441	130 000	247 994	436 000	660	693	730
	2005	2 939 058	77 000	245 895	462 000	600	617	640
	2010	3 390 964	6 900	122 858	277 000	620	642	660
	2015	3 965 958	109 000	291 679	582 000	720	751	780
	2020	4 600 131	67 000	201 771	394 000	130	516	1 230
	2021	4 734 874	68 000	195 224	379 000	130	499	1 160
	2022	4 875 637	99 000	234 004	421 000	180	599	1 300
	2023	5 022 441	77 000	192 584	357 000	140	493	1 130
Mozambique	2000	18 129 652	7 131 000	8 752 862	10 570 000	39 600	42 536	45 700
	2005	20 304 569	7 433 000	9 052 556	10 910 000	26 600	28 667	31 000
	2010	22 999 235	7 118 000	8 771 816	10 670 000	21 800	23 849	26 100
	2015	26 547 572	7 721 000	9 387 475	11 280 000	18 200	21 866	27 000
	2020	30 783 688	7 405 000	9 491 891	11 970 000	13 900	22 295	37 300
	2021	31 707 800	7 398 000	9 611 214	12 410 000	13 400	21 201	35 200
	2022	32 656 246	7 073 000	8 907 999	11 130 000	13 100	21 094	36 000
	2023	33 635 160	7 225 000	9 256 415	11 730 000	12 400	17 875	27 300
Namibia[2]	2000	1 443 551	31 000	77 331	155 000	–	1 985	–
	2005	1 560 974	34 000	65 303	120 000	–	1 325	–
	2010	1 674 662	790	2 590	6 200	–	63	–
	2015	1 884 600	12 000	15 052	18 000	–	32	–
	2020	2 165 954	16 000	20 192	25 000	–	35	–
	2021	2 230 872	17 000	21 322	26 000	–	14	–
	2022	2 293 669	13 000	16 808	21 000	–	28	–
	2023	2 351 956	15 000	19 376	24 000	–	23	–
Niger	2000	11 509 630	2 317 000	4 134 706	6 854 000	21 800	23 204	24 800
	2005	13 756 191	2 688 000	4 271 200	6 443 000	19 700	21 033	22 500
	2010	16 548 834	4 821 000	6 785 885	9 379 000	24 300	26 267	28 500
	2015	19 939 498	5 143 000	8 073 585	12 100 000	29 800	32 906	36 500
	2020	23 717 613	4 583 000	7 845 383	12 750 000	29 600	35 694	43 100
	2021	24 502 140	4 283 000	7 452 978	12 050 000	28 800	34 234	40 900
	2022	25 311 973	4 490 000	7 723 787	12 400 000	28 700	34 802	42 700
	2023	26 159 867	4 603 000	7 982 516	12 960 000	28 500	35 381	44 500
Nigeria	2000	126 382 494	39 480 000	50 779 020	64 300 000	214 000	226 214	239 000
	2005	145 017 253	46 230 000	57 411 916	70 620 000	197 000	209 804	223 000
	2010	166 642 885	49 030 000	60 551 056	73 900 000	184 000	199 233	216 000
	2015	190 671 878	43 300 000	54 115 123	67 110 000	148 000	169 052	195 000
	2020	213 996 181	46 800 000	65 133 759	88 650 000	154 000	200 257	268 000
	2021	218 529 286	47 520 000	65 399 501	89 000 000	146 000	190 761	258 000
	2022	223 150 895	48 080 000	66 721 582	89 900 000	141 000	187 692	261 000
	2023	227 882 945	49 140 000	68 136 453	92 560 000	135 000	184 689	264 000
Rwanda	2000	8 213 930	657 000	1 505 682	2 987 000	5 910	6 177	6 460
	2005	9 054 528	306 000	1 376 695	2 311 000	3 260	3 371	3 480
	2010	10 317 553	749 000	1 079 765	1 422 000	2 920	3 002	3 100
	2015	11 640 022	2 666 000	3 585 563	4 556 000	2 890	2 996	3 120
	2020	13 065 837	2 169 000	2 784 545	3 425 000	3 000	3 186	3 510
	2021	13 355 260	1 236 000	1 585 741	1 956 000	3 050	3 263	3 640
	2022	13 651 030	907 000	1 168 150	1 439 000	3 090	3 311	3 730
	2023	13 954 471	584 000	748 570	923 000	3 130	3 349	3 780
Sao Tome and Principe[1,2]	2000	144 018	–	31 975	–	–	254	–
	2005	161 639	–	18 139	–	–	85	–
	2010	181 802	–	3 146	–	–	14	–
	2015	200 291	–	2 056	–	–	0	–
	2020	217 434	–	1 933	–	–	0	–
	2021	221 961	–	2 719	–	–	1	–
	2022	226 305	–	3 970	–	–	0	–
	2023	230 871	–	2 348	–	–	0	–

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AFRICAN								
Senegal	2000	9 968 260	1 631 000	2 323 458	3 202 000	4 230	4 360	4 500
	2005	11 235 472	441 000	1 489 949	2 683 000	3 410	3 493	3 580
	2010	12 635 412	536 000	763 134	1 012 000	800	1 953	3 520
	2015	14 593 330	677 000	981 634	1 326 000	1 030	2 512	4 580
	2020	16 789 219	562 000	721 819	905 000	810	1 847	3 130
	2021	17 220 866	694 000	941 758	1 225 000	1 010	2 410	4 250
	2022	17 651 103	637 000	1 015 072	1 551 000	1 020	2 598	5 060
	2023	18 077 573	698 000	1 199 388	1 918 000	1 170	3 070	6 220
Sierra Leone	2000	4 423 611	1 297 000	1 998 873	2 944 000	13 000	13 827	14 700
	2005	5 501 712	1 547 000	2 275 559	3 241 000	10 500	11 172	11 900
	2010	6 222 714	2 143 000	2 848 109	3 689 000	13 300	14 295	15 300
	2015	7 037 655	2 170 000	2 720 269	3 372 000	9 600	10 553	11 600
	2020	7 912 558	1 664 000	2 634 547	3 963 000	6 470	9 392	13 100
	2021	8 094 602	1 607 000	2 608 263	3 950 000	6 020	8 464	11 700
	2022	8 276 806	1 520 000	2 577 814	4 089 000	5 740	8 194	11 600
	2023	8 460 512	1 309 000	2 479 839	4 283 000	5 310	6 635	8 360
South Africa[1,2]	2000	4 715 971	13 000	18 202	26 000	–	424	–
	2005	4 949 003	–	7 755	–	–	63	–
	2010	5 234 405	–	8 060	–	–	83	–
	2015	5 672 353	–	4 959	–	–	110	–
	2020	6 056 238	–	4 463	–	–	38	–
	2021	6 150 260	–	2 972	–	–	56	–
	2022	6 237 841	–	2 043	–	–	29	–
	2023	6 321 238	–	5 291	–	–	64	–
South Sudan[5]	2000	6 032 267	1 464 000	2 113 044	2 959 000	10 100	11 590	13 200
	2005	7 590 143	1 717 000	2 371 566	3 190 000	7 170	8 259	9 500
	2010	9 745 953	2 171 000	2 750 116	3 453 000	5 420	6 835	8 540
	2015	11 107 561	2 182 000	2 984 871	3 996 000	4 990	7 388	10 800
	2020	10 698 467	2 048 000	3 080 079	4 457 000	3 990	7 136	13 300
	2021	10 865 780	1 944 000	2 991 440	4 388 000	3 780	6 738	13 000
	2022	11 021 177	1 787 000	2 841 206	4 312 000	3 680	6 700	13 400
	2023	11 483 374	1 871 000	2 907 170	4 332 000	3 640	6 671	13 700
Togo	2000	5 140 036	1 669 000	2 241 464	2 987 000	4 670	4 938	5 240
	2005	5 844 631	2 104 000	2 728 743	3 455 000	6 400	6 824	7 270
	2010	6 732 590	1 552 000	2 096 417	2 782 000	3 790	4 043	4 320
	2015	7 663 195	2 200 000	2 712 520	3 329 000	4 660	5 151	5 700
	2020	8 669 720	1 448 000	2 093 996	2 943 000	3 050	3 577	4 250
	2021	8 878 378	1 508 000	2 121 550	2 912 000	2 990	3 546	4 300
	2022	9 089 738	1 558 000	2 159 312	2 961 000	2 930	3 527	4 350
	2023	9 304 337	1 357 000	2 143 070	3 219 000	2 870	3 456	4 260
Uganda	2000	24 000 150	9 001 000	11 703 496	14 900 000	39 900	42 056	44 300
	2005	27 963 289	9 381 000	12 118 906	15 490 000	29 400	30 951	32 600
	2010	32 390 801	10 580 000	13 241 888	16 340 000	24 400	25 736	27 300
	2015	37 531 445	6 650 000	9 501 063	12 970 000	14 700	15 762	17 000
	2020	44 457 152	8 333 000	12 602 807	19 840 000	14 200	18 514	25 300
	2021	45 910 930	8 018 000	12 053 928	18 880 000	13 900	17 438	23 100
	2022	47 312 719	8 403 000	12 651 126	19 950 000	13 900	17 538	23 600
	2023	48 656 601	8 278 000	12 572 518	19 760 000	13 800	15 945	19 300
United Republic of Tanzania	2000	34 260 138	9 226 000	11 569 622	14 430 000	42 300	44 280	46 400
	2005	39 182 076	7 534 000	9 894 169	12 690 000	26 300	27 472	28 600
	2010	44 758 487	4 785 000	6 518 346	8 648 000	20 700	21 418	22 200
	2015	52 020 962	5 474 000	7 347 340	9 664 000	22 400	23 244	24 200
	2020	60 972 797	5 343 000	7 397 590	10 060 000	23 100	24 568	26 300
	2021	62 830 412	6 141 000	8 271 495	10 840 000	23 600	25 155	27 100
	2022	64 711 821	6 357 000	8 507 374	11 240 000	23 800	25 499	27 700
	2023	66 617 606	6 017 000	8 554 792	11 810 000	24 000	25 540	27 500

Annex 4 – F. Population denominator for case incidence and mortality rate, and estimated malaria cases and deaths, 2000–2023

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AFRICAN								
Zambia	2000	10 017 631	2 866 000	3 613 723	4 497 000	13 900	14 647	15 500
	2005	11 718 819	2 306 000	3 051 504	3 985 000	7 200	7 515	7 840
	2010	13 965 594	1 829 000	2 342 443	2 952 000	6 150	6 353	6 590
	2015	16 399 088	2 812 000	3 590 396	4 498 000	7 610	8 015	8 460
	2020	19 059 395	2 193 000	3 420 287	5 123 000	7 400	8 556	10 300
	2021	19 603 607	2 272 000	3 535 173	5 317 000	7 530	8 734	10 600
	2022	20 152 938	2 309 000	3 608 474	5 403 000	7 560	8 834	10 900
	2023	20 723 965	2 339 000	3 662 799	5 571 000	7 580	8 525	10 100
Zimbabwe	2000	9 364 125	234 000	960 651	2 387 000	470	2 459	7 000
	2005	9 829 791	225 000	1 008 423	2 487 000	470	2 581	7 290
	2010	10 517 306	609 000	1 097 776	1 727 000	1 000	2 810	5 640
	2015	11 338 171	722 000	1 067 121	1 454 000	1 110	2 731	4 980
	2020	12 226 291	691 000	1 152 901	1 651 000	1 100	2 951	5 660
	2021	12 439 149	205 000	342 543	492 000	330	876	1 670
	2022	12 653 208	219 000	365 695	526 000	350	936	1 790
	2023	12 867 204	381 000	635 589	914 000	600	1 627	3 100
AMERICAS								
Argentina[1,2,3]	2000	186 069	–	440	–	–	0	–
	2005	196 083	–	231	–	–	0	–
	2010	206 443	–	54	–	–	0	–
	2015	217 385	–	0	–	–	0	–
	2020	225 959	–	0	–	–	0	–
	2021	226 561	–	0	–	–	0	–
	2022	227 039	–	0	–	–	0	–
	2023	227 692	–	0	–	–	0	–
Belize[1,2,3]	2000	166 151	–	1 486	–	–	0	–
	2005	193 014	–	1 549	–	–	0	–
	2010	220 969	–	150	–	–	0	–
	2015	245 869	–	9	–	–	0	–
	2020	269 659	–	0	–	–	0	–
	2021	272 789	–	0	–	–	0	–
	2022	277 885	–	0	–	–	0	–
	2023	283 662	–	0	–	–	0	–
Bolivia (Plurinational State of)	2000	3 904 431	33 000	45 647	58 000	11	24	41
	2005	4 246 693	21 000	27 296	34 000	5	12	21
	2010	4 619 424	15 000	18 659	23 000	4	10	16
	2015	4 997 041	7 300	9 315	11 000	1	3	6
	2020	5 360 700	13 000	16 506	20 000	2	6	11
	2021	5 415 621	11 000	13 476	17 000	1	4	9
	2022	5 479 042	11 000	13 987	17 000	2	5	10
	2023	5 554 807	11 000	13 940	17 000	3	7	13
Brazil[2]	2000	35 325 711	643 000	760 760	888 000	–	245	–
	2005	37 491 684	624 000	658 276	707 000	–	123	–
	2010	39 321 491	349 000	390 024	422 000	–	76	–
	2015	40 940 132	147 000	164 589	178 000	–	35	–
	2020	42 358 151	150 000	167 113	181 000	–	51	–
	2021	42 538 709	142 000	147 804	158 000	–	58	–
	2022	42 692 202	132 000	137 150	146 000	–	50	–
	2023	42 861 567	146 000	163 461	177 000	–	73	–

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AMERICAS								
Colombia[2,6]	2000	8 654 120	154 000	210 720	269 000	–	124	–
	2005	9 326 934	129 000	166 899	207 000	–	87	–
	2010	9 913 250	125 000	164 564	206 000	–	42	–
	2015	10 398 675	63 000	84 841	109 000	–	18	–
	2020	11 208 975	87 000	113 807	142 000	–	5	–
	2021	11 332 549	79 000	103 472	129 000	–	11	–
	2022	11 454 263	77 000	101 685	127 000	–	16	–
	2023	11 583 379	93 000	122 467	153 000	–	22	–
Costa Rica[1,2]	2000	1 378 208	–	1 879	–	–	0	–
	2005	1 491 434	–	3 541	–	–	0	–
	2010	1 594 586	–	110	–	–	0	–
	2015	1 686 313	–	0	–	–	0	–
	2020	1 762 012	–	90	–	–	0	–
	2021	1 770 995	–	189	–	–	0	–
	2022	1 778 617	–	406	–	–	0	–
	2023	1 786 933	–	543	–	–	0	–
Dominican Republic[1,2]	2000	4 728 343	1 300	1 524	1 800	–	6	–
	2005	5 081 333	4 000	4 950	5 900	–	16	–
	2010	5 409 148	2 600	3 202	3 800	–	15	–
	2015	5 747 712	660	771	890	–	3	–
	2020	6 063 591	860	977	1 100	–	2	–
	2021	6 127 032	–	284	–	–	1	–
	2022	6 186 112	–	320	–	–	0	–
	2023	6 241 487	–	253	–	–	0	–
Ecuador[1,2]	2000	7 190 972	–	104 528	–	–	66	–
	2005	7 846 620	–	17 050	–	–	22	–
	2010	8 543 963	–	1 888	–	–	0	–
	2015	9 218 069	–	627	–	–	0	–
	2020	9 943 354	–	1 934	–	–	3	–
	2021	10 020 646	–	2 175	–	–	0	–
	2022	10 100 802	–	1 348	–	–	1	–
	2023	10 189 313	–	604	–	–	0	–
El Salvador[1,2,3]	2000	1 206 503	–	753	–	–	0	–
	2005	1 219 132	–	67	–	–	0	–
	2010	1 231 854	–	17	–	–	0	–
	2015	1 255 286	–	5	–	–	0	–
	2020	1 265 638	–	0	–	–	0	–
	2021	1 269 923	–	0	–	–	0	–
	2022	1 274 904	–	0	–	–	0	–
	2023	1 280 853	–	0	–	–	0	–
French Guiana[1,2]	2000	88 868	3 900	4 428	5 300	–	0	–
	2005	112 009	3 600	4 015	4 700	–	2	–
	2010	129 779	1 700	2 092	2 700	–	1	–
	2015	147 373	410	462	530	–	0	–
	2020	159 928	150	164	190	–	0	–
	2021	162 119	–	74	–	–	0	–
	2022	165 046	–	21	–	–	0	–
	2023	167 866	–	189	–	–	0	–
Guatemala[1,2]	2000	8 830 746	56 000	63 676	76 000	–	0	–
	2005	9 880 112	41 000	46 748	55 000	–	4	–
	2010	10 946 424	7 800	9 468	12 000	–	0	–
	2015	12 057 388	5 800	6 482	7 500	–	1	–
	2020	13 103 392	1 100	1 240	1 400	–	0	–
	2021	13 285 573	–	1 273	–	–	0	–
	2022	13 473 719	–	1 856	–	–	0	–
	2023	13 682 802	–	3 046	–	–	0	–

Annex 4 – F. Population denominator for case incidence and mortality rate, and estimated malaria cases and deaths, 2000–2023

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AMERICAS								
Guyana	2000	764 832	28 000	33 628	40 000	24	50	80
	2005	760 914	45 000	54 583	65 000	35	69	110
	2010	749 256	24 000	29 631	36 000	24	52	84
	2015	758 781	14 000	18 030	25 000	10	22	37
	2020	807 481	19 000	22 093	26 000	12	25	39
	2021	815 482	22 000	25 713	30 000	13	27	42
	2022	821 637	22 000	26 478	31 000	15	31	48
	2023	826 353	30 000	35 255	41 000	22	42	67
Haiti	2000	7 418 201	42 000	72 058	116 000	68	184	370
	2005	8 095 522	45 000	78 638	127 000	74	201	400
	2010	8 758 458	48 000	85 077	138 000	81	217	440
	2015	9 401 674	21 000	32 185	44 000	32	82	150
	2020	10 045 478	27 000	40 876	56 000	40	104	190
	2021	10 162 282	14 000	22 546	35 000	22	57	110
	2022	10 277 551	17 000	26 231	36 000	26	67	120
	2023	10 397 084	16 000	23 824	32 000	24	60	110
Honduras[1,2]	2000	5 958 146	37 000	51 498	66 000	–	0	–
	2005	6 773 893	17 000	23 468	30 000	–	1	–
	2010	7 577 811	10 000	13 308	16 000	–	3	–
	2015	8 367 150	3 800	4 850	6 000	–	0	–
	2020	9 166 370	860	1 125	1 400	–	0	–
	2021	9 320 570	–	1 533	–	–	0	–
	2022	9 478 175	–	3 540	–	–	0	–
	2023	9 642 106	–	2 589	–	–	0	–
Mexico[1,2]	2000	2 090 861	–	7 390	–	–	0	–
	2005	2 243 203	–	2 967	–	–	0	–
	2010	2 408 826	–	1 226	–	–	0	–
	2015	2 566 732	–	517	–	–	0	–
	2020	2 688 139	–	356	–	–	0	–
	2021	2 706 140	–	242	–	–	0	–
	2022	2 726 598	–	163	–	–	0	–
	2023	2 750 482	–	42	–	–	0	–
Nicaragua[2,7]	2000	4 419 917	25 000	29 953	35 000	–	4	–
	2005	4 701 052	7 000	8 412	9 900	–	6	–
	2010	5 048 956	730	876	1 000	–	1	–
	2015	5 411 486	2 400	2 886	3 400	–	1	–
	2020	5 777 434	27 000	32 469	38 000	–	0	–
	2021	5 847 372	24 000	29 457	35 000	–	0	–
	2022	5 922 975	17 000	20 400	24 000	–	0	–
	2023	6 004 779	7 100	8 505	10 000	–	0	–
Panama[1,2,8]	2000	2 016 946	1 000	1 091	1 200	–	1	–
	2005	2 219 727	3 700	3 861	4 100	–	1	–
	2010	2 431 118	420	440	470	–	1	–
	2015	2 653 223	550	575	610	–	0	–
	2020	2 876 484	2 000	2 051	2 200	–	0	–
	2021	2 911 421	–	4 156	–	–	0	–
	2022	2 948 517	–	4 746	–	–	0	–
	2023	2 987 368	–	9 485	–	–	0	–
Paraguay[1,2,3]	2000	183 631	–	6 853	–	–	0	–
	2005	196 131	–	373	–	–	0	–
	2010	206 566	–	20	–	–	0	–
	2015	221 727	–	0	–	–	0	–
	2020	237 734	–	0	–	–	0	–
	2021	240 630	–	0	–	–	0	–
	2022	243 376	–	0	–	–	0	–
	2023	246 389	–	0	–	–	0	–

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
AMERICAS								
Peru	2000	10 446 760	95 000	137 781	198 000	67	142	250
	2005	11 037 019	92 000	108 134	125 000	41	80	120
	2010	11 423 825	33 000	37 847	43 000	9	20	31
	2015	11 962 526	71 000	86 896	104 000	35	70	110
	2020	12 897 680	22 000	29 745	42 000	11	23	41
	2021	13 022 304	19 000	23 250	28 000	9	17	28
	2022	13 147 813	29 000	35 740	42 000	13	27	42
	2023	13 293 204	24 000	29 089	35 000	9	20	32
Suriname[1,2]	2000	70 400	–	11 361	–	–	24	–
	2005	76 702	–	9 131	–	–	1	–
	2010	81 223	–	1 771	–	–	1	–
	2015	85 906	–	81	–	–	0	–
	2020	90 439	–	147	–	–	0	–
	2021	91 263	–	22	–	–	0	–
	2022	92 041	–	0	–	–	0	–
	2023	92 886	–	0	–	–	0	–
Venezuela (Bolivarian Republic of)	2000	12 263 354	31 000	35 517	42 000	13	26	41
	2005	13 392 901	47 000	52 979	62 000	17	34	52
	2010	14 406 550	48 000	57 905	73 000	26	53	84
	2015	15 286 986	142 000	159 668	183 000	77	150	230
	2020	14 222 038	199 000	223 067	259 000	100	196	300
	2021	14 118 913	182 000	204 424	235 000	80	155	240
	2022	14 106 508	137 000	154 089	177 000	64	125	190
	2023	14 150 427	120 000	134 811	156 000	61	118	180
EASTERN MEDITERRANEAN								
Afghanistan	2000	15 542 191	843 000	1 312 939	2 022 000	410	965	1 880
	2005	18 842 240	315 000	535 477	860 000	100	259	510
	2010	21 837 535	166 000	292 015	459 000	67	165	320
	2015	26 120 776	253 000	368 235	514 000	74	174	320
	2020	30 164 317	195 000	253 150	321 000	45	110	190
	2021	30 883 456	149 000	193 232	245 000	41	91	150
	2022	31 330 050	222 000	287 835	366 000	56	131	220
	2023	32 006 328	326 000	424 307	539 000	88	202	340
Djibouti[1]	2000	560 428	1 300	1 722	2 100	1	4	8
	2005	629 307	1 500	1 933	2 400	1	4	9
	2010	697 613	–	1 010	–	1	2	3
	2015	765 152	–	9 473	–	11	24	37
	2020	828 802	–	73 535	–	64	129	190
	2021	840 845	–	58 916	–	57	118	180
	2022	852 730	–	40 648	–	39	81	120
	2023	864 614	–	38 944	–	38	80	120
Egypt[1,2,3]	2000	73 083 284	–	0	–	–	0	–
	2005	81 101 003	–	0	–	–	0	–
	2010	89 196 072	–	0	–	–	0	–
	2015	99 597 342	–	0	–	–	0	–
	2020	109 315 123	–	0	–	–	0	–
	2021	110 957 008	–	0	–	–	0	–
	2022	112 618 249	–	0	–	–	0	–
	2023	114 535 771	–	0	–	–	0	–

Annex 4 – F. Population denominator for case incidence and mortality rate, and estimated malaria cases and deaths, 2000–2023

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
EASTERN MEDITERRANEAN								
Iran (Islamic Republic of)[1,2,9]	2000	678 134	–	19 716	–	–	4	–
	2005	733 368	–	18 966	–	–	1	–
	2010	790 466	–	1 847	–	–	0	–
	2015	843 543	–	167	–	–	0	–
	2020	895 656	–	0	–	–	0	–
	2021	903 130	–	0	–	–	0	–
	2022	914 042	–	1 439	–	–	0	–
	2023	925 114	–	2 528	–	–	0	–
Iraq[1,2]	2000	3 175 127	–	1 860	–	–	0	–
	2005	3 692 968	–	47	–	–	0	–
	2010	4 035 897	–	0	–	–	0	–
	2015	4 882 869	–	0	–	–	0	–
	2020	5 475 158	–	0	–	–	0	–
	2021	5 599 257	–	0	–	–	0	–
	2022	5 729 171	–	0	–	–	0	–
	2023	5 859 626	–	0	–	–	0	–
Morocco[1,2,3]	2000	28 423 435	–	3	–	–	0	–
	2005	30 358 144	–	0	–	–	0	–
	2010	32 467 015	–	0	–	–	0	–
	2015	34 607 588	–	0	–	–	0	–
	2020	36 584 208	–	0	–	–	0	–
	2021	36 954 442	–	0	–	–	0	–
	2022	37 329 064	–	0	–	–	0	–
	2023	37 712 505	–	0	–	–	0	–
Oman[1,2]	2000	2 282 131	–	6	–	–	0	–
	2005	2 459 802	–	0	–	–	0	–
	2010	2 757 446	–	0	–	–	0	–
	2015	4 184 895	–	0	–	–	0	–
	2020	4 522 496	–	0	–	–	0	–
	2021	4 500 424	–	0	–	–	0	–
	2022	4 730 226	–	0	–	–	0	–
	2023	5 049 269	–	0	–	–	0	–
Pakistan	2000	152 263 218	362 000	926 494	2 214 000	300	992	2 610
	2005	172 489 807	375 000	845 170	1 958 000	310	923	2 430
	2010	195 873 899	646 000	1 445 704	3 040 000	560	1 616	3 860
	2015	213 620 839	529 000	1 000 339	2 055 000	300	765	1 790
	2020	231 032 566	429 000	542 938	728 000	230	454	740
	2021	235 433 020	403 000	505 836	677 000	240	460	750
	2022	239 584 562	2 098 000	2 655 514	3 559 000	1 540	3 051	5 060
	2023	243 324 144	3 410 000	4 284 621	5 755 000	2 520	4 956	8 290
Saudi Arabia[1,2]	2000	1 734 765	–	6 608	–	–	0	–
	2005	2 204 673	–	1 059	–	–	0	–
	2010	2 697 643	–	29	–	–	0	–
	2015	3 214 266	–	83	–	–	0	–
	2020	3 323 242	–	83	–	–	0	–
	2021	3 359 397	–	0	–	–	0	–
	2022	3 450 220	–	0	–	–	0	–
	2023	3 566 989	–	0	–	–	0	–
Somalia	2000	8 838 713	734 000	1 159 428	1 751 000	1 170	2 968	5 580
	2005	10 644 228	1 013 000	1 392 703	1 865 000	1 540	3 565	6 210
	2010	12 261 756	345 000	493 866	684 000	530	1 264	2 260
	2015	13 806 963	509 000	800 085	1 205 000	780	1 959	3 660
	2020	16 651 190	608 000	927 848	1 361 000	970	2 375	4 420
	2021	17 271 431	670 000	1 113 178	1 738 000	970	2 464	4 740
	2022	17 801 897	631 000	1 037 936	1 631 000	980	2 507	4 860
	2023	18 358 615	662 000	1 081 187	1 679 000	1 030	2 611	5 180

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
EASTERN MEDITERRANEAN								
Sudan	2000	27 816 744	1 624 000	2 439 775	3 493 000	2 460	5 978	11 000
	2005	31 262 443	994 000	1 614 440	2 428 000	1 570	3 956	7 460
	2010	35 414 399	820 000	1 104 287	1 457 000	1 170	2 705	4 640
	2015	40 024 431	1 053 000	1 611 298	2 378 000	1 620	3 948	7 270
	2020	46 789 231	1 614 000	3 261 859	5 853 000	2 640	7 635	16 500
	2021	48 066 924	1 643 000	3 325 874	5 906 000	2 760	7 784	16 400
	2022	49 383 345	1 665 000	3 361 374	6 020 000	2 720	7 868	16 900
	2023	50 042 790	1 712 000	3 406 260	6 227 000	2 780	7 974	17 300
Syrian Arab Republic[1,2,3]	2000	16 637 888	–	6	–	–	0	–
	2005	18 814 091	–	0	–	–	0	–
	2010	22 482 420	–	0	–	–	0	–
	2015	19 424 618	–	0	–	–	0	–
	2020	21 049 429	–	0	–	–	0	–
	2021	21 628 839	–	0	–	–	0	–
	2022	22 462 172	–	0	–	–	0	–
	2023	23 594 623	–	0	–	–	0	–
United Arab Emirates[1,2,3]	2000	3 493 575	–	0	–	–	0	–
	2005	4 664 790	–	0	–	–	0	–
	2010	6 938 363	–	0	–	–	0	–
	2015	8 674 633	–	0	–	–	0	–
	2020	9 448 524	–	0	–	–	0	–
	2021	9 789 048	–	0	–	–	0	–
	2022	10 242 086	–	0	–	–	0	–
	2023	10 642 081	–	0	–	–	0	–
Yemen	2000	12 630 893	449 000	1 052 131	4 562 000	790	2 633	12 700
	2005	14 668 623	447 000	1 002 795	4 513 000	760	2 495	12 100
	2010	17 220 209	637 000	1 131 912	2 144 000	1 080	2 866	6 590
	2015	20 055 441	358 000	521 856	767 000	560	1 330	2 500
	2020	23 257 865	546 000	848 385	1 282 000	850	2 152	4 190
	2021	23 904 960	673 000	1 057 919	1 614 000	1 050	2 652	5 190
	2022	24 601 794	601 000	960 462	1 483 000	930	2 402	4 710
	2023	25 353 517	609 000	985 137	1 521 000	980	2 474	4 830
EUROPEAN								
Armenia[1,2,3]	2000	3 125 628	–	141	–	–	0	–
	2005	3 006 351	–	7	–	–	0	–
	2010	2 931 078	–	0	–	–	0	–
	2015	2 921 177	–	0	–	–	0	–
	2020	2 890 892	–	0	–	–	0	–
	2021	2 870 348	–	0	–	–	0	–
	2022	2 880 874	–	0	–	–	0	–
	2023	2 943 393	–	0	–	–	0	–
Azerbaijan[1,2,3]	2000	188 020	–	1 526	–	–	0	–
	2005	197 736	–	242	–	–	0	–
	2010	210 377	–	50	–	–	0	–
	2015	224 315	–	0	–	–	0	–
	2020	234 179	–	0	–	–	0	–
	2021	235 390	–	0	–	–	0	–
	2022	236 791	–	0	–	–	0	–
	2023	237 318	–	0	–	–	0	–

Annex 4 – F. Population denominator for case incidence and mortality rate, and estimated malaria cases and deaths, 2000–2023

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
EUROPEAN								
Georgia[1,2]	2000	43 283	–	245	–	–	0	–
	2005	40 261	–	155	–	–	0	–
	2010	38 959	–	0	–	–	0	–
	2015	37 915	–	0	–	–	0	–
	2020	37 956	–	0	–	–	0	–
	2021	37 884	–	0	–	–	0	–
	2022	37 947	–	0	–	–	0	–
	2023	38 074	–	0	–	–	0	–
Kazakhstan[1,2]	2000	15 501 102	–	0	–	–	0	–
	2005	15 968 116	–	0	–	–	0	–
	2010	16 836 810	–	0	–	–	0	–
	2015	18 084 169	–	0	–	–	0	–
	2020	19 482 117	–	0	–	–	0	–
	2021	19 743 603	–	0	–	–	0	–
	2022	20 034 609	–	0	–	–	0	–
	2023	20 330 104	–	0	–	–	0	–
Kyrgyzstan[1,2,3]	2000	3 919 613	–	7	–	–	0	–
	2005	4 092 138	–	225	–	–	0	–
	2010	4 283 573	–	3	–	–	0	–
	2015	4 681 467	–	0	–	–	0	–
	2020	5 198 028	–	0	–	–	0	–
	2021	5 319 973	–	0	–	–	0	–
	2022	5 425 514	–	0	–	–	0	–
	2023	5 517 342	–	0	–	–	0	–
Tajikistan[1,2,3]	2000	2 099 101	–	19 064	–	–	0	–
	2005	2 312 856	–	2 309	–	–	0	–
	2010	2 555 814	–	111	–	–	0	–
	2015	2 887 042	–	0	–	–	0	–
	2020	3 256 269	–	0	–	–	0	–
	2021	3 328 947	–	0	–	–	0	–
	2022	3 400 862	–	0	–	–	0	–
	2023	3 470 192	–	0	–	–	0	–
Türkiye[1,2]	2000	4 252 687	–	11 432	–	–	0	–
	2005	4 506 421	–	2 084	–	–	0	–
	2010	4 767 539	–	0	–	–	0	–
	2015	5 200 924	–	0	–	–	0	–
	2020	5 595 959	–	0	–	–	0	–
	2021	5 634 606	–	0	–	–	0	–
	2022	5 658 800	–	0	–	–	0	–
	2023	5 672 582	–	0	–	–	0	–
Turkmenistan[1,2,3]	2000	297 874	–	24	–	–	0	–
	2005	328 396	–	1	–	–	0	–
	2010	361 683	–	0	–	–	0	–
	2015	404 025	–	0	–	–	0	–
	2020	451 744	–	0	–	–	0	–
	2021	460 982	–	0	–	–	0	–
	2022	469 962	–	0	–	–	0	–
	2023	478 688	–	0	–	–	0	–
Uzbekistan[1,2,3]	2000	24 787	–	126	–	–	0	–
	2005	26 356	–	102	–	–	0	–
	2010	28 385	–	3	–	–	0	–
	2015	30 749	–	0	–	–	0	–
	2020	33 586	–	0	–	–	0	–
	2021	34 243	–	0	–	–	0	–
	2022	34 938	–	0	–	–	0	–
	2023	35 652	–	0	–	–	0	–

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
SOUTH-EAST ASIA								
Bangladesh	2000	14 499 874	42 000	95 942	153 000	–	484	–
	2005	15 596 058	46 000	103 195	165 000	–	501	–
	2010	16 402 847	59 000	69 307	80 000	75	166	270
	2015	17 176 766	41 000	45 478	50 000	49	105	170
	2020	17 921 981	6 400	7 545	8 700	6	15	24
	2021	18 068 638	7 600	8 974	10 000	7	16	27
	2022	18 254 654	19 000	22 451	26 000	19	41	65
	2023	18 479 042	17 000	20 376	24 000	15	31	49
Bhutan[1,2]	2000	441 678	–	5 935	–	–	15	–
	2005	489 780	–	1 825	–	–	5	–
	2010	519 207	–	436	–	–	2	–
	2015	548 057	–	34	–	–	0	–
	2020	569 804	–	22	–	–	0	–
	2021	573 826	–	9	–	–	0	–
	2022	577 876	–	0	–	–	0	–
	2023	581 924	–	0	–	–	0	–
Democratic People's Republic of Korea[1,2]	2000	9 251 800	–	90 582	–	–	0	–
	2005	9 537 387	–	6 728	–	–	0	–
	2010	9 768 360	–	13 520	–	–	0	–
	2015	9 998 265	–	7 022	–	–	0	–
	2020	10 217 564	–	1 819	–	–	0	–
	2021	10 255 180	–	2 357	–	–	0	–
	2022	10 292 831	–	2 136	–	–	0	–
	2023	10 327 765	–	3 160	–	–	0	–
India	2000	988 523 001	15 280 000	19 727 653	25 640 000	14 200	29 614	48 700
	2005	1 078 929 555	18 250 000	24 254 973	33 440 000	15 700	32 582	55 100
	2010	1 161 909 173	14 870 000	20 166 267	28 430 000	14 200	30 539	53 000
	2015	1 240 906 090	6 733 000	8 143 325	10 450 000	7 110	14 904	24 500
	2020	1 310 605 974	2 786 000	3 478 200	4 388 000	2 940	6 155	10 100
	2021	1 321 432 120	2 810 000	3 458 152	4 298 000	2 890	6 040	9 780
	2022	1 331 915 449	1 862 000	2 252 922	2 791 000	1 800	3 663	5 890
	2023	1 343 732 230	1 621 000	2 037 519	2 729 000	1 650	3 461	5 830
Indonesia	2000	216 077 790	945 000	1 141 729	1 401 000	740	1 550	2 630
	2005	230 871 650	1 071 000	1 187 260	1 325 000	850	1 647	2 480
	2010	246 305 322	1 795 000	1 991 459	2 215 000	1 630	3 209	4 930
	2015	261 799 249	937 000	1 039 394	1 158 000	830	1 651	2 520
	2020	274 814 865	704 000	769 298	847 000	690	1 415	2 160
	2021	276 758 053	745 000	811 636	888 000	700	1 412	2 160
	2022	278 830 528	1 065 000	1 155 531	1 267 000	1 010	2 036	3 100
	2023	281 190 066	1 004 000	1 089 788	1 198 000	940	1 876	2 860
Myanmar	2000	39 459 589	944 000	1 357 510	2 003 000	1 200	2 746	5 010
	2005	41 330 617	999 000	1 421 878	2 126 000	1 270	2 877	5 350
	2010	42 712 433	1 098 000	1 507 212	2 108 000	1 560	3 623	6 580
	2015	44 511 277	220 000	271 652	327 000	230	481	790
	2020	46 190 579	66 000	82 144	99 000	39	77	120
	2021	46 513 447	178 000	292 857	1 206 000	98	231	1 020
	2022	46 835 535	353 000	583 983	2 470 000	200	465	2 090
	2023	47 164 005	508 000	847 261	3 454 000	280	660	2 870
Nepal[1,2]	2000	7 128 661	–	7 981	–	1	3	6
	2005	7 640 647	–	5 050	–	–	10	–
	2010	7 940 499	–	3 894	–	–	6	–
	2015	8 080 385	–	591	–	–	0	–
	2020	8 412 313	–	73	–	–	0	–
	2021	8 559 970	–	32	–	–	1	–
	2022	8 629 793	–	36	–	–	0	–
	2023	8 623 746	–	15	–	–	0	–

Annex 4 – F. Population denominator for case incidence and mortality rate, and estimated malaria cases and deaths, 2000–2023

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
SOUTH-EAST ASIA								
Sri Lanka[1,2,3]	2000	4 437 402	–	210 039	–	–	77	–
	2005	4 649 800	–	1 640	–	–	0	–
	2010	4 802 190	–	684	–	–	0	–
	2015	4 997 893	–	0	–	–	0	–
	2020	5 189 215	–	0	–	–	0	–
	2021	5 221 085	–	0	–	–	0	–
	2022	5 252 041	–	0	–	–	0	–
	2023	5 283 471	–	0	–	–	0	–
Thailand[1,2]	2000	11 956 362	–	78 561	–	–	625	–
	2005	12 527 465	–	29 782	–	–	161	–
	2010	13 013 635	–	32 480	–	–	80	–
	2015	13 385 821	–	17 495	–	–	33	–
	2020	13 594 687	–	3 123	–	–	3	–
	2021	13 610 978	–	2 426	–	–	0	–
	2022	13 612 496	–	6 263	–	–	0	–
	2023	13 606 254	–	9 169	–	–	5	–
Timor-Leste[1]	2000	700 762	48 000	110 986	251 000	56	211	580
	2005	891 895	105 000	153 748	210 000	130	304	540
	2010	1 020 151	68 000	95 412	126 000	85	194	330
	2015	1 133 437	93	110	130	–	0	–
	2020	1 247 165	–	3	–	–	0	–
	2021	1 269 818	–	0	–	–	0	–
	2022	1 287 835	–	0	–	–	0	–
	2023	1 301 934	–	0	–	–	0	–
WESTERN PACIFIC								
Cambodia	2000	8 865 525	411 000	669 109	974 000	640	1 582	2 920
	2005	9 560 453	329 000	388 706	463 000	340	705	1 120
	2010	10 315 606	291 000	353 293	431 000	310	644	1 040
	2015	11 114 153	189 000	218 837	256 000	180	374	590
	2020	11 898 259	37 000	43 341	51 000	13	27	42
	2021	12 075 274	16 000	19 064	22 000	4	10	15
	2022	12 237 056	15 000	17 607	21 000	4	9	15
	2023	12 395 095	5 200	6 012	7 100	0	2	4
China[1,2,3]	2000	530 964 239	–	8 025	–	–	39	–
	2005	547 879 548	–	21 936	–	–	48	–
	2010	565 250 056	–	4 990	–	–	19	–
	2015	583 891 234	–	39	–	–	0	–
	2020	596 426 090	–	0	–	–	0	–
	2021	596 564 593	–	0	–	–	0	–
	2022	596 038 599	–	0	–	–	0	–
	2023	594 953 470	–	0	–	–	0	–
Lao People's Democratic Republic	2000	2 826 055	71 000	89 755	111 000	–	350	–
	2005	3 054 124	23 000	35 002	51 000	34	86	160
	2010	3 295 909	31 000	43 766	59 000	45	109	200
	2015	3 539 141	45 000	62 489	82 000	37	80	140
	2020	3 822 665	4 100	5 674	7 500	3	7	13
	2021	3 878 164	4 600	6 403	8 500	2	6	11
	2022	3 933 223	2 700	3 713	4 900	0	3	4
	2023	3 988 371	830	1 143	1 500	–	0	–

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
WESTERN PACIFIC								
Malaysia[1,2]	2000	918 712	–	12 705	–	–	35	–
	2005	1 033 442	–	5 569	–	–	33	–
	2010	1 146 231	–	5 194	–	–	13	–
	2015	1 249 311	–	242	–	–	4	–
	2020	1 355 582	–	0	–	–	0	–
	2021	1 371 295	–	0	–	–	0	–
	2022	1 387 819	–	0	–	–	0	–
	2023	1 405 051	–	0	–	–	0	–
Papua New Guinea	2000	5 537 063	463 000	1 462 249	2 639 000	840	3 142	6 920
	2005	6 535 905	461 000	1 413 497	2 573 000	710	2 796	6 140
	2010	7 633 523	369 000	1 079 284	1 897 000	650	2 354	5 140
	2015	8 743 246	577 000	884 727	1 248 000	750	1 860	3 420
	2020	9 815 745	1 017 000	1 470 120	1 977 000	1 280	2 962	5 240
	2021	10 012 896	859 000	1 237 112	1 650 000	1 040	2 449	4 350
	2022	10 203 169	1 154 000	1 660 032	2 209 000	1 430	3 398	6 030
	2023	10 389 635	1 060 000	1 529 373	2 038 000	1 300	3 080	5 460
Philippines	2000	46 213 492	60 000	79 974	103 000	–	536	–
	2005	51 083 261	60 000	83 163	110 000	73	167	300
	2010	55 912 751	37 000	53 512	71 000	48	113	200
	2015	61 122 221	20 000	27 904	37 000	26	63	110
	2020	65 050 434	11 000	15 088	20 000	14	33	61
	2021	65 642 246	7 500	10 606	14 000	9	22	40
	2022	66 143 344	5 700	8 160	11 000	7	17	31
	2023	66 681 282	11 000	15 505	21 000	14	33	61
Republic of Korea[1,2]	2000	3 273 666	–	4 183	–	–	0	–
	2005	3 349 615	–	1 369	–	–	0	–
	2010	3 413 853	–	1 267	–	–	1	–
	2015	3 568 873	–	627	–	–	0	–
	2020	3 630 093	–	356	–	–	0	–
	2021	3 629 387	–	274	–	–	0	–
	2022	3 624 775	–	382	–	–	0	–
	2023	3 622 411	–	662	–	–	0	–
Solomon Islands	2000	436 064	134 000	254 582	422 000	180	476	960
	2005	478 249	153 000	286 015	466 000	210	547	1 090
	2010	527 638	66 000	91 425	131 000	73	163	290
	2015	633 020	33 000	39 811	49 000	28	57	92
	2020	737 053	99 000	114 019	134 000	64	124	190
	2021	754 965	127 000	154 113	188 000	84	165	260
	2022	773 255	137 000	163 117	197 000	100	207	330
	2023	792 005	163 000	187 733	221 000	120	245	380
Vanuatu[2]	2000	186 281	13 000	23 167	38 000	13	34	68
	2005	210 760	17 000	25 624	39 000	15	35	64
	2010	238 247	15 000	20 972	30 000	12	27	48
	2015	266 101	710	877	1 100	–	0	–
	2020	298 858	740	1 130	1 700	–	0	–
	2021	305 868	470	738	1 100	–	0	–
	2022	313 046	1 700	2 700	4 200	–	0	–
	2023	320 408	3 500	5 748	9 100	–	0	–
Viet Nam[1,2]	2000	56 861 657	–	74 316	–	74	154	230
	2005	59 761 194	–	19 496	–	18	37	57
	2010	64 453 484	–	17 515	–	16	34	52
	2015	68 409 717	–	9 331	–	6	12	19
	2020	72 283 284	–	1 376	–	–	0	–
	2021	72 914 079	–	377	–	–	0	–
	2022	73 463 546	–	412	–	–	0	–
	2023	73 958 461	–	373	–	–	0	–

Annex 4 – F. Population denominator for case incidence and mortality rate, and estimated malaria cases and deaths, 2000–2023

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
REGIONAL SUMMARY								
African	2000	574 385 196	189 000 000	204 294 828	222 000 000	781 000	804 683	836 000
	2005	661 931 673	197 000 000	214 329 985	237 000 000	686 000	711 989	753 000
	2010	764 471 383	200 000 000	217 271 692	241 000 000	619 000	649 545	699 000
	2015	880 419 430	194 000 000	210 291 110	229 000 000	516 000	550 088	605 000
	2020	1 005 975 615	211 000 000	234 918 079	263 000 000	552 000	597 812	711 000
	2021	1 032 110 420	213 000 000	235 816 253	264 000 000	536 000	577 523	691 000
	2022	1 058 531 321	213 000 000	237 001 795	265 000 000	532 000	573 425	698 000
	2023	1 086 112 693	221 000 000	246 379 881	277 000 000	521 000	568 749	694 000
Americas	2000	117 293 170	1 424 000	1 582 971	1 752 000	739	896	1 112
	2005	126 582 112	1 201 000	1 273 168	1 359 000	513	659	875
	2010	135 229 920	745 000	818 329	900 000	344	492	715
	2015	143 627 434	530 000	572 789	620 000	282	385	498
	2020	150 530 636	604 000	653 760	710 000	291	415	554
	2021	151 658 894	540 000	580 090	626 000	242	330	433
	2022	152 874 822	491 000	528 160	569 000	239	322	411
	2023	154 251 439	506 000	548 103	594 000	266	342	428
Eastern Mediterranean	2000	347 160 526	5 400 000	6 920 688	10 900 000	8 500	13 544	24 900
	2005	392 565 487	4 200 000	5 412 590	9 400 000	7 100	11 203	22 100
	2010	444 670 733	3 400 000	4 470 670	6 500 000	5 500	8 618	13 400
	2015	489 823 356	3 500 000	4 311 536	5 700 000	5 100	8 200	12 200
	2020	539 337 807	4 200 000	5 907 798	8 500 000	7 200	12 855	21 800
	2021	550 092 181	4 500 000	6 254 955	9 000 000	7 600	13 569	22 600
	2022	561 029 608	6 400 000	8 345 208	11 300 000	9 800	16 040	25 600
	2023	571 835 986	8 100 000	10 222 985	13 300 000	11 500	18 297	28 300
European	2000	29 452 095	–	32 565	–	–	0	–
	2005	30 478 631	–	5 125	–	–	0	–
	2010	32 014 218	–	167	–	–	0	–
	2015	34 471 783	–	0	–	–	0	–
	2020	37 180 730	–	0	–	–	0	–
	2021	37 665 976	–	0	–	–	0	–
	2022	38 180 297	–	0	–	–	0	–
	2023	38 723 345	–	0	–	–	0	–
South-East Asia	2000	1 292 476 919	18 500 000	22 826 918	28 700 000	20 000	35 325	54 000
	2005	1 402 464 854	21 200 000	27 166 079	36 100 000	21 000	38 087	60 000
	2010	1 504 393 817	18 600 000	23 880 671	32 000 000	21 000	37 819	61 000
	2015	1 602 537 240	8 100 000	9 525 101	11 800 000	9 000	17 174	27 000
	2020	1 688 764 147	3 700 000	4 342 227	5 300 000	4 000	7 665	12 000
	2021	1 702 263 115	3 900 000	4 576 443	5 800 000	4 000	7 700	12 000
	2022	1 715 489 038	3 500 000	4 023 322	5 900 000	4 000	6 205	9 000
	2023	1 730 290 437	3 400 000	4 007 288	6 700 000	4 000	6 033	9 000

WHO region Country/area	Year	Population denominator for incidence and mortality rate	Cases			Deaths		
			Lower	Point	Upper	Lower	Point	Upper
REGIONAL SUMMARY								
Western Pacific	2000	656 082 754	1 653 000	2 678 065	3 913 000	3 700	6 348	10 300
	2005	682 946 551	1 307 000	2 280 377	3 438 000	2 300	4 454	7 900
	2010	712 187 298	969 000	1 671 218	2 520 000	1 700	3 477	6 300
	2015	742 537 017	938 000	1 244 884	1 611 000	1 300	2 450	4 000
	2020	765 318 063	1 196 000	1 651 104	2 152 000	1 400	3 153	5 500
	2021	767 148 767	1 048 000	1 428 687	1 843 000	1 200	2 652	4 600
	2022	768 117 832	1 348 000	1 856 123	2 409 000	1 700	3 634	6 300
	2023	768 506 189	1 275 000	1 746 549	2 257 000	1 600	3 360	5 800
Total	2000	3 016 850 660	223 000 000	238 336 035	258 000 000	831 000	860 796	901 000
	2005	3 296 969 308	232 000 000	250 467 324	275 000 000	735 000	766 392	815 000
	2010	3 592 967 369	229 000 000	248 112 748	273 000 000	664 000	699 951	754 000
	2015	3 893 416 260	210 000 000	225 945 421	245 000 000	543 000	578 297	635 000
	2020	4 187 106 998	224 000 000	247 472 969	276 000 000	578 000	621 900	736 000
	2021	4 240 939 353	225 000 000	248 656 429	276 000 000	559 000	601 774	716 000
	2022	4 294 222 918	228 000 000	251 754 609	282 000 000	555 000	599 626	726 000
	2023	4 349 720 089	238 000 000	262 904 806	294 000 000	548 000	596 781	723 000

Data as of 9 October 2024

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

"–" is shown where the point estimate and the lower and upper confidence intervals are equal.

[1] The number of indigenous malaria cases registered by the NMPs is reported here without further adjustments for the entire time series (since 2017 for Timor-Leste and since 2021 for the Dominican Republic, French Guiana, Guatemala, Honduras, Nepal, Panama and Viet Nam).

[2] The number of indigenous malaria deaths registered by the NMPs is reported here without further adjustments.

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

[4] The number of presumed cases in 2023 was updated from 4187 to 1102 after data collection for the *World malaria report 2024* had closed. This change results in 2607 fewer estimated cases, and a corrected number of estimated cases in 2023 of 217 374.

[5] 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 Sudanese high transmission areas (10 southern states which correspond to contemporary South Sudan) and low transmission areas (15 northern states which correspond to contemporary Sudan) are reported separately.

[6] Following the closure of the database, 17 300 unclassified cases have been classified as indigenous after analysis of the burden of disease. The current estimate of malaria cases in Colombia in 2023 is an underestimate.

[7] Malaria cases and deaths may be overestimated because national-level assumptions used for estimation related to access to services may not correspond to the reality of the specific area with the highest malaria burden, where there was a significant case detection effort and a low positivity rate.

[8] Malaria cases and deaths are likely to be underestimated because current reporting methods are based on routinely reported cases without adjustment. Given the challenges with detecting cases in a difficult epidemiological context, estimates adjusted for assumptions of underdetection may provide more accurate figures.

[9] In 2022 and 2023, cases are reported as locally acquired (includes indigenous and introduced).

Notes:

Population denominator for incidence and mortality rate is based on the United Nations population multiplied by the proportion of the population at risk at baseline.

Estimated cases are based on indigenous and introduced cases and do not include imported, relapse or induced cases where such case classifications are reliable.

Estimated cases and deaths are based on those attributable to human malaria parasites and do not include cases due to *Plasmodium knowlesi* infection.

Annex 4 – G. Population denominator for case incidence and mortality rate, and reported malaria cases by place of care, 2023

WHO region Country/area	Population			
	UN population	At risk (low + high)	At risk (high)	Number of people living in active foci
AFRICAN				
Angola	36 749 906	36 749 906	36 749 906	–
Benin	14 111 034	14 111 034	14 111 034	–
Botswana	2 480 244	1 644 352	104 468	NA
Burkina Faso	23 025 776	23 025 776	23 025 776	–
Burundi	13 689 449	13 689 449	13 689 449	–
Cameroon	28 372 687	28 372 687	20 144 608	–
Central African Republic	5 152 420	5 152 420	5 152 420	–
Chad	19 319 064	19 107 520	13 012 356	–
Comoros	850 387	850 387	404 614	430 672
Congo	6 182 885	6 182 885	6 182 885	–
Côte d’Ivoire	31 165 654	31 165 654	31 165 654	–
Democratic Republic of the Congo	105 789 731	105 789 731	102 616 039	–
Equatorial Guinea	1 847 549	1 847 549	1 847 549	NA
Eritrea	3 470 389	3 470 389	2 463 976	–
Eswatini	1 230 506	344 541	0	NA
Ethiopia	128 691 692	87 510 350	35 004 140	NA
Gabon	2 484 788	2 484 788	2 484 788	–
Gambia	2 697 845	2 697 845	2 697 845	–
Ghana	33 787 914	33 787 914	33 787 914	–
Guinea	14 405 468	14 405 468	14 405 468	–
Guinea-Bissau	2 153 339	2 153 339	2 153 339	–
Kenya	55 339 002	55 339 002	38 845 212	–
Liberia	5 493 031	5 493 031	5 493 031	–
Madagascar	31 195 932	31 195 932	27 380 046	–
Malawi	21 104 482	21 104 482	21 104 482	–
Mali	23 769 127	23 769 127	21 666 035	–
Mauritania	5 022 441	5 022 441	3 237 867	–
Mayotte	316 015	69 523	0	0
Mozambique	33 635 160	33 635 160	33 635 160	–
Namibia	2 963 095	2 351 956	1 367 794	NA
Niger	26 159 867	26 159 867	26 159 867	–
Nigeria	227 882 945	227 882 945	174 052 436	–
Rwanda	13 954 471	13 954 471	13 954 471	–
Sao Tome and Principe	230 871	230 871	230 871	NA
Senegal	18 077 573	18 077 573	17 973 265	2 294
Sierra Leone	8 460 512	8 460 512	8 460 512	–
South Africa	63 212 383	6 321 238	2 528 495	2 607 188
South Sudan[1]	11 483 374	11 483 374	11 483 374	–
Togo[2]	9 304 337	9 304 337	9 304 337	–
Uganda	48 656 601	48 656 601	48 656 601	–
United Republic of Tanzania	66 617 606	66 617 606	4 863 085	4 101 690
Mainland	62 845 229	62 845 229	4 587 702	2 481 515
Zanzibar[2]	3 772 377	3 772 377	275 383	1 620 175
Zambia	20 723 965	20 723 965	20 723 965	–
Zimbabwe	16 340 821	12 867 204	4 676 089	NA
AMERICAS				
Bolivia (Plurinational State of)	12 244 159	5 554 807	305 859	NA
Brazil	211 140 729	42 861 567	4 856 237	–
Colombia	52 321 152	11 583 379	5 257 229	–
Costa Rica	5 105 525	1 786 933	51 055	87 286
Dominican Republic	11 331 265	6 241 487	160 337	7 021 659
Ecuador	17 980 083	10 189 313	807 315	653 424
French Guiana[3]	303 402	167 866	28 004	–
Guatemala	18 124 837	13 682 802	2 472 772	401 007
Guyana	826 353	826 353	90 188	NA
Haiti	11 637 398	10 397 084	2 820 789	–
Honduras	10 644 851	9 642 106	2 713 160	169 355

Public sector		Private sector		Community level	
Presumed	Confirmed	Presumed	Confirmed	Presumed	Confirmed
1 398 874	8 995 776	–	–	–	102 230
16 027	1 653 919	15 971	383 377	–	–
–	651 [5]	–	–	–	–
245 444	9 299 763	294 874	937 052	–	278 565
10 059	3 885 604	3 941	465 145	–	1 255 014
22 384	1 264 235	15 683	1 109 511	–	604 008
114 580	1 596 796	23 908	244 330	–	–
129 330	1 697 679	5 733	30 242	–	431 116
–	16 863	–	2 846	–	1 370
219 714 [5]	474 766 [5]	–	–	–	43 171
686 323	6 778 203	54 700	452 420	–	1 157 903
1 972 415	25 164 969	–	–	–	2 492 793
–	76 921	–	–	–	–
1 102	69 360	–	–	–	32 042
–	607	–	238	–	–
87 082	2 414 584	1 718	107 192	–	677 592
78 608	59 248	–	–	–	–
–	114 869	–	2 141	–	1 449
122 018	2 929 729	38 391	818 141	45 891	1 946 018
32 173 [4,6]	2 231 561	–	116 755	–	353 660
2 761 [4,6]	105 491	–	7 107	–	5 482
1 200 356 [6]	5 619 026 [6]	–	–	–	–
153 803	377 433	26 866	335 822	–	100 858
18 307 [5]	2 843 012 [5,8]	–	–	–	–
25 796	5 570 050	–	–	–	856 100
133 496	2 875 640	16 541	153 591	6 989	331 326
76 991 [6]	31 424 [6]	–	–	–	–
–	38 [6,8]	–	–	–	–
6 247	11 441 134	–	–	3 314	1 789 479
–	13 735 [5]	–	–	–	–
60 539	3 824 800	16 749	223 173	–	361 722
1 330 531	22 268 235	321 492	1 617 566	661 013	212 522
–	135 911	–	94 814	–	318 601
–	2 368	–	–	–	–
35 916	140 549	5 797	10 732	1 124	38 347
48 385	1 728 549	10 122	215 164	–	146 430
–	9 890 [8]	–	–	–	–
1 418 090	2 519 271	–	–	243 361	908 966
–	1 244 737	–	344 903	–	778 066
227 658	11 251 128	329 144	2 268 788	–	2 448 864
1 673	3 142 637	751	613 790	–	16 354
1 673	3 130 891	751	607 876	–	15 673
–	11 746	–	5 914	–	681
152 159	4 444 197	–	2	–	3 874 337
–	100 380	–	3 030	–	145 289
–	10 039	–	258	–	–
–	167 170 [5]	–	–	–	–
–	105 479 [5]	–	–	–	–
–	641 [6,8]	–	–	–	–
–	146 [5,8]	–	–	–	125
–	738	–	2	–	17
–	340	–	–	–	–
–	3 053 [8]	–	–	–	–
–	26 511	–	61	–	2 204
–	6 927 [8]	–	2 123	–	5 386
–	2 631 [6]	–	–	–	–

Annex 4 – G. Population denominator for case incidence and mortality rate, and reported malaria cases by place of care, 2023

WHO region Country/area	Population			
	UN population	At risk (low + high)	At risk (high)	Number of people living in active foci
AMERICAS				
Mexico	129 739 759	2 750 482	129 739 759	554 021
Nicaragua	6 823 613	6 004 779	237 366	620 099
Panama	4 458 759	2 987 368	191 344	NA
Peru	33 845 617	13 293 204	1 694 312	NA
Suriname	628 886	92 886	26 702	0
Venezuela (Bolivarian Republic of)	28 300 854	14 150 427	5 869 173	11 629 740
EASTERN MEDITERRANEAN				
Afghanistan	41 454 761	32 006 328	11 287 402	–
Djibouti	1 152 943	864 614	404 775	–
Iran (Islamic Republic of)	90 608 707	925 114	0	363 959
Pakistan	247 504 495	243 324 144	71 570 875	–
Saudi Arabia	33 264 292	3 566 989	0	0
Somalia	18 358 615	18 358 615	9 343 984	–
Sudan	50 042 790	50 042 790	43 487 184	–
Yemen	39 390 799	25 353 517	6 193 058	–
SOUTH-EAST ASIA				
Bangladesh	171 466 990	18 479 042	2 165 690	NA
Bhutan	786 385	581 924	102 230	0
Democratic People's Republic of Korea	26 418 204	10 327 765	1 484 015	2 439 757
India	1 438 069 596	1 343 732 230	174 452 223	–
Indonesia[2]	281 190 066	281 190 066	17 979 293	NA
Myanmar	54 133 797	47 164 005	8 886 272	NA
Nepal	29 694 614	8 623 746	1 551 999	58 687
Thailand[2]	71 702 435	13 606 254	1 587 492	438 775
Timor-Leste	1 384 286	1 301 934	468 824	–
WESTERN PACIFIC				
Cambodia[2]	17 423 880	12 395 095	8 385 397	18 000
Lao People's Democratic Republic	7 664 992	3 988 371	3 988 374	17 451
Malaysia[2]	35 126 298	1 405 051	1 053 789	–
Papua New Guinea	10 389 635	10 389 635	9 766 257	–
Philippines	114 891 199	66 681 282	7 829 864	518 251
Republic of Korea	51 748 739	3 622 411	0	–
Solomon Islands	800 005	792 005	792 005	–
Vanuatu	320 408	320 408	278 514	NA
Viet Nam	100 352 191	73 958 461	6 821 440	40 750
REGIONAL SUMMARY				
African	1 187 602 338	1 083 265 202	857 001 224	7 141 844
Americas	555 457 242	152 212 843	157 321 600	21 136 591
Eastern Mediterranean	521 777 402	374 442 111	142 287 278	363 959
South-East Asia	2 074 846 373	1 725 006 966	208 678 037	2 937 219
Western Pacific	338 717 347	173 552 719	38 915 640	594 452
Total	**4 678 400 702**	**3 508 479 841**	**1 404 203 779**	**32 174 065**

RDT: rapid diagnostic test; UN: United Nations; WHO: World Health Organization.

"–" refers to not applicable.

"NA" refers to data not available in countries that are carrying out foci investigation.

[1] South Sudan became an independent state on 9 July 2011 and a Member State of WHO on 27 September 2011. South Sudan and Sudan have distinct epidemiological profiles comprising high transmission and low transmission areas, respectively. For this reason, data up to June 2011 from the Sudanese high transmission areas (10 southern states which correspond to contemporary South Sudan) and low transmission areas (15 northern states which correspond to contemporary Sudan) are reported separately.

[2] Figures include non-human malaria cases.

[3] *Source: Pan American Health Organization (PAHO)/WHO, Regional Malaria Meeting: Expanding access to malaria diagnosis and treatment, reducing malaria in high-burden municipalities. "Élargir l'accès au diagnostic et au traitement du paludisme, Situation de la malaria en Guyane Française. Agence régionale de santé (ARS-Guyane)." Bogotá, Colombia, 24–26 September 2024 (https://www.infectiologie.com/UserFiles/File/jni/2024/com/jni2024-sg3-03-epelboin.pdf). Entered by Dennis Navarro Costa, Malaria Regional Program PAHO/WHO. 10 September 2024.*

Public sector		Private sector		Community level	
Presumed	Confirmed	Presumed	Confirmed	Presumed	Confirmed
–	342	–	–	–	–
–	7 008 [6]	–	–	–	–
–	11 611 [6,8]	–	–	–	–
–	22 625	–	–	–	–
–	63	–	5	–	34
–	130 077 [7]	–	–	–	–
638	142 115	–	5 876	35	32 054
–	38 664	–	280	–	–
2	10 002	–	–	–	–
4 887	1 926 596	3	799 893	–	17 170
–	6 460 [5,8]	–	–	–	–
90 [7]	13 598 [7]	–	–	–	–
950 116	354 412	–	–	–	–
36 981	105 680	16 174	22 802	–	17 783
–	2 971	–	52	–	13 544
–	18	–	–	–	–
–	3 160	–	–	–	–
–	227 564 [6]	–	–	–	–
54	254 066	42	97 254	–	67 117
–	228 567 [6,8]	–	–	–	–
–	542	–	94	–	29
–	9 870	–	2 829	–	3 985
–	5 [6]	–	–	–	4
–	525	–	–	–	859
–	497	–	41	–	157
–	3 629 [6]	–	–	–	–
113 349	839 537	–	–	–	–
–	435	–	128	–	5 685
–	113 [8]	–	634	–	–
23 669	123 476	–	–	–	–
–	2 261 [7]	–	–	–	–
–	453 [7]	–	–	–	–
10 028 841	148 415 738	1 182 381	10 557 872	961 692	21 709 674
0	495 401	0	2 449	0	7 766
992 714	2 597 527	16 177	828 851	35	67 007
54	726 763	42	100 229	0	84 679
137 018	970 926	0	803	0	6 701
11 158 627	**153 206 355**	**1 198 600**	**11 490 204**	**961 727**	**21 875 827**

Data as of 24 October 2024

[4] Presumed cases are calculated as: test positivity rate × (suspected cases – tested).
[5] Figures reported for the public sector include cases detected in the private sector.
[6] Figures reported for the public sector include cases detected at the community level and in the private sector.
[7] Figures reported for the public sector include cases detected at the community level.
[8] Confirmed cases are corrected for double counting of microscopy and RDTs.
Note: Figures include imported cases.

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

WHO region Country/area	Method of confirmation	2015	2016	2017
AFRICAN				
Algeria[1,2,3]	Suspected cases	8 000	6 628	6 469
	Presumed and confirmed	747~	432~	453~
	Confirmed	747	432	453
	Microscopy examined	8 000	6 628	6 469
	Microscopy positive	747	432	453
	Imported cases	727	420	446
	Reporting completeness (%)	100	100	100
Angola[2]	Suspected cases	6 839 963	7 649 902	11 050 353
	Presumed and confirmed	3 254 270	4 301 146	4 500 221
	Confirmed	2 769 305	3 794 253	3 874 892
	Microscopy examined	3 345 693	4 183 727	7 493 969
	Microscopy positive	1 396 773	2 058 128	2 199 810
	RDT examined	3 009 305	2 959 282	2 931 055
	RDT positive	1 372 532	1 736 125	1 675 082
	Imported cases	–	–	–
	Reporting completeness (%)	83	87	82
Benin	Suspected cases	2 733 611	2 184 524	2 705 456
	Presumed and confirmed	2 042 684	1 667 005	1 968 532
	Confirmed	1 721 626	1 610 790	1 933 912
	Microscopy examined	296 264	267 405	267 492
	Microscopy positive	108 061	104 601	208 823
	RDT examined	2 116 289	1 860 904	2 403 344
	RDT positive	1 613 565	1 506 189	1 725 089
	Reporting completeness (%)	93	100	88
Botswana[2]	Suspected cases	1 298	12 986	12 605
	Presumed and confirmed	346	725	1 911
	Confirmed	332	723	1 909
	Microscopy examined	–	5 178	5 223
	Microscopy positive	–	–	–
	RDT examined	1 284	7 806	7 380
	RDT positive	332	723	1 909
	Imported cases	48	64	62
	Reporting completeness (%)	82	87	82
Burkina Faso	Suspected cases	9 783 385	12 006 793	14 811 872
	Presumed and confirmed	8 286 453	9 799 818	12 255 671
	Confirmed	7 015 446	9 779 411	10 557 260
	Microscopy examined	222 190	191 208	133 101
	Microscopy positive	92 589	80 077	46 411
	RDT examined	8 290 188	11 795 178	12 980 360
	RDT positive	6 922 857	9 699 334	10 510 849
	Reporting completeness (%)	100	98	97
Burundi	Suspected cases	8 761 333	13 022 128	13 956 707
	Presumed and confirmed	5 512 414	8 902 503	9 259 694
	Confirmed	5 428 710	8 793 176	8 795 952
	Microscopy examined	3 254 670	3 941 251	3 814 355
	Microscopy positive	1 964 862	2 520 622	2 269 831
	RDT examined	5 422 959	8 971 550	9 678 610
	RDT positive	3 463 848	6 272 554	6 526 121
	Reporting completeness (%)	100	100	100
Cabo Verde[1,2,3]	Suspected cases	6 620**	8 906**	16 573**
	Presumed and confirmed	27^	77^	457^
	Confirmed	27^	77^	457^
	Microscopy examined	3 117	8 393	3 857
	Microscopy positive	27	77	446
	RDT examined	6 620	8 906	16 573
	RDT positive	27	77	446
	Imported cases	20	28	23
	Reporting completeness (%)	100	100	100
Cameroon	Suspected cases	3 378 923	4 665 318	5 098 975
	Presumed and confirmed	2 381 592	2 615 750	3 607 898
	Confirmed	1 193 281	2 476 153	2 244 788
	Microscopy examined	1 024 306	1 373 802	627 709
	Microscopy positive	592 351	810 367	390 130
	RDT examined	1 166 306	3 151 919	3 108 156
	RDT positive	600 930	1 665 786	1 854 658
	Reporting completeness (%)	78	86	91

2018	2019	2020	2021	2022	2023
10 081	8 620	11 197	7 220	1 292	6 138
1 242~	1 014~	2 726~	1 164~	1 292~	427~
1 242	1 014	2 726	1 164	1 292	427
10 081	8 620	11 197	7 220	1 292	6 138
1 242	1 014	2 726	1 164	1 292	427
1 241	1 014	2 725	1 164	1 292	427
100	100	–	–	–	–
10 870 446	14 341 390	13 989 836	15 624 710	16 172 933	19 410 521
5 928 260	7 530 788	7 682 739	9 169 267	9 221 410	10 496 880
5 150 575	7 054 978	7 343 696	8 325 921	7 858 860	9 098 006
5 066 780	5 643 654	5 216 938	6 663 417	7 857 537	9 699 775
2 442 500	2 557 385	2 359 788	3 424 950	3 934 900	4 548 707
5 025 981	8 221 926	8 433 855	8 117 947	6 926 016	8 309 491
2 708 075	4 497 593	4 983 908	4 900 971	3 923 960	4 549 299
–	–	–	–	–	2
82	84	91	91	92	95
2 880 743	3 958 782	3 572 587	3 965 763	4 059 542	3 972 044
2 255 946	3 084 525*	2 632 959	2 928 382*	2 653 438	2 069 294*
1 975 812	2 895 878*	2 516 646	2 634 063*	2 557 084	2 037 296*
349 191	432 001	367 925	515 103	580 867	258 514
258 519	294 518	242 775	340 810	361 628	296 169
2 251 418	3 338 134	3 083 337	3 113 068	3 220 557	3 418 948
1 717 293	2 601 360	2 273 871	2 293 253	2 195 456	1 741 127
92	89	99	100	100	100
13 979	16 564	9 148	9 825**	17 295	16 885
585	272	953	729^	446	651
585	272	953	729^	446	651
872	707	–	729	1 003	562
–	–	–	729	–	2
13 107	15 857	9 148	9 825	16 090	16 323
585	272	953	729	446	649
51	103	69	26	49	91
86	85	62	86	100	100
14 931 136	18 116 942	15 357 249	17 892 801	17 324 387	17 073 745
11 991 146	6 474 757*	11 567 698*	12 465 543	11 958 988	11 055 698
10 278 970	5 877 426*	10 600 340*	11 791 638	11 415 559	10 515 380
157 824	270 289	203 529	339 369	370 093	520 550
56 989	52 582	81 017	187 199	195 754	269 103
13 061 136	15 997 219	13 680 757	16 879 527	16 410 865	16 012 877
10 221 981	5 824 844	10 519 323	11 604 439	11 219 805	10 246 277
98	69	96	95	98	85
8 734 322	16 214 258	8 571 445	12 379 963	14 378 061	10 854 561
5 149 436	9 983 843	4 732 339	6 618 492	8 124 159	5 619 763
4 966 511	9 959 533	4 720 103	6 615 714	8 117 435	5 605 763
1 542 232	3 858 517	1 786 568	2 667 318	2 013 113	1 893 421
1 148 316	1 759 011	756 441	1 191 319	971 263	1 279 616
7 009 165	12 331 431	6 772 641	9 593 269	12 051 825	8 947 140
3 818 195	8 200 522	3 963 662	5 424 395	7 146 172	4 326 147
100	94	99	100	100	100
16 623	7 867**	4 399**	4 327**	10 246**	15 879**
21	40~^	10~	21~	27~	37~
21	40^	10	21	27	37
16 623	5 596	1 246	4 327	10 246	20 720
21	40	10	21	27	37
–	7 867	4 399	4 279	6 196	15 879
–	40	0	0	0	0
18	39	10	20	26	36
100	100	100	100	100	100
5 036 256	4 743 338	4 567 624	5 192 692	5 162 188	4 850 510
3 550 183	3 011 133	2 974 819	3 420 788*	3 382 676*	3 015 821*
2 257 633	2 819 803	2 890 193	3 335 174*	3 327 381*	2 977 754*
658 017	1 527 436	1 304 972	1 505 989	1 361 007	1 231 506
428 888	1 097 615	956 647	1 075 831	963 595	816 808
3 085 689	2 716 410	2 840 269	3 335 377	3 544 747	3 450 690
1 828 745	1 722 188	1 933 546	2 259 343	2 363 786	2 160 946
77	86	85	93	96	97

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

WHO region Country/area	Method of confirmation	2015	2016	2017
AFRICAN				
Central African Republic	Suspected cases	1 218 246	2 095 095	1 533 258
	Presumed and confirmed	953 535	1 607 079	1 296 277
	Confirmed	598 833	1 239 317	411 913
	Microscopy examined	139 241	189 481	112 007
	Microscopy positive	106 524	144 924	28 855
	RDT examined	724 303	1 537 852	536 887
	RDT positive	492 309	1 094 393	383 058
	Reporting completeness (%)	46	76	82
Chad	Suspected cases	1 641 285	2 032 301	2 943 595
	Presumed and confirmed	1 490 556	1 402 215	1 962 372
	Confirmed	787 046	1 294 768	1 962 372
	Microscopy examined	–	1 063 293	1 584 525
	Microscopy positive	149 574	720 765	1 064 354
	RDT examined	937 775	861 561	1 359 070
	RDT positive	637 472	574 003	898 018
	Reporting completeness (%)	92	90	95
Comoros[2]	Suspected cases	117 762	116 692	229 445
	Presumed and confirmed	2 101	1 734	3 896
	Confirmed	1 884	1 467	3 896
	Microscopy examined	89 634	71 902	130 134
	Microscopy positive	963	559	1 325
	RDT examined	27 911	44 523	99 311
	RDT positive	921	908	2 571
	Imported cases	–	–	–
	Reporting completeness (%)	90	88	98
Congo	Suspected cases	300 592	466 254	322 916
	Presumed and confirmed	264 574	374 252	297 652
	Confirmed	51 529	171 847	127 939
	Microscopy examined	87 547	202 922	153 203
	Microscopy positive	51 529	134 612	127 939
	RDT examined	–	60 927	–
	RDT positive	–	37 235	–
	Reporting completeness (%)	60	87	64
Côte d’Ivoire	Suspected cases	5 216 344	5 560 136	7 262 684
	Presumed and confirmed	3 606 725	3 754 504	4 152 065
	Confirmed	3 375 904	3 754 504	4 034 781
	Microscopy examined	811 426	975 507	1 221 845
	Microscopy positive	478 870	579 566	588 969
	RDT examined	4 174 097	4 584 629	5 923 555
	RDT positive	2 897 034	3 174 938	3 445 812
	Reporting completeness (%)	96	96	100
Democratic Republic of the Congo	Suspected cases	17 617 219	23 443 227	23 195 284
	Presumed and confirmed	12 538 805	16 888 006	16 888 842
	Confirmed	12 538 805	16 821 130	16 793 002
	Microscopy examined	2 877 585	2 810 067	1 981 621
	Microscopy positive	1 902 640	1 847 143	1 291 717
	RDT examined	14 739 634	20 566 284	21 117 823
	RDT positive	10 636 165	14 973 987	15 501 285
	Reporting completeness (%)	91	93	92
Equatorial Guinea	Suspected cases	68 058	318 779	91 217
	Presumed and confirmed	15 142	147 714	15 725
	Confirmed	15 142	147 714	15 725
	Microscopy examined	21 831	239 938	13 127
	Microscopy positive	8 564	125 623	6 800
	RDT examined	46 227	78 841	78 090
	RDT positive	6 578	22 091	8 925
	Reporting completeness (%)	91	91	100
Eritrea	Suspected cases	155 782	139 798	205 836
	Presumed and confirmed	32 974	80 450	55 588
	Confirmed	28 036	24 251	54 005
	Microscopy examined	59 268	83 599	74 962
	Microscopy positive	8 332	24 251	14 519
	RDT examined	91 576	–	129 291
	RDT positive	19 704	–	39 486
	Reporting completeness (%)	91	100	100

2018	2019	2020	2021	2022	2023
1 367 986	3 393 641	2 730 158	3 069 218	3 352 129	2 793 655
995 157	2 708 497*	1 980 804	2 223 562	2 460 689	1 979 614*
972 119	2 416 960*	1 740 970	2 002 149	2 247 250	1 841 126*
163 370	265 673	237 910	246 348	276 494	262 612
117 267	196 413	177 742	189 114	214 285	201 495
1 181 578	2 781 622	2 181 204	2 504 262	2 771 175	2 295 531
854 852	2 220 547	1 563 228	1 813 035	2 032 965	1 639 631
56	79	80	95	74	67
1 941 489	2 779 742	2 955 271	2 584 679	2 755 046	3 310 497
1 364 706	1 910 518*	1 890 264*	1 811 859	1 882 503	2 294 100
1 364 706	1 632 529*	1 544 194*	1 418 539	1 671 060	2 159 037
190 006	211 816	250 117	284 426	264 439	348 113
137 501	152 127	193 816	191 628	194 912	258 941
1 751 483	2 260 256	1 873 598	1 788 058	2 073 184	2 716 597
1 227 205	1 480 402	1 350 378	1 226 911	1 476 148	1 900 096
92	95	93	96	93	97
119 592	185 045**	175 364	168 942	233 847	201 781
19 682	17 697^	4 546*	10 547*	20 681*	21 079
15 613	17 697^	4 546*	10 547*	20 681*	21 079
90 956	158 670	133 024	120 785	162 648	155 891
9 197	19 029	3 339	7 631	7 672	12 880
24 567	46 172	42 340	48 157	71 199	45 890
6 416	20 535	1 207	2 916	13 009	8 199
–	98	0	10	6	30
88	100	100	99	98	100
385 729	594 237	146 262	593 519	823 100	1 155 691
324 615	545 796	103 692	351 136*	581 329	737 651
116 903	117 837	91 538	189 616*	364 466	517 937
178 017	166 278	80 110	234 919	270 105	309 126
116 903	117 837	55 348	41 491	135 898	200 981
–	–	53 998	197 080	319 053	453 401
–	–	36 190	148 125	228 568	316 956
54	65	22	76	92	93
6 706 148	8 280 575	7 992 806	9 629 227	15 533 289	10 862 902
5 189 974	5 950 336*	5 695 412	7 633 965	8 408 469	9 129 549
4 766 477	5 935 178*	4 980 640	7 295 068	8 145 591	8 388 526
1 132 659	1 447 694	1 437 608	1 572 997	1 850 863	2 050 994
696 124	918 371	932 627	1 089 041	1 227 464	1 382 739
5 042 040	6 152 962	4 837 781	7 197 967	7 868 431	7 811 948
4 070 353	5 016 807	4 048 013	6 206 027	6 918 127	7 005 787
99	99	100	100	100	100
23 833 694	32 067 354	32 954 190	32 438 379	39 367 459	40 508 834
18 208 440	24 124 400*‡@	24 959 997‡	24 592 389*‡	29 337 562*‡	29 630 177*‡
16 972 207	21 934 127*‡	22 590 647‡	21 345 031*‡	27 296 419*‡	27 657 762*‡
1 926 455	2 152 433	2 067 978	2 450 106	2 385 163	2 412 206
995 577	1 128 371	1 214 424	1 646 553	1 358 923	1 511 993
20 671 006	26 963 687	28 054 832	26 740 915	34 941 153	36 124 213
15 976 630	20 480 310	21 376 223	21 602 612	25 990 586	26 372 237
88	92	97	95	99	99
43 533	94 656	–	–	158 244	150 425
10 926	43 897	–	–	98 346	76 921
8 962	25 904	–	–	71 204	76 921
8 395	43 417	–	–	97 694	107 466
4 135	14 787	–	–	56 886	60 403
33 174	33 246	–	–	33 408	42 959
4 827	11 117	–	–	14 318	16 518
67	67	–	–	100	100
253 687	452 673	346 565	343 054	407 463	522 151
48 326	93 878	75 756	44 036	65 853	102 504
46 440	93 878	74 041	43 463	65 063	101 402
70 465	116 666	101 966	98 068	131 509	169 340
10 325	18 117	17 936	10 114	18 147	27 810
181 336	336 007	241 982	244 413	275 147	345 710
36 115	75 761	56 105	33 349	46 916	73 592
97	97	99	97	97	98

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

WHO region Country/area	Method of confirmation	2015	2016	2017
AFRICAN				
Eswatini[2]	Suspected cases	–	1 249	3 212
	Presumed and confirmed	475^	317^	1 127^
	Confirmed	475^	317^	1 127^
	Microscopy examined	–	1 249	371
	Microscopy positive	43	141	68
	RDT examined	–	–	2 841
	RDT positive	452	458	1 594
	Imported cases	157	67	687
	Reporting completeness (%)	92	98	100
Ethiopia[2]	Suspected cases	5 987 580	6 611 801	6 471 958
	Presumed and confirmed	2 174 707	1 962 996	1 755 748
	Confirmed	1 867 059	1 718 504	1 530 739
	Microscopy examined	5 679 932	6 367 309	6 246 949
	Microscopy positive	1 867 059	1 718 504	1 530 739
	Imported cases	–	–	–
	Reporting completeness (%)	87	98	97
Gabon	Suspected cases	285 489	202 989	212 092
	Presumed and confirmed	217 287	161 508	157 639
	Confirmed	23 867	23 915	35 244
	Microscopy examined	79 308	62 658	70 820
	Microscopy positive	20 390	22 419	28 297
	RDT examined	12 761	2 738	18 877
	RDT positive	3 477	1 496	6 947
	Reporting completeness (%)	56	40	71
Gambia[2]	Suspected cases	908 082	874 690	656 212
	Presumed and confirmed	255 403	164 421	83 668
	Confirmed	246 348	162 739	78 040
	Microscopy examined	272 604	165 793	77 491
	Microscopy positive	49 649	26 397	11 343
	RDT examined	626 423	707 215	573 093
	RDT positive	196 699	136 342	66 697
	Imported cases	–	–	–
	Reporting completeness (%)	90	94	92
Ghana	Suspected cases	15 946 366	15 742 112	19 069 870
	Presumed and confirmed	11 678 306	11 451 328	13 472 089
	Confirmed	5 657 096	5 428 979	7 003 155
	Microscopy examined	2 023 581	2 594 918	2 495 536
	Microscopy positive	934 304	1 189 012	1 089 799
	RDT examined	7 901 575	7 124 845	10 105 400
	RDT positive	4 722 792	4 239 967	5 913 356
	Reporting completeness (%)	86	99	93
Guinea	Suspected cases	1 254 937	1 503 035	2 134 543
	Presumed and confirmed	895 016	992 146	1 335 323
	Confirmed	810 979	992 146	1 335 323
	Microscopy examined	78 377	79 233	99 083
	Microscopy positive	52 211	53 805	64 211
	RDT examined	1 092 523	1 423 802	2 035 460
	RDT positive	758 768	938 341	1 271 112
	Reporting completeness (%)	92	95	99
Guinea-Bissau	Suspected cases	413 727	398 429	498 879
	Presumed and confirmed	150 085	156 523	152 619
	Confirmed	150 085	156 471	152 619
	Microscopy examined	123 810	146 708	157 970
	Microscopy positive	45 789	53 014	53 770
	RDT examined	289 917	251 669	340 909
	RDT positive	104 296	103 457	98 849
	Reporting completeness (%)	98	100	93
Kenya	Suspected cases	16 037 285	16 290 286	15 362 146
	Presumed and confirmed	8 219 230	8 647 072	8 462 076
	Confirmed	2 041 277	3 064 796	3 607 026
	Microscopy examined	7 772 329	6 167 609	5 952 353
	Microscopy positive	1 025 508	1 569 045	2 215 665
	RDT examined	2 087 003	4 540 401	4 554 743
	RDT positive	1 015 769	1 495 751	1 391 361
	Reporting completeness (%)	87	96	84

2018	2019	2020	2021	2022	2023
10 285	34 866	27 979	12 894	77 682	68 109
957^	589*	325*	581	369	845
957^	589*	325*	581	369	845
1 526	15 434	8 047	8 246	162	154
957	207	121	207	95	110
8 759	19 432	19 932	4 575	77 520	67 955
11	382	204	374	274	735
271	337	82	76	155	248
90	100	99	99	91	97
5 913 799	6 708 222	7 509 602	6 716 458	7 546 500	11 738 218
1 206 891	1 015 792	1 848 231	1 487 758	1 837 213	3 288 168
962 087	904 495	1 743 755	1 397 151	1 732 562	3 199 368
5 668 995	6 596 925	7 400 644	6 625 851	7 441 849	11 649 418
962 087	904 495	1 743 755	1 397 151	1 732 562	3 199 368
–	–	–	836	1 465	1 811
93	90	90	93	86	84
1 022 022	214 286	206 908	229 360	156 958	208 456
797 278	142 917	127 500	141 195	100 290	137 856
111 719	53 182	53 659	64 957	45 783	59 248
264 676	75 819	80 266	104 166	63 388	77 681
88 112	31 184	33 349	44 330	27 887	38 747
71 787	47 712	48 330	38 736	37 481	49 014
23 607	21 998	20 310	20 627	17 896	20 501
87	87	86	89	69	83
706 868	602 947	537 205	609 029	713 242	853 363
88 654	53 386	75 801	73 781	119 104	118 459
87 448	53 386	75 801	73 781	119 104	118 459
171 668	150 585	198 658	116 036	262 070	279 636
14 510	10 982	22 226	12 642	42 480	35 224
533 994	452 362	338 547	492 993	451 172	573 727
72 938	42 404	53 575	61 139	76 624	83 235
–	–	–	–	–	166
88	85	72	82	86	90
15 542 218	11 977 117	10 433 887	12 071 445	10 930 585	11 949 730
11 154 400	6 703 687	5 879 506	6 077 543	5 456 588	5 900 188
4 931 454	6 115 267	5 447 563	5 747 585	5 239 236	5 693 888
2 659 067	3 004 989	3 088 665	3 652 265	3 409 994	3 595 100
1 105 348	1 160 426	1 401 009	1 327 675	1 264 229	1 291 576
6 660 205	8 383 708	6 820 524	8 057 955	7 284 471	8 148 330
3 826 106	4 954 841	4 046 554	4 419 910	3 975 007	4 402 312
89	97	92	98	100	99
2 608 481	3 733 346	3 431 504	4 162 127	4 549 696	4 623 872
1 246 598	2 172 260@	2 029 517@	2 450 957@	2 548 231@	2 734 149@
1 214 996	2 143 225	2 008 976	2 422 374	2 474 774	2 701 976
131 715	184 697	191 421	234 269	257 178	277 975
77 119	112 966	117 568	141 621	131 767	166 390
2 445 164	3 498 748	3 205 353	3 879 319	4 161 365	4 291 487
1 137 877	2 030 259	1 891 408	2 280 753	2 343 007	2 535 586
100	98	98	99	100	100
469 640	497 916	–	–	501 423	437 261
171 075	162 635@	–	–	185 156@	120 841@
171 075	160 907	–	–	185 156	118 080
149 423	151 262	–	–	146 666	129 968
45 564	45 675	–	–	47 359	32 061
320 217	341 365	–	–	350 222	297 303
125 511	115 232	–	–	137 797	86 019
100	100	–	–	100	91
18 435 472	8 911 133	14 060 361	13 748 015	13 508 830	15 965 481
10 875 734	5 270 358*	7 285 476*‡	4 697 886‡	5 232 307‡	6 819 382‡
2 318 090	5 019 389*	4 069 277*‡	4 270 769‡	4 890 691‡	5 619 026‡
4 282 912	–	6 591 588	7 503 911	6 154 581	6 738 733
827 947	4 656 702	1 646 648	1 496 769	1 127 502	1 298 652
5 594 916	514 579	4 179 731	5 816 987	7 012 633	8 026 392
1 490 143	362 687	2 012 522	2 331 988	3 343 289	3 939 094
87	98	98	97	98	98

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

WHO region Country/area	Method of confirmation	2015	2016	2017
AFRICAN				
Liberia	Suspected cases	2 403 783	3 105 390	2 034 027
	Presumed and confirmed	1 835 238	2 343 410	1 366 176
	Confirmed	941 711	1 191 137	1 093 115
	Microscopy examined	509 062	649 096	715 643
	Microscopy positive	305 981	381 781	425 639
	RDT examined	1 001 194	1 304 021	1 045 323
	RDT positive	635 730	809 356	667 476
	Reporting completeness (%)	87	87	86
Madagascar[2]	Suspected cases	2 386 641	2 567 451	2 610 069
	Presumed and confirmed	1 366 205	1 216 077	1 163 807
	Confirmed	939 657	686 024	985 852
	Microscopy examined	39 604	33 085	34 265
	Microscopy positive	4 748	3 734	5 134
	RDT examined	1 920 489	2 004 313	2 397 849
	RDT positive	934 909	682 290	980 718
	Imported cases	1 167	–	–
	Reporting completeness (%)	83	99	93
Malawi	Suspected cases	8 518 905	9 239 462	10 530 601
	Presumed and confirmed	4 933 416	5 165 386	5 936 348
	Confirmed	3 661 238	4 827 373	4 947 443
	Microscopy examined	216 643	240 212	127 752
	Microscopy positive	75 923	96 538	46 099
	RDT examined	7 030 084	8 661 237	9 413 944
	RDT positive	3 585 315	4 730 835	4 901 344
	Reporting completeness (%)	87	90	93
Mali	Suspected cases	4 692 412	3 778 535	3 624 885
	Presumed and confirmed	3 543 576	2 465 914	2 456 639
	Confirmed	2 454 508	2 311 098	2 277 218
	Microscopy examined	–	–	397 723
	Microscopy positive	243 151	235 212	276 673
	RDT examined	3 603 344	3 623 719	3 047 741
	RDT positive	2 211 357	2 075 886	2 000 545
	Reporting completeness (%)	70	67	96
Mauritania	Suspected cases	233 362	192 980	214 087
	Presumed and confirmed	195 740	171 348	182 677
	Confirmed	22 631	29 156	20 105
	Microscopy examined	–	–	–
	Microscopy positive	–	–	–
	RDT examined	60 253	50 788	51 515
	RDT positive	22 631	29 156	20 105
	Reporting completeness (%)	67	66	67
Mayotte[2,3]	Presumed and confirmed	11	28	19
	Confirmed	11	28	19
	Microscopy positive	11	28	19
	RDT positive	–	–	–
	Imported cases	10	10	10
	Reporting completeness (%)	67	100	100
Mozambique	Suspected cases	15 057 398	17 490 954	17 463 976
	Presumed and confirmed	8 306 986	10 373 341	9 981 277
	Confirmed	8 222 814	9 690 873	9 892 601
	Microscopy examined	2 313 129	1 886 154	1 699 589
	Microscopy positive	735 750	674 697	700 282
	RDT examined	12 660 097	14 922 332	15 675 711
	RDT positive	7 487 064	9 016 176	9 192 319
	Reporting completeness (%)	94	91	95
Namibia[2]	Suspected cases	207 612**	308 414**	616 513**
	Presumed and confirmed	12 050^	24 869^	66 141^
	Confirmed	12 050^	24 869^	66 141^
	Microscopy examined	1 471	1 778	1 778
	Microscopy positive	118	329	364
	RDT examined	207 612	308 414	616 513
	RDT positive	12 050	24 869	66 141
	Imported cases	2 888	3 980	11 874
	Reporting completeness (%)	100	100	99

2018	2019	2020	2021	2022	2023
–	1 726 913	–	1 507 881	1 214 098	1 544 769
–	1 041 800	–	983 978	760 056	994 782
–	915 845	–	912 436	696 684	814 113
–	640 901	–	478 408	356 700	685 771
–	325 658	–	304 818	218 297	399 132
–	960 057	–	957 931	794 026	678 329
–	590 187	–	607 618	478 387	414 981
–	92	–	90	98	92
2 439 906	2 866 191	3 838 721	4 571 944**	4 248 332	6 062 334**
1 078 140	984 304	1 959 962	2 365 135^	1 693 321*	2 861 319^
972 790	970 828	1 950 471	2 339 103^	1 679 547*	2 843 012^
43 759	40 619	30 406	12 495	10 305	15 292
7 400	5 932	5 075	6 759	2 852	3 874
2 290 797	2 685 182	3 798 824	4 571 944	4 224 253	6 044 027
965 390	964 896	1 945 396	2 339 103	1 676 695	2 843 012
–	7 116	1 732	203	–	–
100	96	99	98	99	100
11 513 684	10 994 966	12 645 404	13 303 404	10 899 799	13 905 437
5 865 476	5 151 732‡	7 108 848‡	6 863 146‡	4 221 797‡	6 451 946‡
5 865 476	5 129 919‡	7 078 271‡	6 829 223‡	4 196 890‡	6 426 150‡
129 575	103 754	166 959	173 924	156 925	164 343
34 735	30 328	81 201	67 963	52 173	69 682
11 384 109	10 861 320	12 439 185	13 075 023	10 711 306	13 715 298
5 830 741	5 153 779	7 057 864	6 880 537	4 173 988	6 385 640
97	97	97	100	99	100
3 725 896	5 232 430	4 382 988	4 924 702	5 572 383	5 216 664
2 614 104	3 607 237	3 363 800	3 561 439	4 004 297	3 517 583
2 345 475	3 221 535	2 666 266	3 204 130	3 771 426	3 360 557
437 903	594 303	736 392	773 071	835 860	874 810
301 880	468 011	541 755	582 149	632 358	844 635
3 019 364	4 252 425	2 927 529	3 778 046	4 490 638	4 184 828
2 043 595	2 753 524	2 124 511	2 621 981	3 139 068	2 515 922
88	94	99	98	98	99
221 121	155 658	160 032	96 044	205 333	191 823
175 841	135 120	144 709	49 560	130 720	108 415
30 609	14 869	12 425	18 660	41 901	31 424
–	–	–	–	4 600	963
–	–	–	–	1 361	529
75 889	35 407	27 748	49 972	111 914	113 869
30 609	14 869	12 425	18 660	40 540	30 895
100	100	–	–	–	–
47	55	25	–	–	38~^
47	55	25	–	–	38^
47	–	–	–	–	38
–	–	–	–	–	38
44	51	22	–	–	38
100	100	–	–	–	–
18 791 446	21 180 727	19 516 184	19 238 020	23 225 280	25 945 411
10 339 330	11 781 516	11 331 009	10 106 592	12 405 868	13 240 174
10 304 472	11 734 926	11 318 685	10 095 807	12 387 459	13 230 613
1 909 051	1 669 097	1 293 955	833 970	1 129 094	2 179 224
743 435	608 016	473 160	271 441	371 766	360 408
16 847 537	19 465 040	18 209 905	18 393 265	22 077 777	23 756 626
9 561 037	11 126 910	10 845 525	9 824 366	12 015 693	12 870 205
99	97	96	98	97	97
394 822**	295 367**	258 145**	263 202**	369 364	334 205**
36 451^	3 404^	13 636^	13 738^	11 849	13 735+
36 451^	3 404^	13 636^	13 738^	11 849	13 735+
1 215	511	809	245	1 039	938
289	301	168	100	49	145
394 822	295 367	258 145	263 202	362 797	334 205
36 451	3 404	13 636	13 738	11 800	13 587
4 021	1 064	1 342	759	1 548	1 941
100	76	100	98	98	96

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

WHO region Country/area	Method of confirmation	2015	2016	2017
AFRICAN				
Niger	Suspected cases	4 671 411	7 347 200	4 013 178
	Presumed and confirmed	3 937 742	5 166 336	2 761 268
	Confirmed	2 392 108	4 258 110	2 761 268
	Microscopy examined	295 229	3 198 194	203 583
	Microscopy positive	206 660	2 120 515	125 856
	RDT examined	2 830 548	3 240 780	3 809 595
	RDT positive	2 185 448	2 137 595	2 635 412
	Reporting completeness (%)	87	87	100
Nigeria	Suspected cases	20 243 915	29 113 322	25 106 551
	Presumed and confirmed	16 702 261	23 956 669	20 219 268
	Confirmed	8 068 583	13 598 282	13 087 878
	Microscopy examined	839 849	901 141	1 055 444
	Microscopy positive	556 871	618 363	749 118
	RDT examined	10 770 388	17 853 794	16 919 717
	RDT positive	7 511 712	12 979 919	12 338 760
	Reporting completeness (%)	65	81	87
Rwanda	Suspected cases	6 093 114	7 502 174	11 186 029
	Presumed and confirmed	2 505 794	3 380 568	5 940 533
	Confirmed	2 505 794	3 380 568	5 940 533
	Microscopy examined	5 811 267	6 603 261	6 637 571
	Microscopy positive	2 354 400	2 916 902	2 927 780
	RDT examined	281 847	898 913	4 548 458
	RDT positive	151 394	463 666	3 012 753
	Reporting completeness (%)	100	99	99
Sao Tome and Principe[2]	Suspected cases	84 348	121 409	96 612
	Presumed and confirmed	2 058	2 238	2 241
	Confirmed	2 058	2 238	2 241
	Microscopy examined	11 941	3 682	2 146
	Microscopy positive	140	33	109
	RDT examined	72 407	117 727	94 466
	RDT positive	1 918	2 205	2 132
	Imported cases	2	0	2
	Reporting completeness (%)	100	100	100
Senegal[2,4]	Suspected cases	1 421 221	1 559 054	2 035 693
	Presumed and confirmed	502 084	356 272	398 377
	Confirmed	492 253	349 540	395 706
	Microscopy examined	26 556	38 748	21 639
	Microscopy positive	17 846	9 918	10 463
	RDT examined	1 384 834	1 513 574	2 011 383
	RDT positive	474 407	339 622	385 243
	Imported cases	0	0	0
	Reporting completeness (%)	97	99	100
Sierra Leone	Suspected cases	2 337 297	2 996 959	2 935 447
	Presumed and confirmed	1 569 606	1 845 727	1 741 512
	Confirmed	1 483 376	1 775 306	1 651 236
	Microscopy examined	75 025	120 917	10 910
	Microscopy positive	37 820	60 458	5 717
	RDT examined	2 176 042	2 805 621	2 834 261
	RDT positive	1 445 556	1 714 848	1 645 519
	Reporting completeness (%)	100	97	99
South Africa[2]	Suspected cases	43 515	63 277	56 257
	Presumed and confirmed	4 959	4 323	29 615
	Confirmed	4 959	4 323	29 615
	Microscopy examined	13 917	20 653	–
	Microscopy positive	785	1 219	9 592
	RDT examined	29 598	42 624	56 257
	RDT positive	4 174	3 104	20 023
	Imported cases	3 568	3 075	6 234
	Reporting completeness (%)	98	87	87
South Sudan[4,5]	Suspected cases	3 814 332	566 043	5 391 360
	Presumed and confirmed	3 789 475	555 957	4 054 795
	Confirmed	24 371	7 619	1 488 005
	Microscopy examined	22 721	6 954	800 067
	Microscopy positive	11 272	2 357	335 642
	RDT examined	26 507	10 751	2 024 503
	RDT positive	13 099	5 262	1 152 363
	Reporting completeness (%)	67	56	59

2018	2019	2020	2021	2022	2023
4 810 919	6 214 192	7 110 541	6 506 016	9 001 730	15 265 405
3 358 058	4 402 685	5 235 815	4 661 376	5 648 740	4 486 983
3 046 450	3 771 451	4 377 938	4 044 707	5 166 412	4 409 695
213 795	303 115	337 657	264 694	445 044	7 929 067
121 657	211 783	223 601	198 998	267 548	4 409 695
4 285 516	5 279 843	5 915 007	5 624 653	8 074 358	–
2 924 793	3 559 668	4 154 337	3 845 709	4 898 864	–
89	97	94	90	100	–
25 381 459	29 489 245	27 370 935	30 202 722	32 983 459	35 179 110
20 482 380	23 376 793	21 580 055	23 608 797	24 968 466	26 411 359
14 548 024	19 806 915	18 325 240	21 325 186	23 050 405	24 098 323
1 428 731	3 298 156	3 086 039	3 405 012	3 186 224	3 200 671
1 023 273	2 476 514	2 312 163	2 559 742	2 377 840	2 448 643
18 018 372	22 621 211	21 030 081	24 514 099	27 879 174	29 665 403
13 524 751	17 330 401	16 013 077	18 765 444	20 672 565	21 649 680
61	90	65	80	92	95
9 666 424	8 829 176	6 879 911	5 576 953	5 117 823	4 293 184
4 231 883	3 612 822	2 043 392	1 163 670*	857 228	549 326
4 231 883	3 612 822	2 043 392	1 163 670*	857 228	549 326
5 501 455	4 576 495	3 181 252	3 175 568	3 023 720	2 535 594
1 657 793	1 144 762	493 480	259 161	205 153	126 393
4 164 969	4 252 681	3 698 659	2 401 385	2 094 103	1 757 590
2 574 090	2 468 060	1 549 912	904 509	652 075	422 933
99	99	99	99	99	98
169 883	163 188	195 365	163 496	228 377	229 918
2 940	2 457	1 944	2 730	3 979	2 368
2 940	2 457	1 944	2 730	3 979	2 368
13 186	4 071	30 265	6 739	4 058	3 896
148	306	1 544	2 397	2 502	2 278
156 697	159 117	165 100	156 757	224 319	226 022
2 792	2 151	400	333	1 477	90
3	10	11	11	9	20
100	100	100	100	97	–
2 096 124	2 010 398	2 206 842	2 632 540	2 193 851	935 141
536 745	359 246	452 984	547 773	391 679	232 465
530 944	354 708	445 313	536 850	358 033	189 628
12 881	11 356	13 641	15 963	20 296	20 177
3 997	2 496	3 881	5 222	4 664	4 874
2 077 442	1 994 504	2 185 530	2 605 654	2 139 909	872 127
526 947	352 212	441 432	531 628	353 369	184 754
292	45	0	0	0	0
98	99	100	99	73	22
2 895 596	4 169 146	1 860 018	3 174 623	2 979 539	3 219 405
1 781 855	2 445 392	1 223 397	2 043 818	1 862 886	2 148 650
1 733 831	2 407 505	725 006	1 953 902	1 768 419	2 090 143
20 155	140 768	149 100	137 649	167 999	279 472
8 719	35 055	71 001	71 448	78 371	163 430
2 827 417	3 990 491	1 212 527	2 947 058	2 660 791	2 881 426
1 725 112	2 372 450	654 005	1 882 454	1 690 048	1 926 713
99	95	81	97	100	96
–	–	98 562	97 213**	28 641**	120 395**
10 789	13 833	8 126^	5 889	7 280^	9 890^
10 789	13 833	8 126^	5 889	7 280^	9 890^
–	–	4 654	1 426	6 758	3 230
2 666	477	622	1 426	1 190	1 161
–	–	11 982	96 802	28 641	120 395
8 123	13 356	8 126	4 463	7 280	9 890
5 742	8 890	3 663	2 917	5 237	4 599
87	87	95	80	80	85
6 405 779	5 258 306	–	4 038 950	9 874 633	5 960 194
4 697 506	4 064 662	1 805 371*‡	3 149 649	5 538 588	5 089 688
98 843	1 903 742	661 922*‡	2 017 227	2 527 657	3 428 237
1 204	4 689	33 656	300 439	3 593 783	419 801
634	1 237	16 535	173 612	259 472	244 260
1 805 912	3 092 697	280 150	2 606 089	3 269 919	3 183 977
98 209	1 902 505	192 095	1 843 615	2 268 185	3 183 977
59	55	52	30	41	55

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

WHO region Country/area	Method of confirmation	2015	2016	2017
AFRICAN				
Togo	Suspected cases	2 356 048	2 577 029	2 747 984
	Presumed and confirmed	1 610 711	1 746 334	1 756 582
	Confirmed	1 610 711	1 746 334	1 756 582
	Microscopy examined	643 815	501 516	482 664
	Microscopy positive	317 578	231 919	209 626
	RDT examined	1 712 233	2 075 513	2 265 320
	RDT positive	1 293 133	1 514 415	1 546 956
	Reporting completeness (%)	98	100	97
Uganda	Suspected cases	22 952 246	27 257 784	22 319 643
	Presumed and confirmed	13 696 889	14 008 604	11 667 831
	Confirmed	7 412 747	9 735 849	11 667 831
	Microscopy examined	3 684 722	4 492 090	5 515 931
	Microscopy positive	1 248 576	1 542 091	1 694 441
	RDT examined	12 983 382	18 492 939	16 803 712
	RDT positive	6 164 171	8 193 758	9 973 390
	Reporting completeness (%)	99	96	99
United Republic of Tanzania[2]	Suspected cases	20 829 480	17 881 657	20 276 522
	Presumed and confirmed	8 406 354	6 624 054	5 988 136
	Confirmed	4 902 828	5 762 462	5 744 907
	Microscopy examined	673 223	1 386 389	2 888 538
	Microscopy positive	412 702	1 262 679	916 742
	RDT examined	16 652 731	15 633 676	17 144 755
	RDT positive	4 490 126	4 499 783	4 828 165
	Imported cases	2 550[$]	–	–
	Reporting completeness (%)	90	99	96
Mainland[2]	Suspected cases	20 451 119	17 526 829	19 930 496
	Presumed and confirmed	8 400 537	6 617 261	5 982 270
	Confirmed	4 898 211	5 755 669	5 739 863
	Microscopy examined	532 118	1 285 720	2 826 948
	Microscopy positive	411 741	1 261 650	915 887
	RDT examined	16 416 675	15 379 517	16 861 141
	RDT positive	4 486 470	4 494 019	4 823 976
	Imported cases	–	–	–
	Reporting completeness (%)	90	99	96
Zanzibar[2]	Suspected cases	378 361	354 828	346 026
	Presumed and confirmed	5 817	6 793	5 866
	Confirmed	4 617	6 793	5 044
	Microscopy examined	141 105	100 669	61 590
	Microscopy positive	961	1 029	855
	RDT examined	236 056	254 159	283 614
	RDT positive	3 656	5 764	4 189
	Imported cases	2 550	–	–
	Reporting completeness (%)	89	100	92
Zambia	Suspected cases	8 116 962	9 627 862	10 952 323
	Presumed and confirmed	5 094 123	5 976 192	6 054 679
	Confirmed	4 184 661	4 851 319	5 505 639
	Microscopy examined	–	–	–
	Microscopy positive	–	–	–
	RDT examined	7 207 500	8 502 989	10 403 283
	RDT positive	4 184 661	4 851 319	5 505 639
	Reporting completeness (%)	91	87	91
Zimbabwe[2]	Suspected cases	1 693 630	1 499 675	1 828 301
	Presumed and confirmed	484 794	384 029	767 069
	Confirmed	484 794	316 989	471 798
	Microscopy examined	55 192	102 566	–
	Microscopy positive	2 415	2 986	3 522
	RDT examined	1 638 438	1 330 069	1 533 030
	RDT positive	482 379	314 003	468 276
	Imported cases	180	358	768
	Reporting completeness (%)	98	98	96

2018	2019	2020	2021	2022	2023
3 009 800	3 531 375	2 908 748	3 091 060	3 536 879	3 825 451
2 002 877	2 406 091	1 737 469	1 845 368[‡]	2 222 943[‡]	2 367 706[*‡]
2 002 877	2 406 091	1 737 469	1 845 368[‡]	2 222 943[‡]	2 367 706[*‡]
446 404	492 629	478 736	623 623	545 147	543 207
229 267	269 526	226 894	245 956	197 157	193 512
2 563 396	3 038 746	2 167 823	2 332 983	2 911 059	3 245 720
1 773 610	2 136 565	1 510 575	1 617 949	2 017 505	2 174 156
100	99	96	97	98	99
17 111 650	25 756 835	27 434 176	25 048 071	30 886 839	28 323 479
8 522 824	15 592 793	17 475 040[£]	15 144 755[*£]	20 012 873[£]	16 525 582[£]
5 759 174	13 982 362	16 329 136[£]	14 336 387[*£]	19 185 472[£]	15 968 780[£]
1 606 330	4 691 859	4 284 114	4 029 037	4 850 295	5 268 889
458 909	1 622 576	1 647 933	1 513 116	1 867 654	2 025 021
12 741 670	19 454 545	22 004 158	20 210 666	25 155 167	21 994 962
5 300 265	12 359 786	12 548 724	11 131 747	15 006 036	12 164 951
87	100	99	99	97	100
22 784 288	20 997 372	22 471 902	20 794 633	19 062 775	21 239 449
6 558 257[+]	6 575 185[+]	6 346 069[+]	4 632 180[+]	3 666 741[+]	3 775 205[+]
6 392 846[+]	6 485 437[+]	6 308 276[+]	4 623 393[+]	3 661 208[+]	3 772 781[+]
3 015 052	1 840 897	1 696 487	1 534 975	1 151 121	1 083 187
831 903	366 673	296 052	229 485	174 640	177 895
19 603 825	18 861 368	20 620 288	19 210 871	17 898 920	20 120 618
5 221 811	5 546 911	5 681 861	4 227 333	3 355 968	3 448 987
1 754[$]	3 286[$]	4 314[$]	4 319[$]	6 244	9 540
98	98	96	96	94	93
22 440 865	20 570 343	22 009 560	20 273 766	18 629 918	20 633 435
6 554 247[£]	6 568 222[£]	6 331 881[£]	4 625 830[£]	3 662 184[*£]	3 756 864[*£]
6 389 514[£]	6 478 474[£]	6 294 088[£]	4 617 043[£]	3 656 651[*£]	3 754 440[*£]
2 937 666	1 768 635	1 627 724	1 480 697	1 113 993	1 046 377
830 668	364 890	293 049	228 379	174 276	171 856
19 338 466	18 711 960	20 344 043	18 784 282	17 510 392	19 584 634
5 219 714	5 541 731	5 670 676	4 222 089	3 351 775	3 436 685
–	–	–	–	2 951	5 370
98	97	97	96	94	94
343 423	427 029	462 342	520 867	432 857	606 014
4 010	6 963	14 188[*]	6 350	4 557	18 341
3 332	6 963	14 188[*]	6 350	4 557	18 341
77 386	72 262	68 763	54 278	37 128	36 810
1 235	1 783	3 003	1 106	364	6 039
265 359	149 408	276 245	426 589	388 528	535 984
2 097	5 180	11 185	5 244	4 193	12 302
1 754	3 286	4 314	4 319	3 293	4 170
92	100	94	98	94	96
10 055 407	11 340 409	15 491 235	13 957 528	16 376 877	21 599 012
5 195 723	5 360 020	8 698 304	7 159 243	8 318 534	8 470 695
5 039 679	5 147 350	8 121 215	6 769 142	8 126 829	8 318 536
180 697	275 323	398 195	446 750	416 225	416 225
49 855	78 474	128 291	117 585	98 782	98 782
9 718 666	10 852 416	14 513 049	13 120 677	15 768 947	20 694 119
4 989 824	5 068 876	7 992 924	6 651 557	8 028 047	8 219 754
93	92	97	93	100	99
1 293 392	1 324 299	1 389 065	922 001	985 957	1 197 321
266 789	308 173	447 381	133 137	141 076	248 699
266 789	308 173	447 381	133 137	141 076	248 699
–	–	–	–	–	–
2 771	–	–	–	–	–
1 290 621	1 297 197	1 356 433	904 833	967 891	1 178 340
264 018	308 173	447 381	133 137	141 076	248 699
672	–	–	–	–	2 545
98	98	98	96	98	99

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

WHO region Country/area	Method of confirmation	2015	2016	2017
AMERICAS				
Argentina[1,2,3]	Suspected cases	3 862	3 479	2 114
	Presumed and confirmed	11~	9~	16~^
	Confirmed	11	9	16^
	Microscopy examined	3 862	3 479	2 114
	Microscopy positive	11	9	16
	RDT positive	–	–	2
	Imported cases	11	9	18
	Reporting completeness (%)	100	94	100
Belize[1,2,3]	Suspected cases	26 367	20 936	26 995
	Presumed and confirmed	13^	5	9^
	Confirmed	13^	5	9^
	Microscopy examined	26 367	20 936	26 995
	Microscopy positive	13	5	9
	RDT examined	–	–	–
	RDT positive	5	–	3
	Imported cases	4	1	2
	Reporting completeness (%)	100	100	100
Bolivia (Plurinational State of)[2]	Suspected cases	159 167	155 407	151 697
	Presumed and confirmed	6 907	5 553	4 587
	Confirmed	6 907	5 553	4 587
	Microscopy examined	159 167	155 407	151 697
	Microscopy positive	6 907	5 553	4 334
	RDT examined	–	–	–
	RDT positive	–	–	253
	Imported cases	33	11	15
	Reporting completeness (%)	99	100	100
Brazil[2]	Suspected cases	1 590 403	1 364 912	1 696 063
	Presumed and confirmed	169 390+	152 160+	238 517+
	Confirmed	169 390+	152 160+	238 517+
	Microscopy examined	1 573 538	1 341 639	1 656 685
	Microscopy positive	139 844	124 210	184 876
	RDT examined	16 865	23 273	39 378
	RDT positive	3 318	5 034	9 549
	Imported cases	4 932	5 068	4 867
	Relapse cases	23 229	22 916	44 092
	Reporting completeness (%)	100	100	100
Colombia[2]	Suspected cases	328 434	296 091	254 380
	Presumed and confirmed	65 453+	86 407+	56 515+
	Confirmed	65 453+	86 407+	56 515+
	Microscopy examined	316 451	242 973	244 732
	Microscopy positive	48 059	57 515	38 349
	RDT examined	11 983	53 118	9 648
	RDT positive	3 535	5 655	5 056
	Imported cases	7 785	618	1 297
	Reporting completeness (%)	100	100	100
Costa Rica[2]	Suspected cases	7 373**	5 160**	9 680**
	Presumed and confirmed	8^	13^	25^
	Confirmed	8~^	13^	25^
	Microscopy examined	7 373	5 160	9 680
	Microscopy positive	8	13	25
	RDT examined	3	2	3
	RDT positive	3	2	3
	Imported cases	8	9	13
	Relapse cases	0	0	0
	Reporting completeness (%)	100	100	100
Dominican Republic[2]	Suspected cases	317 257**	251 245	226 988**
	Presumed and confirmed	661^	755‡	398^
	Confirmed	661^	755‡	398^
	Microscopy examined	317 257	228 795	226 988
	Microscopy positive	661	487	398
	RDT examined	7 659	22 450	87 397
	RDT positive	129	80	74
	Imported cases	30	65	57
	Relapse cases	0	3	0
	Reporting completeness (%)	100	100	96

2018	2019	2020	2021	2022	2023
345	2 850	1 268	439	1 077	337
28[~]	22[~]	13[~]	13[~]	10[~]	16[~]
28	22	13	13	10	16
345	2 850	1 268	439	1 077	337
28	22	13	13	10	16
–	–	–	–	–	–
23	22	13	13	10	16
–	100	–	–	–	–
17 642	19 731	10 711**	10 893**	28 121	23 163
7	2[~]	0[~]	0[~]	0[~]	2[~]
7	2	0	0	0	2
17 642	19 731	10 711	10 893	10 514	15 870
7	2	0	0	0	2
–	–	114	7 278	16 299	6 864
–	–	0	0	0	0
4	2	0	0	0	2
100	100	–	87	–	–
139 938	137 473	136 795	139 279	155 466	197 270**
5 354	9 357	12 187	9 959	10 330	10 297
5 354	9 357	12 187	9 959	10 330	10 297
139 938	110 028	–	–	–	197 270
5 261	8 118	8 507	7 404	7 692	7 401
–	27 445	–	–	–	197 270
93	1 239	3 680	2 555	2 638	2 896
12	19	7	15	9	10
100	100	100	100	100	100
1 800 465	1 591 308	1 232 321	1 234 266	1 391 127	1 407 046
244 042[+]	190 745[+]	172 419[+]	163 585[+]	151 530[+]	167 170[+]
244 042[+]	190 745[+]	172 419[+]	163 585[+]	151 530[+]	167 170[+]
1 754 244	1 539 938	1 163 048	1 138 847	1 151 314	1 218 807
181 968	146 868	127 403	119 735	113 752	119 920
46 221	51 370	69 273	95 419	80 477	94 295
12 606	10 586	17 785	20 651	17 502	22 917
6 816	4 165	1 811	1 365	2 254	2 564
49 469	33 286	27 213	23 199	20 276	24 345
100	100	100	95	–	87
208 538	295 406	212 399	239 060	222 903	304 207
63 143[+]	82 721[+]	81 829[+,++]	74 707[+]	73 561	105 479[+]
63 143[+]	82 721[+]	81 829[+,++]	74 707[+]	73 561	105 479[+]
195 286	283 471	202 736	222 155	195 291	243 548
42 810	47 806	40 155	34 114	59 811	61 618
13 252	11 935	9 663	16 905	27 612	60 659
3 407	3 703	5 284	5 396	13 750	15 445
1 948	2 306	466	733	864	625
87	87	100	95	100	100
9 000**	10 631	7 754**	12 383**	10 946**	47 461**
152[^]	149	145[^]	232[^]	462[^]	641[^]
152[^]	149	145[^]	232[^]	462[^]	641[^]
9 000	10 631	4 200	2 001	10 946	16 488
110	149	141	232	409	650
700	–	3 647	12 383	20 093	47 461
44	–	93	128	398	350
38	45	34	27	36	93
2	4	4	12	5	2
100	100	100	–	100	100
132 775**	143 366**	59 826**	48 139**	77 709	46 009**
484[^]	1 314[^]	829[^]	291	337	271[^]
484[^]	1 314[^]	829[^]	291	337	271[^]
132 775	143 366	59 843	48 139	49 466	46 549
322	1 314	829	17	0	271
42 425	55 000	7 570	26 839	28 243	46 009
221	1 313	241	274	337	271
87	37	3	7	17	18
23	3	0	0	0	0
95	96	96	88	91	98

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

WHO region Country/area	Method of confirmation	2015	2016	2017
AMERICAS				
Ecuador[2]	Suspected cases	261 824	311 920	306 894
	Presumed and confirmed	686^	1 424	1 380^
	Confirmed	686^	1 424	1 380^
	Microscopy examined	261 824	311 920	306 894
	Microscopy positive	686	1 424	1 380
	RDT examined	–	–	–
	RDT positive	6	–	6
	Imported cases	59	233	105
	Reporting completeness (%)	100	100	100
El Salvador[1,2,3]	Suspected cases	89 267	81 904	70 022
	Presumed and confirmed	9	14	4~
	Confirmed	9	14	4
	Microscopy examined	89 267	81 904	70 022
	Microscopy positive	9	14	4
	RDT examined	–	–	–
	RDT positive	–	–	–
	Imported cases	4	1	3
	Reporting completeness (%)	100	100	100
French Guiana[2,6]	Suspected cases	11 558	9 430	–
	Presumed and confirmed	434	258	597
	Confirmed	434	258	597
	Microscopy examined	11 558	9 430	–
	Microscopy positive	297	173	468
	RDT examined	–	–	–
	RDT positive	137	85	129
	Imported cases	60	41	43
	Relapse cases	–	–	–
	Reporting completeness (%)	90	90	90
Guatemala[2]	Suspected cases	295 246**	333 535**	372 158**
	Presumed and confirmed	5 540^	5 001‡	4 124^
	Confirmed	5 540^	5 001‡	4 124^
	Microscopy examined	295 246	333 535	372 158
	Microscopy positive	5 538	4 854	3 744
	RDT examined	6 500	74 859	170 325
	RDT positive	1 298	1	2 078
	Imported cases	2	1	3
	Reporting completeness (%)	100	97	97
Guyana[2]	Suspected cases	132 941	117 483	100 348
	Presumed and confirmed	9 984	11 108^	13 936^
	Confirmed	9 984	11 108^	13 936^
	Microscopy examined	132 941	110 891	100 105
	Microscopy positive	9 984	10 906	13 734
	RDT examined	–	6 592	243
	RDT positive	–	1 724	242
	Imported cases	–	411	–
	Reporting completeness (%)	58	59	65
Haiti	Suspected cases	330 603	459 959	330 738**
	Presumed and confirmed	17 583^	21 430^	19 135^
	Confirmed	17 583^	21 430^	19 135^
	Microscopy examined	69 659	61 428	62 539
	Microscopy positive	5 224	4 342	2 119
	RDT examined	260 944	398 531	301 812
	RDT positive	12 702	23 325	18 309
	Reporting completeness (%)	84	91	89
Honduras[2]	Suspected cases	152 730**	173 651**	148 160**
	Presumed and confirmed	3 555^	4 097^	1 283^
	Confirmed	3 555^	4 097^	1 283^
	Microscopy examined	150 854	167 836	148 160
	Microscopy positive	3 555	4 097	1 283
	RDT examined	4 928	20 745	25 870
	RDT positive	79	657	263
	Imported cases	0	3	10
	Relapse cases	0	0	0
	Reporting completeness (%)	100	99	99

2018	2019	2020	2021	2022	2023
237 995**	177 742	163 990	184 862	122 820	149 975
1 806	1 909	2 089+	2 436+	1 666*+	757
1 806	1 909	2 089+	2 436+	1 666*+	757
237 995	177 742	163 607	149 568	122 504	93 853
1 589	1 428	1 618	1 778	1 213	414
6 782	–	383	35 294	316	56 122
217	481	383	467	315	343
153	106	67	70	42	59
100	99	92	100	98	92
52 216**	89 992	18 868	12 415	22 235	26 409
2~^	3~	0~	4~	1~	8~
2^	3	0	4	1	8
52 216	89 992	18 868	12 415	22 235	26 409
2	3	0	4	1	8
1	–	–	–	–	–
1	–	–	–	–	–
2	3	0	4	1	7
100	–	100	–	–	–
–	–	6 238	–	5 322**	–
546	212§	154	143	51^	340
546	212§	154	143	51^	340
–	–	6 238	–	4 600	8 392
546	178	120	122	38	340
–	–	–	–	736	–
–	34	34	21	27	–
–	36	14	37	15	–
–	–	–	32	15	–
100	100	–	–	98	–
438 833**	427 239**	319 660**	369 252	454 272	376 483**
3 021^	2 072^	1 058^	1 274+	1 856+	3 053^
3 021^	2 072^	1 058^	1 274+	1 856+	3 053^
438 833	427 239	319 660	369 252	381 272	348 479
3 021	2 072	1 058	1 273	1 811	3 053
75 300	61 275	16 000	–	73 000	34 547
1 748	1 309	292	–	–	2 203
3	3	0	–	–	7
100	100	100	100	100	100
101 346	103 836	72 821**	89 809	93 879	125 930
17 038^	18 826	17 230^	20 850*	20 769*	28 776
17 038^	18 826	17 230^	20 850*	20 769*	28 776
95 986	85 736	49 496	63 165	73 726	91 904
15 607	13 840	8 932	11 785	15 106	18 634
5 360	18 100	27 116	26 622	20 153	34 026
3 570	4 986	10 025	9 065	5 663	10 142
–	184	51	64	39	243
75	84	91	95	92	99
287 522**	266 675	245 202	198 881	230 117	157 340**
8 828^	10 687	22 996‡	9 513^	14 757	14 436^
8 828^	10 687	22 996‡	9 513^	14 757	14 436^
59 803	35 144	7 855	18 130	23 157	23 541
1 586	765	1 446	674	831	819
253 001	231 531	226 374	180 751	206 960	157 340
8 232	9 922	21 541	9 333	13 926	14 436
85	93	93	75	–	93
142 780**	142 870**	10 350	165 853	159 584	194 506
653^	391^	913^	1 657^	3 580*	2 631
653^	391^	913^	1 657^	3 580*	2 631
142 780	142 870	–	151 244	138 052	146 159
653	391	913	1 657	3 321	1 364
31 556	18 754	10 350	14 609	21 532	48 347
454	193	539	968	259	1 267
21	61	98	105	36	38
3	0	0	19	4	4
87	100	–	95	95	–

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

WHO region Country/area	Method of confirmation	2015	2016	2017
AMERICAS				
Mexico[2]	Suspected cases	867 853**	798 568**	644 174**
	Presumed and confirmed	551^	596^	765^
	Confirmed	551^	596^	765^
	Microscopy examined	867 853	798 568	644 174
	Microscopy positive	551	596	765
	RDT examined	7	6	6
	RDT positive	7	6	6
	Imported cases	34	45	29
	Relapse cases	0	0	5
	Reporting completeness (%)	100	97	97
Nicaragua[2]	Suspected cases	604 418	554 415	663 132
	Presumed and confirmed	2 308	6 284	10 952
	Confirmed	2 308	6 284	10 952
	Microscopy examined	604 418	553 615	660 452
	Microscopy positive	2 308	6 284	10 952
	RDT examined	–	800	2 680
	RDT positive	–	–	–
	Imported cases	29	12	3
	Relapse cases	–	–	–
	Reporting completeness (%)	100	100	100
Panama[2]	Suspected cases	64 511	50 772	38 270**
	Presumed and confirmed	562^	811^	689^
	Confirmed	562^	811^	689^
	Microscopy examined	64 511	50 772	38 270
	Microscopy positive	562	811	689
	RDT examined	–	–	829
	RDT positive	3	5	689
	Imported cases	16	42	40
	Relapse cases	0	0	0
	Reporting completeness (%)	100	100	81
Paraguay[1,2,3]	Suspected cases	6 687**	3 192**	8 014**
	Presumed and confirmed	8~^	10~^	5~^
	Confirmed	8^	10^	5^
	Microscopy examined	6 687	3 192	8 014
	Microscopy positive	8	10	5
	RDT examined	10	1	1 267
	RDT positive	1	1	2
	Imported cases	8	10	5
	Reporting completeness (%)	100	100	100
Peru[2]	Suspected cases	865 980**	566 230	388 699**
	Presumed and confirmed	66 609^	56 671	55 367^
	Confirmed	66 609^	56 671	55 367^
	Microscopy examined	865 980	566 230	388 699
	Microscopy positive	66 609	56 671	55 367
	RDT examined	18 133	–	13 924
	RDT positive	463	–	2 325
	Imported cases	–	48	57
	Reporting completeness (%)	87	100	93
Suriname[2,3]	Suspected cases	15 236	23 444	22 302
	Presumed and confirmed	376	332	551^
	Confirmed	376	332	551^
	Microscopy examined	15 083	14 946	12 536
	Microscopy positive	345	321	412
	RDT examined	153	8 498	9 766
	RDT positive	31	11	160
	Imported cases	295	251	414
	Relapse cases	0	3	0
	Reporting completeness (%)	97	97	97
Venezuela (Bolivarian Republic of)[2]	Suspected cases	625 174	852 556	1 144 635
	Presumed and confirmed	137 996	301 466	525 897
	Confirmed	137 996	301 466	525 897
	Microscopy examined	625 174	852 556	1 144 635
	Microscopy positive	137 996	301 466	525 897
	RDT examined	–	–	–
	RDT positive	–	–	–
	Imported cases	1 594	1 948	2 941
	Relapse cases	–	58 390	111 360
	Reporting completeness (%)	95	97	97

2018	2019	2020	2021	2022	2023
548 247	531 471**	242 200	298 496	376 185	358 368
803^	641^	369	275	244	342
803^	641^	369	275	244	342
548 247	531 471	242 200	298 496	372 714	355 092
836	641	369	275	215	273
–	161	–	–	3 471	3 276
–	3	–	–	29	69
23	22	10	31	77	298
10	1	2	2	3	–
90	91	89	–	95	98
831 077**	1 029 288	947 451	1 158 806	1 616 617	2 118 727
15 934^	13 226	31 763	23 323	16 158+	7 008+
15 934^	13 226	25 530	23 323	16 158+	7 008+
831 077	1 001 225	884 821	1 158 806	–	1 806 437
15 934	12 337	18 799	16 684	10 361	3 427
44 905	28 063	56 397	–	–	312 290
2 885	889	6 731	6 639	5 747	3 342
17	26	25	64	50	43
–	–	–	–	–	239
100	100	–	100	100	100
23 383**	22 171	14 809	18 779**	44 785**	97 647**
715^	1 597	2 206++	4 364‡	7 173^	11 611^
715^	1 597	2 206++	4 364‡	7 173^	11 611^
23 383	18 217	7 027	6 105	25 732	76 184
715	1 209	1 358	649	628	1 654
1 141	3 954	7 782	17 239	29 319	44 446
424	388	2 109	4 253	6 800	10 025
31	15	10	7	31	56
0	130	135	192	467	2 021
87	100	–	63	93	–
–	11 415	11 221	11 073**	11 183**	9 411
0~‡	2~	1~	4~^	3~^	0~
0‡	2	1	4^	3^	0
–	11 336	11 196	11 073	11 183	9 405
0	1	1	4	3	0
–	79	25	153	49	6
–	1	0	3	3	0
0	2	1	4	3	0
100	100	–	–	–	–
304 785**	243 240	–	412 933	279 778	–
45 619^	24 483	15 847	18 140	27 785	22 625
45 619^	24 483	15 847	18 140	27 785	22 625
304 785	243 240	–	412 933	278 546	–
45 619	24 483	15 847	18 140	26 553	22 625
160 000	–	–	–	1 232	–
1 000	–	–	–	1 232	–
176	159	25	65	0	11
100	78	60	100	–	100
19 836	20 743	14 057**	16 597**	11 445**	21 713
235	215	238^	77^	61~	102~
235	215	238^	77^	61	102
11 799	13 702	13 798	16 592	11 445	10 919
218	209	238	77	51	90
8 037	7 041	14 043	16 513	11 433	10 794
17	6	6	76	10	12
198	111	88	53	60	102
7	0	3	0	0	0
97	93	87	97	98	95
699 130	1 104 736	725 591	600 242	553 872	682 200
522 059+	492 753+	232 757++	194 057	151 458*	130 077*
522 059+	492 753+	232 757++	194 057	151 458*	130 077*
699 130	1 040 683	655 707	342 616	283 790	262 862
404 924	398 285	197 466	113 863	81 002	54 663
–	64 053	69 884	257 626	270 082	419 338
48 117	64 053	69 884	80 194	70 456	75 414
2 125	1 848	1 356	829	1 544	1 377
106 886	87 029	31 308	12 806	14 274	14 481
99	100	100	100	90	90

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

WHO region Country/area	Method of confirmation	2015	2016	2017
EASTERN MEDITERRANEAN				
Afghanistan	Suspected cases	939 964	1 055 368	1 143 511
	Presumed and confirmed	383 008	436 017	413 536
	Confirmed	119 859	241 233	313 086
	Microscopy examined	538 789	598 556	611 904
	Microscopy positive	103 377	151 528	194 866
	RDT examined	138 026	262 028	431 157
	RDT positive	16 482	89 705	118 220
	Reporting completeness (%)	90	92	93
Djibouti	Suspected cases	10 586	19 492	75 594
	Presumed and confirmed	9 557	13 822	14 810
	Confirmed	9 473	13 822	14 810
	Microscopy examined	10 502	19 492	24 504
	Microscopy positive	1 764	2 280	1 283
	RDT examined	–	–	51 090
	RDT positive	7 709	11 542	13 527
	Reporting completeness (%)	87	87	91
Iran (Islamic Republic of)[2]	Suspected cases	610 337	418 125	383 397
	Presumed and confirmed	799	705	939
	Confirmed	799	705	939
	Microscopy examined	610 337	418 125	383 397
	Microscopy positive	799	705	939
	RDT examined	–	–	–
	RDT positive	–	–	–
	Imported cases	632	611	868
	Relapse cases	2	3	0
	Reporting completeness (%)	100	100	100
Pakistan	Suspected cases	8 943 120	8 216 519	8 200 987
	Presumed and confirmed	3 778 090	2 126 497	2 209 708
	Confirmed	203 859	329 005	369 817
	Microscopy examined	4 620 326	5 091 840	4 539 957
	Microscopy positive	138 130	157 554	132 580
	RDT examined	748 563	1 327 187	1 821 139
	RDT positive	65 729	171 451	237 237
	Reporting completeness (%)	72	72	88
Saudi Arabia[2,3]	Suspected cases	1 306 700	1 267 933	1 073 998
	Presumed and confirmed	2 620	5 382	3 151
	Confirmed	2 620	5 382	3 151
	Microscopy examined	1 306 700	1 267 933	1 073 998
	Microscopy positive	2 620	5 382	3 151
	RDT examined	–	–	–
	RDT positive	–	–	–
	Imported cases	2 537	5 110	2 974
	Reporting completeness (%)	100	100	100
Somalia	Suspected cases	119 008	205 753	228 912
	Presumed and confirmed	39 169	58 021	37 156
	Confirmed	20 953	35 628	35 138
	Microscopy examined	–	–	–
	Microscopy positive	–	–	–
	RDT examined	100 792	183 360	226 894
	RDT positive	20 953	35 628	35 138
	Reporting completeness (%)	69	75	73
Sudan[4]	Suspected cases	4 101 841	4 199 740	3 691 112
	Presumed and confirmed	1 102 186	897 194	1 642 058
	Confirmed	586 827	566 015	800 116
	Microscopy examined	3 586 482	3 236 118	2 426 329
	Microscopy positive	586 827	378 308	588 100
	RDT examined	–	632 443	422 841
	RDT positive	–	187 707	212 016
	Reporting completeness (%)	34	90	70
Yemen	Suspected cases	711 680	1 217 602	1 659 798
	Presumed and confirmed	104 831	145 627	143 333
	Confirmed	76 259	99 700	143 333
	Microscopy examined	561 644	960 860	1 070 020
	Microscopy positive	42 052	45 886	28 936
	RDT examined	121 464	210 815	589 778
	RDT positive	34 207	53 814	114 397
	Reporting completeness (%)	56	60	58

2018	2019	2020	2021	2022	2023
1 240 523	1 008 487	943 267	917 108	954 750	1 003 373
299 863	174 894	105 445	86 370	125 788	180 718
248 689	173 860	105 295	86 263	125 620	180 045
665 200	561 160	449 875	483 806	596 883	636 245
104 960	71 389	38 923	35 149	59 891	98 424
524 149	446 293	389 994	433 195	357 699	366 455
143 729	102 471	66 372	51 114	65 729	81 621
89	90	88	94	93	90
104 800	214 101	268 147**	218 591	213 680	209 135
25 319	49 402*	73 535^	58 916	40 648	38 944
25 319	49 402*	73 535^	58 916	40 648	38 944
–	–	42 250	50 157	49 837	35 448
–	–	11 633	13 210	10 084	7 895
104 800	214 101	268 147	168 434	163 843	173 687
25 319	49 402	73 535	45 706	30 564	31 049
93	93	100	96	92	–
477 914**	455 855**	388 232	275 419**	604 963**	438 177
625~^	1 190~^	1 051~^	999~	5 677^	10 004
625^	1 190^	1 051^	999	5 677^	10 002
477 914	454 322	334 861	275 419	568 492	395 270
625	1 190	1 046	994	5 665	10 000
64 061	101 803	53 371	25 025	39 223	42 905
436	1 089	516	5	2 229	2
602	1 107	878	821	4 238	7 456
3	0	2	0	0	18
100	100	100	100	100	100
7 226 725	8 157 351	7 172 956	7 789 443	13 051 047	15 819 400
1 069 052	414 187"	372 416	400 316	1 824 844	2 748 549
374 510	413 533	371 828	399 097	1 824 396	2 743 659
4 324 570	4 855 044	3 607 265	4 231 801	6 742 977	7 043 591
119 099	125 804	83 859	86 319	474 654	666 754
2 207 613	3 302 307	3 564 489	3 556 423	6 307 622	8 703 250
255 411	287 729	287 969	312 778	1 349 742	2 076 905
86	98	95	99	99	99
1 015 953	1 118 706**	403 972**	642 818	764 822	688 629
2 711	2 152^	3 658^	1 091~^	4 319~	6 460~^
2 711	2 152^	3 658^	1 091^	4 319	6 460^
1 015 953	1 118 706	403 972	429 910	206 975	71 933
2 711	2 152	3 658	1 091	2 608	3 929
–	1 118 706	399 076	212 908	557 847	616 696
–	2 152	3 205	1 525	1 711	5 103
2 517	2 029	3 453	2 470	4 045	6 159
100	90	100	100	98	98
253 220	332 935**	337 965	376 167	348 740	330 488
31 030	65 375^	27 333*	50 648	23 450*	13 688*
31 021	39 687^	27 333*	12 967	11 550*	13 598*
–	59 494	–	32 175	25 182	26 870
–	11 615	–	4 463	4 174	4 506
253 211	332 935	337 965	298 929	311 658	302 807
31 021	39 687	27 333	8 504	7 376	9 092
78	75	84	82	85	73
9 760 505	7 642 050	8 211 933	8 145 586	7 957 950	2 700 365
3 627 586	3 568 941	3 412 499	3 960 654	3 768 163*	1 304 528
1 648 683	1 752 011	1 698 394	1 647 744	1 355 789*	354 412
6 668 355	4 797 856	5 568 277	4 742 722	4 665 151	1 434 043
1 262 210	1 408 242	1 262 841	1 309 892	1 137 726	299 931
1 113 247	1 027 264	929 551	1 056 085	823 287	316 206
386 473	343 769	435 553	337 852	218 063	54 481
63	63	42	42	40	21
779 312	1 283 681	1 280 190**	1 573 986	1 592 228	1 645 842
233 143	216 763	202 671	244 857	201 792	199 420
157 900	165 899	164 066	180 339	155 127	146 265
419 415	841 358	791 049	772 511	695 371	484 779
64 233	104 350	97 008	83 436	62 281	56 713
284 654	391 459	450 541	736 957	850 192	882 063
93 667	61 549	67 058	96 903	92 846	89 552
62	63	56	63	65	–

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

WHO region Country/area	Method of confirmation	2015	2016	2017
EUROPEAN				
Armenia[1,2,3]	Suspected cases	1 213	465	350
	Presumed and confirmed	2	2	2
	Confirmed	2	2	2
	Microscopy examined	1 213	465	350
	Microscopy positive	2	2	2
	Imported cases	2	2	2
	Reporting completeness (%)	65	–	–
Azerbaijan[1,2,3]	Suspected cases	405 416	465 860	373 562
	Presumed and confirmed	1	1	1
	Confirmed	1	1	1
	Microscopy examined	405 416	465 860	373 562
	Microscopy positive	1	1	1
	Imported cases	1	1	1
	Reporting completeness (%)	100	100	100
Georgia[2,3]	Suspected cases	294	318	416
	Presumed and confirmed	6	7	9
	Confirmed	6	7	9
	Microscopy examined	294	318	416
	Microscopy positive	6	7	9
	Imported cases	5	7	8
	Reporting completeness (%)	100	100	100
Kyrgyzstan[1,2,3]	Suspected cases	75 688	62 537	8 459
	Presumed and confirmed	1	6	2
	Confirmed	1	6	2
	Microscopy examined	75 688	62 537	8 459
	Microscopy positive	1	6	2
	Imported cases	1	6	2
	Reporting completeness (%)	65	–	–
Tajikistan[1,2,3]	Suspected cases	188 341**	198 766**	191 284**
	Presumed and confirmed	5^	1^	3^
	Confirmed	5^	1^	3^
	Microscopy examined	188 341	198 766	191 284
	Microscopy positive	5	1	3
	RDT examined	42 056	34 570	41 218
	RDT positive	5	1	3
	Imported cases	4	1	3
	Reporting completeness (%)	100	100	100
Türkiye[2,3]	Suspected cases	211 740	144 499	115 557
	Presumed and confirmed	224	209	214
	Confirmed	224	209	214
	Microscopy examined	211 740	144 499	115 557
	Microscopy positive	224	209	214
	Imported cases	221	208	214
	Reporting completeness (%)	100	100	100
Turkmenistan[1,2,3]	Suspected cases	83 675	85 536	84 264
	Presumed and confirmed	0	0	0
	Confirmed	0	0	0
	Microscopy examined	83 675	85 536	84 264
	Microscopy positive	–	–	–
	Imported cases	0	0	0
	Reporting completeness (%)	100	100	100
Uzbekistan[1,2,3]	Suspected cases	800 912	797 472	655 112
	Presumed and confirmed	0	0	0
	Confirmed	0	0	0
	Microscopy examined	800 912	797 472	655 112
	Microscopy positive	0	0	0
	Imported cases	0	0	0
	Reporting completeness (%)	67	–	–

2018	2019	2020	2021	2022	2023
320	–	121	–	–	–
6	–	3	–	2	2
6	–	3	–	2	2
320	–	121	–	–	–
6	–	3	–	–	–
6	–	3	–	2	2
–	–	–	–	–	–
358 009	–	–	–	–	–
2	0	0[£]	1	1	–
2	0	0[£]	1	1	–
358 009	–	–	–	–	–
2	0	–	–	–	–
2	0	0	1	1	–
100	100	–	–	–	–
286	335	237	–	–	–
9	8	4	–	–	–
9	8	4	–	–	–
286	335	237	–	–	–
9	8	4	–	–	–
9	8	4	–	–	–
100	100	–	–	–	–
7 709	46 384	18 717	–	–	–
0	1	0	–	–	–
0	1	0	–	–	–
7 709	46 384	18 717	–	–	–
0	1	0	–	–	–
0	1	0	–	–	–
–	–	–	–	–	–
–	209 830	159 124	–	–	–
–	3	0	–	1	9
–	3	0	–	1	9
–	207 821	159 124	–	–	–
–	3	0	–	–	–
–	2 009	–	–	–	–
–	–	–	–	–	–
–	3	0	–	1	9
100	100	–	–	–	–
95 877	59 429	54 586	–	–	–
238	279	135	–	–	–
238	279	135	–	–	–
95 877	59 429	54 586	–	–	–
238	279	135	–	–	–
237	277	133	–	–	–
100	100	–	–	–	–
85 722	78 903	71 887	–	–	–
0	3	0	–	–	–
0	3	0	–	–	–
85 722	78 903	71 887	–	–	–
–	3	0	–	–	–
0	3	0	–	–	–
100	100	–	–	–	–
650 616	669 373	552 458	–	–	–
0	1	2	–	–	–
0	1	2	–	–	–
650 616	669 373	552 458	–	–	–
0	1	2	–	–	–
0	1	2	–	–	–
–	–	–	–	–	–

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

WHO region Country/area	Method of confirmation	2015	2016	2017
SOUTH-EAST ASIA				
Bangladesh[2]	Suspected cases	786 830	993 589	986 442
	Presumed and confirmed	39 719	27 737	29 247
	Confirmed	39 719	27 737	29 247
	Microscopy examined	527 659	573 540	613 304
	Microscopy positive	6 621	3 217	3 325
	RDT examined	259 171	420 049	373 138
	RDT positive	33 098	24 520	25 922
	Imported cases	129	109	19
	Reporting completeness (%)	100	100	100
Bhutan[2,3]	Suspected cases	74 087	118 841	120 667
	Presumed and confirmed	104	74	51^
	Confirmed	104	74	51^
	Microscopy examined	26 149	23 442	22 885
	Microscopy positive	84	59	51
	RDT examined	47 938	95 399	97 782
	RDT positive	20	15	11
	Imported cases	70	56	38
	Reporting completeness (%)	84	95	70
Democratic People's Republic of Korea	Suspected cases	91 007	205 807	189 357
	Presumed and confirmed	7 409	5 113	4 626
	Confirmed	7 022	5 033	4 603
	Microscopy examined	29 272	22 747	16 835
	Microscopy positive	7 010	4 890	4 463
	RDT examined	61 348	182 980	172 499
	RDT positive	12	143	140
	Reporting completeness (%)	100	100	100
India	Suspected cases	140 841 230	144 539 608	125 977 799
	Presumed and confirmed	1 169 261	1 087 285	844 558
	Confirmed	1 169 261	1 087 285	844 558
	Microscopy examined	121 141 970	124 933 348	110 769 742
	Microscopy positive	1 169 261	1 087 285	306 768
	RDT examined	19 699 260	19 606 260	15 208 057
	RDT positive	–	–	537 790
	Reporting completeness (%)	100	100	100
Indonesia[2,7]	Suspected cases	1 567 450	1 457 858	1 441 679
	Presumed and confirmed	217 025	218 450	261 617
	Confirmed	217 025	218 450	261 617
	Microscopy examined	1 224 504	1 092 093	1 045 994
	Microscopy positive	217 025	218 450	261 617
	RDT examined	342 946	365 765	395 685
	RDT positive	–	–	–
	Imported cases	–	–	–
	Reporting completeness (%)	87	87	87
Myanmar[2,4]	Suspected cases	2 657 555	3 185 245	3 368 697
	Presumed and confirmed	182 465^	110 146	85 019
	Confirmed	182 465^	110 146	85 019
	Microscopy examined	98 014	122 078	107 242
	Microscopy positive	6 453	6 717	4 648
	RDT examined	2 559 541	3 063 167	3 261 455
	RDT positive	176 163	103 429	80 371
	Imported cases	–	–	–
	Relapse cases	–	–	–
	Reporting completeness (%)	83	84	87
Nepal[2]	Suspected cases	131 654	146 705	165 640**
	Presumed and confirmed	19 171^	10 687	3 610^
	Confirmed	1 112^	1 009	1 293^
	Microscopy examined	63 946	84 595	163 323
	Microscopy positive	1 112	1 009	1 293
	RDT examined	49 649	52 432	97 870
	RDT positive	725	–	449
	Imported cases	521	502	670
	Reporting completeness (%)	85	85	97

2018	2019	2020	2021	2022	2023
1 300 691	1 507 230	1 416 473	1 470 849	1 632 840	1 760 470
10 523	17 225	6 130	7 294	18 246	16 567
10 523	17 225	6 130	7 294	18 246	16 567
800 251	750 657	611 307	370 589	460 668	318 414
1 135	1 311	262	458	906	947
500 440	756 573	805 166	1 100 260	1 172 172	1 442 056
9 388	15 914	5 868	6 836	17 340	15 620
41	6	2	6	13	19
100	100	100	100	100	100
133 498	119 975	31 522	25 510	42 205	56 917
54	42^	54	23	6~	18~
54	42^	54	23	6	18
19 778	18 973	6 246	8 742	12 146	18 724
49	38	46	23	6	15
113 720	101 002	25 276	16 768	30 059	38 193
5	37	8	0	0	3
34	30	9	13	3	14
72	72	95	95	100	100
685 704	461 998	357 778	45 711	378 989	15 855
3 698	1 869	1 819	2 357	2 136	3 160
3 698	1 869	1 819	2 357	2 136	3 160
28 654	3 255	3 681	45 711	11 673	15 855
3 446	886	1 162	2 357	2 056	3 160
657 050	458 743	354 097	0	367 316	0
252	983	657	0	80	0
100	100	100	100	100	100
124 613 482	134 230 349	97 177 024	114 400 959	152 523 919	164 949 610
429 928	338 494	186 532	161 753	176 522	227 564
429 928	338 494	186 532	161 753	176 522	227 564
111 123 775	113 969 785	73 294 318	87 951 904	117 785 803	126 692 485
230 432	132 750	65 468	67 604	75 222	79 568
13 489 707	20 260 564	23 882 706	26 440 073	34 264 089	38 046 158
199 496	205 744	121 064	94 149	101 300	147 996
100	100	100	100	100	100
1 700 094	2 491 516	1 940 676	2 128 771	3 395 811	3 468 250
222 345	250 646	254 055	304 607	443 530	418 533
222 345	250 646	254 055	304 607	443 530	418 437
1 322 026	1 899 437	1 367 987	1 399 683	1 743 771	2 047 407
190 782	212 997	192 769	216 744	293 356	295 217
378 068	592 079	516 167	640 609	1 612 968	1 417 331
31 563	37 649	61 286	87 863	150 174	123 220
11	61	38	27	67	84
83	77	82	93	96	95
3 183 758	3 708 802**	3 665 239**	1 958 385**	2 660 341**	3 159 116**
76 518	56 414^	58 836^	79 001^	157 538^	228 567^
76 518	56 414^	58 836^	79 001^	157 538^	228 567^
58 126	50 902	57 950	43 929	128 630	18 216
2 577	1 054	2 167	2 669	5 399	3 275
3 125 632	3 666 973	3 627 732	1 919 075	2 546 083	3 148 736
73 941	55 590	57 009	76 377	153 071	226 811
–	–	9	1	5	13
–	–	140	12	65	161
87	89	88	25	42	55
256 020	223 998	158 532	159 912**	370 891	471 293
3 031	710	430	373^	512	665
1 293	710	430	373^	512	665
160 904	92 367	31 304	24 221	82 917	104 130
1 158	102	29	18	404	558
93 378	131 631	127 228	159 635	287 974	366 799
135	608	401	373	108	107
539	579	357	359	476	649
56	88	94	95	97	98

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

WHO region Country/area	Method of confirmation	2015	2016	2017
SOUTH-EAST ASIA				
Sri Lanka[1,2,3]	Suspected cases	1 157 366	1 090 743	1 104 333
	Presumed and confirmed	36~	41~	57~
	Confirmed	36	41	57
	Microscopy examined	1 142 466	1 072 396	1 089 290
	Microscopy positive	35	40	57
	RDT examined	14 900	18 347	15 043
	RDT positive	1	1	–
	Imported cases	36	41	57
	Reporting completeness (%)	86	86	86
Thailand[2,7]	Suspected cases	1 537 430	1 619 174	1 268 976
	Presumed and confirmed	27 385	17 800	11 440
	Confirmed	27 385	17 800	11 440
	Microscopy examined	1 358 953	1 302 834	1 117 648
	Microscopy positive	17 980	11 301	7 154
	RDT examined	178 477	316 340	151 328
	RDT positive	9 405	6 499	4 286
	Imported cases	9 890	5 724	4 020
	Relapse cases	–	–	–
	Reporting completeness (%)	100	100	100
Timor-Leste[2,3]	Suspected cases	90 818	114 383	115 008
	Presumed and confirmed	80	95	30
	Confirmed	80	94	30
	Microscopy examined	–	–	–
	Microscopy positive	–	–	–
	RDT examined	90 818	114 382	115 008
	RDT positive	80	94	30
	Imported cases	–	10	13
	Relapse cases	–	1	1
	Reporting completeness (%)	100	100	100
WESTERN PACIFIC				
Cambodia[2,7]	Suspected cases	332 613	298 108	376 702
	Presumed and confirmed	68 109	43 380	76 804
	Confirmed	68 109	43 380	76 804
	Microscopy examined	49 357	42 802	38 188
	Microscopy positive	7 423	3 695	5 908
	RDT examined	283 256	255 306	338 514
	RDT positive	60 686	39 685	70 896
	Imported cases	–	–	–
	Relapse cases	–	–	–
	Reporting completeness (%)	100	100	100
China[1,2]	Suspected cases	4 052 616	3 194 915	2 409 286
	Presumed and confirmed	3 279	3 151	2 672~
	Confirmed	3 251	3 151	2 666
	Microscopy examined	4 052 588	3 194 915	2 409 280
	Microscopy positive	3 251	3 151	2 666
	Imported cases	3 212	3 149	2 663
	Reporting completeness (%)	100	100	100
Lao People's Democratic Republic[2]	Suspected cases	284 361	240 505	234 365
	Presumed and confirmed	36 078	15 509	8 435
	Confirmed	36 078	15 509	8 435
	Microscopy examined	133 363	113 198	116 343
	Microscopy positive	6 198	2 367	1 575
	RDT examined	150 998	127 307	118 022
	RDT positive	29 880	13 142	6 860
	Imported cases	–	–	–
	Relapse cases	–	–	–
	Reporting completeness (%)	100	100	98
Malaysia[2,3,7]	Suspected cases	1 066 470	1 153 108	1 046 163
	Presumed and confirmed	2 311	2 302	4 114
	Confirmed	2 311	2 302	4 114
	Microscopy examined	1 066 470	1 153 108	1 046 163
	Microscopy positive	2 311	2 302	4 114
	Imported cases	435	428	423
	Reporting completeness (%)	100	100	100

2018	2019	2020	2021	2022	2023
1 149 897	1 164 914**	820 210	680 386	808 827	854 175
52~	54~^	30~	26~	37~	63~
52	54^	30	26	37	63
1 129 070	1 164 914	810 205	673 744	795 287	835 655
52	54	30	26	37	63
20 827	20 745	10 005	6 642	13 540	18 520
0	2	0	0	0	0
48	53	30	25	37	62
85	85	100	–	–	–
976 482	937 053	800 012	651 385	674 142	902 309
6 750	5 421	3 940	3 279	10 154	16 684
6 750	5 421	3 940	3 279	10 154	16 684
908 540	856 893	716 060	546 749	558 021	730 783
5 171	4 170	2 792	2 227	6 994	12 072
67 942	80 160	83 952	104 636	116 121	171 526
1 579	1 251	1 148	1 052	3 160	4 612
1 618	1 342	798	800	3 726	7 276
–	–	–	1	57	47
100	100	100	100	100	100
144 061	217 129	103 614**	122 955**	166 167	134 566**
8~	9~	14^	0~	2~	9~
8	9	14^	0	2	9
–	–	35 256	27 731	31 767	36 414
–	–	14	0	2	0
144 061	217 129	103 614	122 955	134 400	133 038
8	9	3	0	0	9
7	9	7	0	2	4
0	0	0	0	0	0
100	100	100	100	100	100
282 295	596 009	790 800	832 846	974 311	1 151 739
62 582	32 197	9 964	4 382	4 053	1 384
62 582	32 197	9 964	4 382	4 053	1 384
42 834	38 964	20 956	4 705	7 129	7 706
8 318	2 635	693	235	399	163
239 461	557 045	769 844	828 141	967 182	1 136 810
54 264	29 562	9 271	4 147	3 654	1 221
–	1	2	0	6	2
–	–	–	1 978	1 609	669
100	100	100	100	100	100
1 904 290	1 680 801	1 274 340	–	–	–
2 511~	2 487~	1 051~	–	820~	–
2 511	2 482	1 051	–	820	–
1 904 290	1 680 796	1 274 340	–	–	–
2 511	2 482	1 051	–	820	–
2 511	2 486	1 050	–	819	–
100	100	–	–	–	–
287 984	567 650	576 026	643 583	844 865	847 058
9 038	6 692	3 498	3 926	2 340	695
9 038	6 692	3 498	3 926	2 340	695
89 811	128 387	87 957	63 095	67 534	75 063
1 093	898	297	185	64	23
198 173	439 263	488 069	580 488	777 331	771 995
7 945	5 794	3 201	3 741	2 276	672
0	0	4	28	59	4
2	0	0	0	5	20
98	99	98	96	98	94
1 070 356	1 072 252	901 799	519 557	866 447	851 074
4 630~	3 941~	2 839~	3 688~	2 807~	3 629~
4 630	3 941	2 839	3 688	2 807	3 629
1 070 356	1 072 252	901 799	519 557	866 447	851 074
4 630	3 941	2 839	3 688	2 807	3 629
485	630	177	111	291	675
100	100	100	100	100	100

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

WHO region Country/area	Method of confirmation	2015	2016	2017
WESTERN PACIFIC				
Papua New Guinea	Suspected cases	996 660	1 246 456	1 432 082
	Presumed and confirmed	620 785	785 120	892 235
	Confirmed	346 431	534 819	488 878
	Microscopy examined	112 864	146 242	139 910
	Microscopy positive	64 719	80 472	70 449
	RDT examined	609 442	849 913	888 815
	RDT positive	281 712	454 347	418 429
	Reporting completeness (%)	93	90	91
Philippines[2,7]	Suspected cases	315 010	321 848	398 759
	Presumed and confirmed	11 445	6 690	6 806
	Confirmed	11 410	6 680	6 806
	Microscopy examined	224 843	255 302	171 424
	Microscopy positive	5 694	2 860	889
	RDT examined	90 132	66 536	227 335
	RDT positive	5 716	3 820	5 917
	Imported cases	85	55	69
	Relapse cases	–	–	–
	Reporting completeness (%)	87	90	100
Republic of Korea[2]	Suspected cases	–	673	515
	Presumed and confirmed	692^	673^	515^
	Confirmed	692^	673^	515^
	Microscopy examined	–	673	515
	Microscopy positive	692	673	515
	RDT examined	–	–	–
	RDT positive	452	454	372
	Imported cases	79	71	79
	Relapse cases	11	16	18
	Reporting completeness (%)	95	95	88
Solomon Islands	Suspected cases	192 044	274 881	238 814
	Presumed and confirmed	50 916	84 514	68 712
	Confirmed	23 998	54 432	52 519
	Microscopy examined	124 376	152 690	89 061
	Microscopy positive	14 793	26 187	15 978
	RDT examined	40 750	92 109	133 560
	RDT positive	9 205	28 245	36 541
	Reporting completeness (%)	83	86	71
Vanuatu[2,4]	Suspected cases	16 044	24 232	34 152
	Presumed and confirmed	845	2 531	1 228
	Confirmed	571	2 252	1 228
	Microscopy examined	4 870	6 704	9 187
	Microscopy positive	15	225	120
	RDT examined	10 900	17 249	24 965
	RDT positive	556	2 027	1 108
	Imported cases	–	–	1
	Reporting completeness (%)	87	77	71
Viet Nam[2]	Suspected cases	2 673 662	2 497 326	2 616 257
	Presumed and confirmed	19 252	10 446	8 411^
	Confirmed	9 331	4 161	4 548^
	Microscopy examined	2 204 409	2 082 986	2 009 233
	Microscopy positive	9 331	4 161	4 548
	RDT examined	459 332	408 055	603 161
	RDT positive	–	–	1 594
	Imported cases	–	–	–
	Relapse cases	–	–	–
	Reporting completeness (%)	100	100	100

2018	2019	2020	2021	2022	2023
1 513 776	1 279 574	1 589 675	1 473 179	1 766 390	1 751 942
940 693	804 134"	932 973	755 598	1 022 780	952 886
516 249	646 648	750 254	651 963	899 510	839 537
121 766	72 636	50 564	48 691	51 533	55 132
59 652	39 684	26 925	20 632	21 355	21 970
967 566	1 206 938	1 356 392	1 320 853	1 591 587	1 583 461
456 597	606 964	723 329	631 331	878 155	817 567
90	93	93	92	94	96
443 997	343 174	235 560	222 002	290 324	352 760
4 641	5 778	6 120	4 297	3 245	6 248
4 641	5 778	6 120	4 297	3 245	6 248
122 502	170 887	103 488	107 525	94 352	126 826
569	1 370	1 229	641	387	824
321 495	172 287	132 072	114 477	195 972	225 934
4 072	4 408	4 891	3 656	2 858	5 424
82	95	26	35	34	55
–	1	3	1	0	–
100	100	100	100	100	100
576	559**	434	294**	444**	747**
576^	559^	390	294^	428^	747^
576^	559^	390	294^	428^	747^
576	559	386	294	440	449
576	559	386	294	421	449
–	94	4	94	248	531
429	94	4	94	245	531
75	74	29	20	38	74
28	0	6	–	8	11
87	100	100	95	100	100
244 523	271 754	240 199	253 419	271 037	327 780
72 430	86 122	90 830	129 758	139 810	147 145
59 191	72 767	77 637	84 139	100 995	123 476
89 169	79 694	66 824	114 187	105 260	105 270
17 825	18 239	19 621	45 185	42 041	36 619
142 115	178 705	160 182	93 613	125 316	198 841
41 366	54 528	58 016	38 954	58 954	86 857
87	75	88	81	89	85
26 931	23 531	29 362	24 748	15 001	28 369
644	576	507	322	1 143	2 261
644	576	507	322	1 143	2 261
5 935	4 596	2 941	1 564	–	723
53	26	22	34	–	6
20 996	11 318	26 421	23 184	15 001	27 646
591	550	485	288	1 143	2 255
12	9	14	10	41	–
76	76	71	69	52	63
1 674 897**	1 969 919**	1 795 335**	1 316 542	1 416 684	1 248 412
6 870^	5 987^	1 733^	467	455	453+
4 813^	4 765^	1 422^	467	455	453+
1 674 897	1 914 379	1 521 490	852 340	1 182 837	1 095 822
4 813	4 765	1 309	448	439	446
492 270	504 431	532 088	218 230	233 847	152 590
1 848	3 243	1 168	19	16	2
1 681	1 565	46	90	43	75
–	–	–	–	–	5
100	100	100	100	100	100

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

WHO region Country/area	Method of confirmation	2015	2016	2017
REGIONAL SUMMARY (presumed and confirmed malaria cases)				
African		142 473 526	160 847 397	164 222 533
Americas		488 644	654 404	934 752
Eastern Mediterranean		5 420 260	3 683 265	4 464 691
European		239	226	231
South-East Asia		1 662 655	1 477 428	1 240 255
Western Pacific		813 712	954 316	1 069 932
Total		**150 859 036**	**167 617 036**	**171 932 394**

RDT: rapid diagnostic test; WHO: World Health Organization

"–" refers to not applicable.

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

[2] Cases include imported and/or introduced cases.

[3] There have been no reported indigenous cases since 2015.

[4] Due to very low reporting completeness in 2023, data are unreliable.

[5] 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.

[6] *Source: Pan American Health Organization (PAHO)/WHO, Regional Malaria Meeting: Expanding access to malaria diagnosis and treatment, reducing malaria in high-burden municipalities. "Élargir l'accès au diagnostic et au traitement du paludisme, Situation de la malaria en Guyane Française. Agence régionale de santé (ARS-Guyane)." Bogotá, Colombia, 24–26 September 2024 (https://www.infectiologie.com/UserFiles/File/jni/2024/com/jni2024-sg3-03-epelboin.pdf). Entered by Dennis Navarro Costa, Malaria Regional Program PAHO/WHO. 10 September 2024.*

[7] Figures include non-human malaria cases (due to *Plasmodium knowlesi* infection).

[~] There are zero indigenous cases.

* The country reported double counting of RDT positive and microscopy positive cases but did not indicate the number of cases that were double counted. Confirmed cases have not been corrected.

2018	2019	2020	2021	2022	2023
158 338 247	172 228 335	172 528 406	174 243 554	190 546 047	192 856 662
930 469	851 327	595 043	524 904	481 792	505 642
5 289 329	4 492 250	4 198 608	4 803 851	5 994 681	4 502 311
255	295	144	1	4	11
752 907	670 884	511 840	558 713	808 683	911 830
1 104 615	948 473	1 049 905	902 732	1 177 881	1 115 448
166 415 822	**179 191 564**	**178 883 946**	**181 033 755**	**199 009 088**	**199 891 904**

Data as of 24 October 2024

** Suspected cases are less than presumed + microscopy examined + RDT examined due to correction for double counting of microscopy tests and RDTs.

^ Confirmed cases are corrected for double counting of microscopy positive and RDT positive cases.

‡ Confirmed cases reported through outpatients registers are used instead of laboratory confirmed cases.

@ Presumed cases are calculated as: test positivity rate × (suspected cases – tested).

+ Incomplete laboratory data. Confirmed cases reported by the country exceed microscopy positive + RDT positive cases.

£ Confirmed cases reported through outpatients + inpatients registers are used instead of laboratory confirmed cases.

$ Data are available for Zanzibar only.

++ Unresolved data quality issues between total confirmed and total classified cases.

§ Imported cases are not included in total confirmed cases.

" Presumed cases are calculated by applying the proportion of presumed cases from the previous or following year to the total.

Note: Between 2015 and 2018, unless reported retrospectively by the country, suspected cases were calculated based on the formula: suspected cases = presumed + microscopy examined + RDT examined. From 2019 onwards, suspected cases were reported by countries. If data quality issues were detected, suspected cases were recalculated by applying the same formula used in 2015–2018.

Annex 4 – I. Reported malaria cases by species, 2015–2023

WHO region Country/area	Species	2015	2016	2017
AFRICAN				
Algeria[1]	Indigenous cases	0*	0*	0*
	Total *P. falciparum*	0	0	0
	Total *P. vivax*	0	0	0
	Total mixed cases	0	0	0
	Total other cases	0	0	0
	Imported cases	727	420	446
Angola[2]	Indigenous cases	2 769 305	3 794 253	3 874 892
	Total *P. falciparum*	2 769 305	3 794 253	3 874 892
	Imported cases	–	–	–
Benin	Indigenous cases	1 721 626	1 610 790	1 933 912
	Total *P. falciparum*	1 721 626	1 610 790	1 933 912
Botswana	Indigenous cases	284**	659**	1 847**
	Total *P. falciparum*	278	640	1 831
	Total *P. vivax*	–	–	4
	Total mixed cases	–	12	3
	Unknown species	–	–	–
	Imported cases	48	64	62
Burkina Faso	Indigenous cases	7 015 446	9 779 411	10 557 260
	Total *P. falciparum*	7 015 446	9 779 411	10 557 260
Burundi	Indigenous cases	5 428 710	8 793 176	8 795 952
	Total *P. falciparum*	5 428 710	8 793 176	8 795 952
	Total other cases	–	–	–
Cabo Verde[1]	Indigenous cases	7*	49*	423*
	Total *P. falciparum*	7	49	423
	Total *P. vivax*	–	–	–
	Total mixed cases	0	0	0
	Total other cases	–	–	–
	Imported cases	20	28	23
Cameroon	Indigenous cases	1 193 281	2 476 153	2 244 788
	Total *P. falciparum*	1 193 281	2 476 153	2 244 788
Central African Republic	Indigenous cases	598 833	1 239 317	411 913
	Total *P. falciparum*	598 833	1 239 317	411 913
Chad	Indigenous cases	787 046	1 294 768	1 962 372
	Total *P. falciparum*	787 046	1 294 768	1 962 372
Comoros	Indigenous cases	1 884	1 467	3 896
	Total *P. falciparum*	1 300	1 066	2 274
	Imported cases	–	–	–
Congo	Indigenous cases	51 529	171 847	127 939
	Total *P. falciparum*	51 529	171 847	127 939
Côte d'Ivoire	Indigenous cases	3 375 904	3 754 504	4 034 781
	Total *P. falciparum*	3 375 904	3 754 504	4 034 781
Democratic Republic of the Congo	Indigenous cases	12 538 805	16 821 130	16 793 002
	Total *P. falciparum*	12 538 805	16 821 130	16 793 002
Equatorial Guinea[2]	Indigenous cases	15 142	147 714	15 725
	Total *P. falciparum*	15 142	147 714	15 725
Eritrea	Indigenous cases	28 036	24 251	54 005
	Total *P. falciparum*	14 510	20 704	21 849
	Total *P. vivax*	4 780	2 999	9 185
	Total mixed cases	70	543	429
	Total other cases	12	5	23
Eswatini	Indigenous cases	318*	250*	440*
	Total *P. falciparum*	318	250	440
	Imported cases	157	67	687
Ethiopia	Indigenous cases	1 867 059	1 718 504	1 530 739
	Total *P. falciparum*	1 188 627	1 142 235	1 059 847
	Total *P. vivax*	678 432	576 269	470 892
	Total mixed cases	–	–	–
	Total other cases	–	–	–
	Imported cases	–	–	–
Gabon	Indigenous cases	23 867	23 915	35 244
	Total *P. falciparum*	–	23 915	35 244
	Total mixed cases	–	–	–

2018	2019	2020	2021	2022	2023
0*	0*	0*	0*	0*	0*
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
1 241	1 014	2 725	1 164	1 292	427
5 150 575	7 054 978	7 343 696	8 325 921	7 858 860	9 098 004**
5 150 575	7 054 978	7 343 696	8 325 921	7 858 860	9 098 004
–	–	–	–	–	2
1 975 812	2 895 878	2 516 646	2 634 063	2 557 084	2 037 296
1 975 812	2 895 878	2 516 646	2 634 063	2 557 084	2 037 296
534*	169*	884*	703*	397*	560***
534	169	884	703	397	552
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	8
51	103	69	26	49	91
10 278 970	5 877 426	10 600 340	11 791 638	11 415 559	10 515 380
10 278 970	5 877 426	10 600 340	11 791 638	11 415 559	10 515 380
4 966 511	9 959 533	4 720 103	6 615 714	8 117 435	5 605 763^
4 966 511	9 959 533	4 720 103	6 615 714	8 117 435	5 580 188
–	–	–	–	–	25 575
2*	0*	0*	0*	0*	0*
2	0	0	0	0	0
–	0	0	0	0	0
0	0	0	0	0	0
–	0	0	0	0	0
18	39	10	20	26	36
2 257 633	2 819 803	2 890 193	3 335 174	3 327 381	2 977 754
2 257 633	2 819 803	2 890 193	3 335 174	3 327 381	2 977 754
972 119	2 416 960	1 740 970	2 002 149	2 247 250	1 841 126
972 119	2 416 960	1 740 970	2 002 149	2 247 250	1 841 126
1 364 706	1 632 529	1 544 194	1 418 539	1 671 060	2 159 037
1 364 706	1 632 529	1 544 194	1 418 539	1 671 060	2 159 037
15 613	17 599**	4 546*	10 537*	20 675*	21 049*
15 613	17 599	4 546	10 537	20 675	21 049
–	98	0	10	6	30
116 903	117 837	91 538	189 616	364 466	517 937
116 903	117 837	91 538	189 616	364 466	517 937
4 766 477	5 935 178	4 980 640	7 295 068	8 145 591	8 388 526
4 766 477	5 935 178	4 980 640	7 295 068	8 145 591	8 388 526
16 972 207	21 934 127	22 590 647	21 345 031	27 296 419	27 657 762
16 972 207	21 934 127	22 590 647	21 345 031	27 296 419	27 657 762
8 962	25 904	–	–	71 204	76 921
8 962	25 904	–	–	71 204	76 921
46 440	93 878	74 041	43 463	65 063	101 402
16 553	75 568	66 600	37 696	56 208	78 840
6 108	15 790	7 119	5 613	8 506	21 649
268	2 340	300	120	293	889
26	180	22	34	56	24
686*	252***	233*	505**	214**	597**
686	252	233	505	214	597
271	337	82	76	155	248
962 087	904 495	1 743 755	1 396 315**	1 731 097**^	3 197 557**^
859 675	738 155	1 340 869	912 075	1 323 355#	2 262 976#
102 412	166 340	263 877	252 589	388 416#	904 398#
–	–	30 051	14 380	20 791#	31 994#
–	–	108 958	90 607	–	–
–	–	–	836	1 465	1 811
111 719	53 182	53 659	64 957	45 783	59 248
111 719	52 811	53 659	64 957	45 783	55 986
–	371	–	–	–	806

Annex 4 – I. Reported malaria cases by species, 2015–2023

WHO region Country/area	Species	2015	2016	2017
AFRICAN				
Gambia	Indigenous cases	246 348	162 739	78 040
	Total *P. falciparum*	240 382	153 685	69 931
	Imported cases	–	–	–
Ghana	Indigenous cases	5 657 096	5 428 979	7 003 155
	Total *P. falciparum*	4 319 919	4 421 788	4 266 541
	Total mixed cases	–	113 379	109 398
	Total other cases	–	–	–
Guinea	Indigenous cases	810 979	992 146	1 335 323
	Total *P. falciparum*	810 979	992 146	1 335 323
Guinea-Bissau	Indigenous cases	150 085	156 471	152 619
	Total *P. falciparum*	150 085	156 471	152 619
Kenya	Indigenous cases	2 041 277	3 064 796	3 607 026
	Total *P. falciparum*	1 499 027	2 783 846	3 215 116
Liberia	Indigenous cases	941 711	1 191 137	1 093 115
	Total *P. falciparum*	941 711	1 191 137	1 093 115
Madagascar	Indigenous cases	938 490**	686 024	985 852
	Total *P. falciparum*	938 490	686 024	187 415
	Total *P. vivax*	–	–	5
	Total mixed cases	–	–	15
	Imported cases	1 167	–	–
Malawi	Indigenous cases	3 661 238	4 827 373	4 947 443
	Total *P. falciparum*	3 661 238	4 827 373	4 947 443
Mali	Indigenous cases	2 454 508	2 311 098	2 277 218
	Total *P. falciparum*	–	–	–
Mauritania	Indigenous cases	22 631	29 156	20 105
	Unknown species	22 631	29 156	20 105
Mayotte	Indigenous cases	1*	18*	9*
	Total *P. falciparum*	–	12	–
	Total *P. vivax*	–	–	–
	Total mixed cases	–	–	–
	Imported cases	10	10	10
Mozambique	Indigenous cases	8 222 814	9 690 873	9 892 601
	Total *P. falciparum*	7 718 782	8 520 376	8 921 081
Namibia	Indigenous cases	9 162*	19 510*	54 268*
	Total *P. falciparum*	9 162	19 510	54 268
	Total *P. vivax*	–	–	–
	Imported cases	2 888	3 980	11 874
Niger	Indigenous cases	2 392 108	4 258 110	2 761 268
	Total *P. falciparum*	2 267 867	3 961 178	2 638 580
	Total other cases	4 133	186 989	–
Nigeria	Indigenous cases	8 068 583	13 598 282	13 087 878
	Total *P. falciparum*	8 068 583	13 598 282	13 087 878
Rwanda	Indigenous cases	2 505 794	3 380 568	5 940 533
	Total *P. falciparum*	2 505 794	3 380 568	5 940 533
Sao Tome and Principe	Indigenous cases	2 056**	2 238	2 239**
	Total *P. falciparum*	2 055	2 238	2 239
	Total other cases	1	–	–
	Imported cases	2	0	2
Senegal	Indigenous cases	492 253	349 540	395 706
	Total *P. falciparum*	492 253	349 540	395 706
	Imported cases	0	0	0
Sierra Leone	Indigenous cases	1 483 376	1 775 306	1 651 236
	Total *P. falciparum*	1 483 376	1 775 306	1 651 236
South Africa	Indigenous cases	4 959	4 323	23 381*
	Total *P. falciparum*	4 946	4 323	23 381
	Total *P. vivax*	5	–	–
	Total mixed cases	3	–	–
	Total other cases	5	–	–
	Imported cases	3 568	3 075	6 234

2018	2019	2020	2021	2022	2023
87 448	53 386	75 801	73 781	119 104	118 293**
87 448	53 386	75 801	73 781	119 104	118 293
–	–	–	–	–	166
4 931 454	6 115 267	5 447 563	5 747 585	5 239 236	5 693 888
4 808 163	6 075 297	5 412 537	5 719 704	5 216 479	5 670 615
27 635	28 952	35 026	27 881	22 757	5 121
–	11 018	–	–	–	12 916
1 214 996	2 143 225	2 008 976	2 422 374	2 474 774	2 701 976
1 214 996	2 143 225	2 008 976	2 422 374	2 474 774	2 701 976
171 075	160 907	–	–	185 156	118 080
171 075	160 907	–	–	185 156	118 080
2 318 090	5 019 389	4 069 277	4 270 769	4 890 691	5 619 026
1 521 566	5 019 389	4 069 277	4 270 769	4 470 791	5 619 026
–	915 845	–	912 436	696 684	814 113
–	915 845	–	912 436	696 684	814 113
972 790	963 712**	1 948 739**	2 338 900**	1 679 547	2 843 012
972 790	963 712	1 948 739	2 338 900	1 679 547	2 843 012
–	–	–	–	–	–
–	–	–	–	–	–
–	7 116	1 732	203	–	–
5 865 476	5 129 919	7 078 271	6 829 223	4 196 890	6 426 150
5 865 476	5 129 919	7 078 271	6 829 223	4 196 890	6 426 150
2 345 475	3 221 535	2 666 266	3 204 130	3 771 426	3 360 557
–	3 165 483	2 666 266	3 204 130	3 771 426	3 360 557
30 609	14 869	12 425	18 660	41 901	31 424
30 609	14 869	12 425	18 660	41 901	31 424
3*	4*	2*	–	–	0*
–	4	2	–	–	0
–	–	–	–	–	0
–	–	–	–	–	0
44	51	22	–	–	38
10 304 472	11 734 926	11 318 685	10 095 807	12 387 459	13 230 613
9 292 928	11 734 926	11 318 685	10 095 807	12 387 459	12 870 205
30 567*	2 376*	12 291**	12 979*	10 301**	11 794***
30 567	2 340	12 291	12 979	10 301	11 794
–	6	–	–	–	–
4 021	1 064	1 342	759	1 548	1 941
3 046 450	3 771 451	4 377 938	4 044 707	5 166 412	4 409 695
3 046 450	3 748 155	4 154 337	4 044 707	5 166 412	4 409 695
–	23 296	–	–	–	–
14 548 024	19 806 915	18 325 240	21 325 186	23 050 405	24 098 323
14 548 024	19 806 915	18 325 240	21 325 186	23 050 405	24 098 323
4 231 883	3 612 822	2 043 392	1 163 670	857 228	549 326
4 231 883	3 612 822	2 043 392	1 163 670	857 228	549 326
2 937**	2 732**	1 933**	2 719**	3 970*	2 348**
2 937	2 732	1 933	2 719	3 970	2 258
–	–	–	–	–	–
3	10	11	11	9	20
530 652**	354 663**	445 313	536 850	358 033	189 628
530 652	354 663	445 313	536 850	358 033	189 628
292	45	0	0	0	0
1 733 831	2 407 505	725 006	1 953 902	1 768 419	2 090 143
1 733 831	2 407 505	725 006	1 953 902	1 768 419	2 090 143
9 562***	4 821***	4 463***	2 972***	2 043***	5 291**
9 562	4 821	4 463	1 598	2 043	5 291
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
5 742	8 890	3 663	2 917	5 237	4 599

Annex 4 – I. Reported malaria cases by species, 2015–2023

WHO region Country/area	Species	2015	2016	2017
AFRICAN				
South Sudan[3]	Indigenous cases	24 371	7 619	1 488 005
	Total *P. falciparum*	24 371	7 619	1 488 005
	Total *P. vivax*	–	–	–
	Total mixed cases	–	–	–
	Total other cases	–	–	–
Togo	Indigenous cases	1 610 711	1 746 334	1 756 582
	Total *P. falciparum*	1 610 568	1 746 101	1 756 331
	Total mixed cases	–	–	–
	Total other cases	143	233	251
Uganda	Indigenous cases	7 412 747	9 735 849	11 667 831
	Total *P. falciparum*	7 137 662	9 385 132	11 667 831
United Republic of Tanzania	Indigenous cases	4 900 278**	5 762 462	5 744 907
	Total *P. falciparum*	4 900 103	5 760 684	5 741 596
	Total *P. vivax*	–	–	–
	Total mixed cases	175	89	1 606
	Total other cases	–	–	10
	Imported cases	2 550$	–	–
Mainland	Indigenous cases	4 898 211	5 755 669	5 739 863
	Total *P. falciparum*	4 898 211	5 755 669	5 739 863
	Imported cases	–	–	–
Zanzibar	Indigenous cases	2 067**	6 793	5 044
	Total *P. falciparum*	1 892	5 015	1 733
	Total *P. vivax*	–	–	–
	Total mixed cases	175	89	1 606
	Total other cases	–	–	10
	Imported cases	2 550	–	–
Zambia	Indigenous cases	4 184 661	4 851 319	5 505 639
	Total *P. falciparum*	4 184 661	4 851 319	5 505 639
Zimbabwe[2]	Indigenous cases	484 614**	316 631**	471 030**
	Total *P. falciparum*	484 614	316 631	471 030
	Imported cases	180	358	768
AMERICAS				
Argentina[1]	Indigenous cases	0*	0*	0*
	Total *P. falciparum*	0	0	0
	Total *P. vivax*	0	0	0
	Total mixed cases	–	–	–
	Total other cases	0	0	0
	Imported cases	11	9	18
Belize[1]	Indigenous cases	9*	4*	7*
	Total *P. falciparum*	–	–	–
	Total *P. vivax*	9	4	5
	Total mixed cases	–	–	2
	Total other cases	–	–	–
	Imported cases	4	1	2
Bolivia (Plurinational State of)	Indigenous cases	6 874*	5 542*	4 572**
	Total *P. falciparum*	77	4	–
	Total *P. vivax*	6 785	5 535	4 572
	Total mixed cases	12	3	–
	Imported cases	33	11	15
Brazil	Indigenous cases	141 229*	124 177*	189 559*
	Total *P. falciparum*	14 762	13 160	18 614
	Total *P. vivax*	122 746	110 340	169 887
	Total mixed cases	683	669	1 032
	Imported cases	4 932	5 068	4 867
Colombia	Indigenous cases	55 334*	82 609*	52 805*
	Total *P. falciparum*	27 875	47 232	29 558
	Total *P. vivax*	19 002	32 635	22 132
	Total mixed cases	739	2 742	1 115
	Imported cases	7 785	618	1 297

2018	2019	2020	2021	2022	2023
98 843	1 903 742	661 922	2 017 227	2 527 657	3 428 237
3 242	1 902 505	145 954	1 943 519	2 382 940	3 428 237
–	–	2 205	43 197	13 907	–
–	–	–	–	6 700	–
–	–	3 851	30 511	3 609	–
2 002 877	2 406 091	1 876 164^	1 845 368^	2 222 943	2 367 706^
2 002 712	2 402 967	1 737 013	1 844 659	2 222 943	2 366 541
–	–	–	–	–	751
165	3 124	456	709	–	414
5 759 174	13 982 362	16 329 136	14 336 387	19 185 472	15 968 780
5 759 174	13 982 362	16 329 136	14 336 387	19 185 472	15 968 780
6 390 976**	6 482 151**	6 300 316**	4 619 074**	3 654 964	3 763 241
6 051 844	6 479 812	6 298 259	4 618 710	3 654 393	3 754 824
–	12	0	–	0	4
–	132	2 000	364	191	7 956
–	35	57	–	9	466
1 754[$]	3 286[$]	4 314[$]	4 319[$]	6 244[$]	9 540[$]
6 389 514	6 478 474	6 294 088	4 617 043	3 653 700**	3 749 070**
6 050 382	6 478 474	6 294 088	4 617 043	3 653 700	3 749 070
–	–	–	–	2 951	5 370
1 462*	3 677**	6 228*	2 031*	1 264**	14 171**^
1 462	1 338	4 171	1 667	693	5 754
–	12	0	–	0	4
–	132	2 000	364	191	7 956
–	35	57	–	9	466
1 754	3 286	4 314	4 319	3 293	4 170
5 039 679	5 147 350	8 121 215	6 769 142	8 126 829	8 318 536
5 039 679	5 147 350	8 121 215	6 769 142	8 126 829	8 318 534
266 117**	308 173	447 381	133 137	141 076	246 154**
266 117	308 173	447 381	133 137	141 076	246 154
672	–	–	–	–	2 545
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
23	22	13	13	10	16
3*	0*	0*	0*	0*	0*
1	0	0	0	0	0
2	0	0	0	0	0
–	–	0	0	0	0
–	0	0	0	0	0
4	2	0	0	0	2
5 342*	9 338*	12 180*	9 944*	10 321*	10 287*
–	31	66	165	466	917
5 342	9 299	12 106	9 714	9 787	9 151
–	5	7	65	68	218
12	19	7	15	9	10
187 757*	153 294*	143 395*	139 021*	129 000*	140 261*
17 861	15 137	21 437	21 612	17 988	21 491
168 552	136 947	119 911	115 258	108 626	115 785
1 333	1 189	2 040	2 135	2 346	2 825
6 816	4 165	1 811	1 365	2 254	2 564
61 195*	80 415*	81 363*	73 974*	72 697*	104 854**
29 953	39 891	39 879	36 169	27 776	37 774
30 063	38 392	39 687	35 992	44 216	66 035
1 179	837	670	657	705	0
1 948	2 306	466	733	864	625

Annex 4 – I. Reported malaria cases by species, 2015–2023

WHO region Country/area	Species	2015	2016	2017
AMERICAS				
Costa Rica	Indigenous cases	0*	4*	12*
	Total *P. falciparum*	0	–	–
	Total *P. vivax*	0	4	12
	Total other cases	0	–	–
	Imported cases	8	9	13
Dominican Republic	Indigenous cases	631*	690*	341*
	Total *P. falciparum*	631	690	341
	Imported cases	30	65	57
Ecuador	Indigenous cases	627**	1 191*	1 275*
	Total *P. falciparum*	209	403	309
	Total *P. vivax*	418	788	963
	Total mixed cases	–	–	3
	Imported cases	59	233	105
El Salvador[1]	Indigenous cases	5*	12*	0*
	Total *P. falciparum*	–	–	0
	Total *P. vivax*	5	12	0
	Total other cases	–	–	0
	Imported cases	4	1	3
French Guiana[4]	Indigenous cases	374**	217***^	554**
	Total *P. falciparum*	61	55	62
	Total *P. vivax*	194	99	368
	Total mixed cases	119	67	124
	Total other cases	–	–	–
	Imported cases	60	41	43
Guatemala	Indigenous cases	5 538*	5 000**	4 121**
	Total *P. falciparum*	43	4	0
	Total *P. vivax*	5 487	4 996	4 121
	Total mixed cases	8	0	0
	Total other cases	–	–	–
	Imported cases	2	1	3
Guyana	Indigenous cases	9 984	10 697**	13 936
	Total *P. falciparum*	3 219	3 576	5 141
	Total *P. vivax*	6 002	6 081	7 645
	Total mixed cases	731	781	1 078
	Total other cases	32	57	72
	Imported cases	–	411	–
Haiti	Indigenous cases	17 583	21 430	19 135
	Total *P. falciparum*	17 583	21 430	19 135
Honduras	Indigenous cases	3 555	4 094**	1 273**
	Total *P. falciparum*	902	1 310	128
	Total *P. vivax*	2 626	2 744	1 145
	Total mixed cases	27	40	–
	Imported cases	0	3	10
Mexico	Indigenous cases	517*	551*	736*
	Total *P. falciparum*	–	–	–
	Total *P. vivax*	517	551	736
	Imported cases	34	45	29
Nicaragua	Indigenous cases	2 279*	6 272*	10 949*
	Total *P. falciparum*	338	1 285	1 836
	Total *P. vivax*	1 937	4 965	9 080
	Total mixed cases	4	22	33
	Imported cases	29	12	3
Panama	Indigenous cases	546*	769*	649*
	Total *P. falciparum*	–	21	1
	Total *P. vivax*	546	748	648
	Total mixed cases	–	–	–
	Total other cases	–	–	–
	Imported cases	16	42	40

2018	2019	2020	2021	2022	2023
70*	95*	90*	189***	406*	543***
9	8	2	171	379	501
61	87	88	17	27	34
–	–	–	1	–	–
38	45	34	27	36	93
433*	1 291*	826*	284*	320*	253*
433	1 291	826	284	320	253
87	37	3	7	17	18
1 653*	1 803*	1 934*	2 175*	1 348*	604*
149	211	214	445	198	30
1 504	1 592	1 715	1 728	1 150	574
–	–	5	2	0	0
153	106	67	70	42	59
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	3	0	4	1	7
546	212*	140**	74*	21***	189*
49	17	3	1	0	7
496	193	137	72	9	182
–	–	–	–	–	–
1	–	–	1	–	–
–	36	14	37	15	–
3 018*	2 069*	1 058*	1 273*	1 856*	3 046*
0	0	0	0	7	0
3 018	2 069	1 058	1 273	1 824	3 046
–	0	0	–	9	–
–	–	–	–	16	–
3	3	0	–	–	7
17 038	18 642**	17 179**^	20 786**	20 730**	28 533**
6 033	5 676	5 544	5 982	6 850	10 203
9 854	11 838	10 889	13 913	13 067	17 187
1 086	1 089	758	844	740	1 053
65	39	28	47	73	90
–	184	51	64	39	243
8 828	10 687	22 996	9 513	14 757	14 436
8 828	10 687	22 996	9 513	13 926	14 436
632**	330**	810****	1 542****	3 534****	2 590****
55	11	223	653	1 134	546
576	319	576	875	2 345	2 021
1	0	11	8	55	23
21	61	98	105	36	38
803*	618*	356*	242*	163*	42*
–	–	–	–	–	0
803	618	356	242	162	42
23	22	10	31	77	298
15 917*	13 200*	25 505*	23 259*	16 108*	6 716*
1 319	2 399	11 250	10 454	4 935	1 176
14 553	10 678	13 421	12 364	10 960	5 540
45	123	834	441	213	0
17	26	25	64	50	43
684*	1 757***^	1 948***	4 354****	4 746*	9 485***
0	12	9	10	29	10
684	1 744	1 937	4 115	4 714	9 451
0	23	–	2	3	4
–	375	–	–	–	–
31	15	10	7	31	56

Annex 4 – I. Reported malaria cases by species, 2015–2023

WHO region Country/area	Species	2015	2016	2017
AMERICAS				
Paraguay[1]	Indigenous cases	0*	0*	0*
	Total *P. falciparum*	0	0	0
	Total *P. vivax*	0	0	0
	Total mixed cases	–	–	–
	Total other cases	0	0	0
	Imported cases	8	10	5
Peru	Indigenous cases	61 865*	56 623*	55 367*
	Total *P. falciparum*	12 569	15 319	13 173
	Total *P. vivax*	49 287	41 287	42 044
	Total other cases	9	17	2
	Imported cases	–	48	57
Suriname	Indigenous cases	81*	78*	137**
	Total *P. falciparum*	17	6	33
	Total *P. vivax*	61	69	99
	Total mixed cases	3	1	5
	Total other cases	–	–	–
	Imported cases	295	251	414
Venezuela (Bolivarian Republic of)	Indigenous cases	136 402*	240 613*	411 586*
	Total *P. falciparum*	24 018	46 503	69 076
	Total *P. vivax*	100 880	179 554	316 401
	Total mixed cases	11 491	14 531	26 080
	Total other cases	13	25	29
	Imported cases	1 594	1 948	2 941
EASTERN MEDITERRANEAN				
Afghanistan	Indigenous cases	119 859	241 233	313 086
	Total *P. falciparum*	4 004	6 369	6 907
	Total *P. vivax*	82 891	132 407	154 468
	Total mixed cases	–	311	403
Djibouti	Indigenous cases	9 473	13 822	14 810
	Total *P. falciparum*	–	11 781	9 290
	Total *P. vivax*	–	2 041	5 381
	Total mixed cases	–	–	–
Iran (Islamic Republic of)	Indigenous cases	167*	81*	57*
	Total *P. falciparum*	8	0	2
	Total *P. vivax*	157	79	55
	Total mixed cases	1	2	–
	Total other cases	–	–	–
	Imported cases	632	611	868
Pakistan	Indigenous cases	203 859	329 005	369 817
	Total *P. falciparum*	28 311	43 821	54 407
	Total *P. vivax*	167 460	260 477	300 623
	Total mixed cases	8 088	24 707	14 787
Saudi Arabia	Indigenous cases	83*	272*	177*
	Total *P. falciparum*	83	270	172
	Total *P. vivax*	–	2	5
	Imported cases	2 537	5 110	2 974
Somalia	Indigenous cases	20 953	35 628	35 138
	Total *P. falciparum*	–	–	2 657
	Total *P. vivax*	–	–	825
Sudan	Indigenous cases	586 827	566 015	800 116
	Total *P. falciparum*	–	333 009	580 145
	Total *P. vivax*	–	82 175	58 335
	Total mixed cases	–	32 557	82 399
	Total other cases	–	–	–
Yemen	Indigenous cases	76 259	99 700	143 333
	Total *P. falciparum*	75 898	45 469	109 849
	Total *P. vivax*	334	347	1 833
	Total mixed cases	27	70	2 322
	Total other cases	0	0	0
	Unknown species	–	–	–

2018	2019	2020	2021	2022	2023
0*	0*	0*	0*	0*	0*
0	0	0	0	0	0
0	0	0	0	0	0
–	–	–	0	0	0
0	0	0	0	0	0
0	2	1	4	3	0
45 443*	24 324*	15 822*	18 075*	27 785	22 614*
9 438	4 716	3 198	3 584	4 171	3 481
36 005	19 605	12 624	14 490	22 514	19 074
–	3	–	1	31	59
176	159	25	65	0	11
37**	104**	147**	22*	0*	0*
5	0	0	0	0	0
12	104	147	22	0	0
20	0	0	0	0	0
–	–	–	–	0	0
198	111	88	53	60	102
404 924*	398 285*	190 314*^	174 409*	124 545*	108 945***
71 504	64 307	33 887	23 428	20 114	21 630
307 622	308 132	151 783	143 287	99 309	80 917
25 789	25 846	11 795	7 693	5 121	6 320
9	0	1	1	1	–
2 125	1 848	1 356	829	1 544	1 377
248 689	173 860	105 295	86 263	125 620	180 045
6 437	2 701	2 691	3 921	4 462	7 946
166 583	170 747	102 316	82 094	120 785	171 523
473	412	288	248	373	576
25 319	49 402	73 535	58 916	40 648	38 944
16 130	36 025	46 537	44 385	30 346	29 728
9 189	13 377	26 998	14 531	9 858	8 620
–	–	–	–	444	596
0*	0*	0*	0*	1 439*‡	2 528*‡
0	0	0	0	197	805
0	0	0	0	1 218	1 666
0	0	0	0	24	57
0	0	0	0	–	–
602	1 107	878	821	4 238	7 456
374 510	413 533	371 828	399 097	1 824 396	2 743 659
55 639	87 169	74 899	94 543	584 943	881 339
314 572	323 355	293 077	301 169	1 178 058	1 761 637
4 299	3 009	3 852	3 385	61 395	100 683
61*	38*	83*	0*	0*	0*
57	38	83	0	0	0
4	–	–	0	0	0
2 517	2 029	3 453	2 470	4 045	6 159
31 021	39 687	27 333	12 967	11 550	13 598
–	36 766	–	10 919	10 788	13 437
–	2 921	–	2 048	762	161
1 648 683	1 752 011	1 698 394	1 647 744	1 355 789	354 412
1 286 915	1 363 507	1 272 738	1 182 363	1 091 532	262 698
143 314	194 904	170 202	175 590	124 730	39 616
187 270	193 600	143 066	160 222	–	–
–	–	–	–	23 621	–
157 900	165 899	164 066	180 339	155 127	146 265
112 823	163 941	162 318	173 922	150 404	145 593
970	1 802	1 684	4 343	4 134	3 235
63	114	3	46	16	78
69	42	61	2 028	0	515
–	–	–	–	–	4

Annex 4 – I. Reported malaria cases by species, 2015–2023

WHO region Country/area	Species	2015	2016	2017
EUROPEAN				
Armenia[1]	Indigenous cases	0*	0*	0*
	Total *P. falciparum*	0	0	0
	Total *P. vivax*	0	0	0
	Total mixed cases	0	0	0
	Total other cases	0	0	0
	Imported cases	2	2	2
Azerbaijan[1]	Indigenous cases	0*	0*	0*
	Total *P. falciparum*	0	0	0
	Total *P. vivax*	0	0	0
	Total mixed cases	0	0	0
	Total other cases	0	0	0
	Imported cases	1	1	1
Georgia	Indigenous cases	0*	0*	0*
	Total *P. falciparum*	0	0	0
	Total *P. vivax*	0	0	0
	Total mixed cases	0	0	0
	Total other cases	0	0	0
	Imported cases	5	7	8
Kyrgyzstan[1]	Indigenous cases	0*	0*	0*
	Total *P. falciparum*	0	0	0
	Total *P. vivax*	0	0	0
	Total mixed cases	0	0	0
	Total other cases	0	0	0
	Imported cases	1	6	2
Tajikistan[1]	Indigenous cases	0*	0*	0*
	Total *P. falciparum*	0	0	0
	Total *P. vivax*	0	0	0
	Total mixed cases	0	0	0
	Total other cases	0	0	0
	Imported cases	4	1	3
Türkiye	Indigenous cases	0*	0*	0*
	Total *P. falciparum*	0	0	0
	Total *P. vivax*	0	0	0
	Total mixed cases	0	0	0
	Total other cases	0	0	0
	Imported cases	221	208	214
Turkmenistan[1]	Indigenous cases	0*	0*	0*
	Total *P. falciparum*	0	0	0
	Total *P. vivax*	0	0	0
	Total mixed cases	0	0	0
	Total other cases	0	0	0
	Imported cases	0	0	0
Uzbekistan[1]	Indigenous cases	0*	0*	0*
	Total *P. falciparum*	0	0	0
	Total *P. vivax*	0	0	0
	Total mixed cases	0	0	0
	Total other cases	0	0	0
	Imported cases	0	0	0
SOUTH-EAST ASIA				
Bangladesh	Indigenous cases	39 590**	27 628**	29 228**
	Total *P. falciparum*	26 453	17 269	23 315
	Total *P. vivax*	4 000	3 297	4 442
	Total mixed cases	9 137	7 062	1 471
	Imported cases	129	109	19
Bhutan	Indigenous cases	34*	15*	11*
	Total *P. falciparum*	13	1	0
	Total *P. vivax*	21	13	11
	Total mixed cases	0	1	0
	Total other cases	–	–	–
	Imported cases	70	56	38

2018	2019	2020	2021	2022	2023
0*	0*	0*	–	0*	0*
0	0	0	–	0	0
0	0	0	–	0	0
–	–	–	–	–	–
0	0	0	–	0	0
6	–	3	–	2	2
0*	0*	0*	0*	0*	–
0	0	0	0	0	–
0	0	0	0	0	–
–	–	–	–	–	–
0	0	0	0	0	–
2	0	0	1	1	–
0*	0*	0*	–	–	–
0	0	0	–	–	–
0	0	0	–	–	–
–	–	–	–	–	–
0	0	0	–	–	–
9	8	4	–	–	–
0*	0*	0*	–	–	–
0	0	0	–	–	–
0	0	0	–	–	–
0	0	–	–	–	–
0	0	0	–	–	–
0	1	0	–	–	–
0*	0*	0*	0*	0*	0*
0	0	0	0	0	0
0	0	0	0	0	0
–	–	–	–	–	–
0	0	0	–	0	0
–	3	0	0	1	9
0*	0*	0*	–	–	–
0	0	0	–	–	–
0	0	0	–	–	–
–	–	–	–	–	–
0	0	0	–	–	–
237	277	133	–	–	–
0*	–	–	–	–	–
0	–	–	–	–	–
0	–	–	–	–	–
–	–	–	–	–	–
0	–	–	–	–	–
0	3	0	–	–	–
0*	0*	0*	–	–	–
0	0	0	–	–	–
0	0	0	–	–	–
–	–	–	–	–	–
0	0	0	–	–	–
0	1	2	–	–	–
10 482**	17 219**	6 128**	7 288**	18 233**^	16 548**^
8 470	14 752	4 744	4 992	11 980#	8 829
1 672	2 126	1 245	1 953	5 856#	7 499
340	341	139	343	410#	221
41	6	2	6	13	19
6*	2*	22*	9*	0*	0*
1	0	0	1	0	0
5	2	22	7	0	0
0	0	0	1	0	0
–	–	–	–	0	0
34	30	9	13	3	14

Annex 4 – I. Reported malaria cases by species, 2015–2023

WHO region Country/area	Species	2015	2016	2017
SOUTH-EAST ASIA				
Democratic People's Republic of Korea	Indigenous cases	7 022	5 033	4 603
	Total *P. falciparum*	0	0	0
	Total *P. vivax*	7 022	5 033	4 603
	Total other cases	–	–	–
India	Indigenous cases	1 169 261	1 087 285	844 558
	Total *P. falciparum*	774 627	706 257	525 637
	Total *P. vivax*	390 440	375 783	315 028
	Total mixed cases	4 194	5 245	3 893
	Total other cases	0	0	0
Indonesia	Indigenous cases	217 017**	218 449**	261 557**
	Total *P. falciparum*	103 315	118 844	143 926
	Total *P. vivax*	94 267	81 748	95 694
	Total mixed cases	13 105	16 751	18 899
	Total other cases	1 387	1 106	1 818
	Imported cases	–	–	–
Myanmar	Indigenous cases	182 465^	110 146	85 019
	Total *P. falciparum*	110 449	62 917	50 730
	Total *P. vivax*	65 536	43 748	32 070
	Total mixed cases	6 624	3 476	2 214
	Total other cases	0	5	5
	Imported cases	–	–	–
Nepal	Indigenous cases	591*	507*	623*
	Total *P. falciparum*	67	61	25
	Total *P. vivax*	504	433	587
	Total mixed cases	20	13	11
	Imported cases	521	502	670
Sri Lanka[1]	Indigenous cases	0*	0*	0*
	Total *P. falciparum*	0	0	0
	Total *P. vivax*	0	0	0
	Total mixed cases	0	0	0
	Total other cases	0	0	0
	Imported cases	36	41	57
Thailand	Indigenous cases	17 495**	12 076**	7 416**
	Total *P. falciparum*	3 301	1 774	846
	Total *P. vivax*	4 655	5 765	4 802
	Total mixed cases	122	109	63
	Total other cases	12	1	506
	Imported cases	9 890	5 724	4 020
Timor-Leste	Indigenous cases	80	81*	16*
	Total *P. falciparum*	33	46	4
	Total *P. vivax*	24	7	3
	Total mixed cases	23	28	9
	Total other cases	0	–	–
	Imported cases	–	10	13
WESTERN PACIFIC				
Cambodia	Indigenous cases	68 109	43 380	76 804
	Total *P. falciparum*	17 830	12 156	20 328
	Total *P. vivax*	13 146	9 816	15 207
	Total mixed cases	2 954	1 520	1 397
	Total other cases	0	0	0
	Imported cases	–	–	–
China[1]	Indigenous cases	39*	1*	0*
	Total *P. falciparum*	1	0	0
	Total *P. vivax*	26	1	0
	Total mixed cases	0	0	0
	Total other cases	6	–	0
	Imported cases	3 212	3 149	2 663

2018	2019	2020	2021	2022	2023
3 698	1 869	1 819	2 357	2 136	3 160
0	0	0	0	0	0
3 698	1 869	1 819	2 357	2 136	3 160
–	–	–	–	0	0
429 928	338 494	186 532	161 753	176 522	227 564
204 733	154 645	117 567	100 442	98 306	134 629
222 730	181 514	67 444	60 187	75 452	89 619
2 465	2 295	1 520	1 124	2 762	3 313
0	0	1	0	2	3
222 125**	250 553**	254 001**	304 579**	443 446**	418 206**
116 035	142 036	141 807	152 724	152 899	200 519
84 862	86 742	83 743	114 301	101 300	160 325
18 383	18 707	25 148	31 893	14 646	46 360
2 585	3 057	3 288	5 658	9 012	10 981
11	61	38	27	67	84
76 518	56 414^	58 827**^	79 000**^	157 533****^	228 554****^
38 483	23 017	15 191	14 614	29 519	39 173
36 502	32 788	43 578	63 909	127 797	187 345
1 530	606	407	523	1 154	3 567
3	4	0	0	–	–
–	–	9§	1§	5	13
493*	131*	73*	32*	36*	15*
5	9	5	3	3	3
488	118	68	29	33	12
0	–	–	0	0	0
539	579	357	359	476	649
0*	0*	0*	0*	0*	0*
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
48	53	30	25	37	62
5 110**	4 065**	3 123**	2 426**	6 263**	9 169**
447	391	155	53	167	171
3 575	3 443	2 892	2 313	6 012	8 378
61	29	16	9	32	44
248	135	58	42	32	38
1 618	1 342	798	800	3 726	7 276
0*	0*	3*	0*	0*	0*
0	0	2	0	0	0
0	0	0	0	0	0
0	0	1	0	0	0
0	0	–	0	0	0
7	9	7	0	2	4
62 582	32 196**	9 962**	4 382	4 047**	1 382**
10 525	4 833	1 073	342	396	34
30 680	26 871	8 722	4 018	3 577	1 307
1 080	492	167	17	16	0
0	–	–	5	55	30
–	1	2	0	6	2
0*	0*	0*	–	0*	–
0	0	0	–	0	–
0	0	0	–	0	–
0	0	0	–	0	–
0	0	0	–	0	–
2 511	2 486	1 050	–	819	–

Annex 4 – I. Reported malaria cases by species, 2015–2023

WHO region Country/area	Species	2015	2016	2017
WESTERN PACIFIC				
Lao People's Democratic Republic	Indigenous cases	36 078	15 509	8 435
	Total *P. falciparum*	14 439	5 737	4 169
	Total *P. vivax*	20 815	9 441	4 104
	Total mixed cases	823	329	162
	Total other cases	0	0	0
	Imported cases	–	–	–
Malaysia	Indigenous cases	242**	266**	85**
	Total *P. falciparum*	110	67	18
	Total *P. vivax*	84	178	59
	Total mixed cases	22	9	1
	Total other cases	26	12	7
	Imported cases	435	428	423
Papua New Guinea	Indigenous cases	346 431	534 819	488 878
	Total *P. falciparum*	118 452	183 686	163 160
	Total *P. vivax*	62 228	95 328	113 561
	Total mixed cases	115 157	197 711	200 186
	Total other cases	1 950	1 772	1 433
Philippines	Indigenous cases	11 325**	6 625**	6 737**
	Total *P. falciparum*	4 769	5 282	3 258
	Total *P. vivax*	755	816	551
	Total mixed cases	195	388	83
	Total other cases	87	139	40
	Imported cases	85	55	69
Republic of Korea	Indigenous cases	627*	602*	436*
	Total *P. falciparum*	0	0	0
	Total *P. vivax*	627	602	436
	Imported cases	79	71	79
Solomon Islands	Indigenous cases	23 998	54 432	52 519
	Total *P. falciparum*	10 478	16 607	15 400
	Total *P. vivax*	12 150	33 060	30 169
	Total mixed cases	1 370	4 719	6 917
	Total other cases	0	46	33
	Unknown species	–	–	–
Vanuatu	Indigenous cases	571	2 243****	1 227**
	Total *P. falciparum*	150	186	273
	Total *P. vivax*	273	1 682	798
	Total mixed cases	0	0	0
	Unknown species	–	–	–
	Imported cases	–	0	1
Viet Nam	Indigenous cases	9 331	4 161	4 548
	Total *P. falciparum*	4 327	2 323	2 858
	Total *P. vivax*	4 756	1 750	1 608
	Total mixed cases	234	73	70
	Total other cases	14	15	12
	Imported cases	–	–	–

P.: *Plasmodium*; RDT: rapid diagnostic test; WHO: World Health Organization.

"–" refers to not applicable or data not available.

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

[2] Between 2015 and 2023, information on species was not available or the species could not be distinguished by the RDT product used for all or some years, and all cases are therefore assumed to be *P. falciparum*.

[3] In May 2013, South Sudan was reassigned to the WHO African Region (WHA resolution 66.21, https://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R21-en.pdf).

[4] *Source: Pan American Health Organization (PAHO)/WHO, Regional Malaria Meeting: Expanding access to malaria diagnosis and treatment, reducing malaria in high-burden municipalities. "Élargir l'accès au diagnostic et au traitement du paludisme, Situation de la malaria en Guyane Française. Agence régionale de santé (ARS-Guyane)." Bogotá, Colombia, 24–26 September 2024 (https://www.infectiologie.com/UserFiles/File/jni/2024/com/jni2024-sg3-03-epelboin.pdf). Entered by Dennis Navarro Costa, Malaria Regional Program PAHO/WHO. 10 September 2024.*

* Reported indigenous cases.

2018	2019	2020	2021	2022	2023
9 006****^	6 690****^	3 484****^	3 896****^	2 263****^	673****^
4 828[#]	2 168	1 573	1 339	473	85
4 099[#]	4 444	1 879	2 536	1 780	591
111[#]	79	37	22	18	6
2[#]	0	0	0	–	–
0	0	4	28	59	4
0**	0**	0**	0**	0**	0**^
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
485	630	177	111	291	675
516 249	646 648	750 254	651 963	899 510	839 537
174 818	181 463	189 397	181 927	254 496	265 571
138 006	163 237	186 981	172 964	211 111	209 647
201 658	299 869	372 257	296 710	433 575	363 943
1 767	2 079	1 619	362	328	376
4 559**	5 681**	6 094**^	4 262**	3 211**	6 193**^
1 310	5 034	5 234	3 347	2 509	5 040
116	537	736	703	523	916
22	80	88	185	151	192
47	4	37	27	28	46
82	95	26	35	34	55
501*	485*	356*	274*	382*	662*
0	0	0	0	0	0
501	485	356	274	348	644
75	74	29	20	38	74
59 191	72 767	77 637	84 139	100 995	123 476
15 771	15 595	14 753	22 057	27 221	33 392
35 072	47 164	52 039	57 095	59 155	70 635
8 341	9 979	10 813	4 943	14 577	19 427
7	27	32	44	36	22
–	–	–	–	6	–
632**	567**	493**^	312**	1 102*	2 261
42	36	38	0	0	0
590	531	469	312	1 102	2 256
0	0	0	0	0	5
–	–	–	–	–	3
12	9	14	10	41	–
3 132*^	3 200**^	1 376*	377*	412*	373*
2 966	3 110	792	142	234	60
1 751	1 541	573	233	163	195
83	33	11	0	1	2
–	10	–	2	14	113
1 681	1 565[§]	46	90	43	75

Data as of 5 November 2024

** Indigenous cases = confirmed cases – imported cases.

*** Unclassified cases are reclassified as indigenous cases.

^ Data discrepancies between total indigenous cases and sum of species are due to the use of different data sources for total indigenous cases and species (outpatient department versus laboratory registers), double counting of mixed infections and *P. falciparum* or *P. vivax* infection, failure to update species data following data audit, species not provided in classification data or the inability to adjust species for double counting of RDT and microscopy tests.

[#] Species includes introduced cases.

[$] Zanzibar only.

**** Indigenous cases = confirmed cases – imported and introduced cases.

[‡] Includes cases classified as indigenous and introduced. Due to the large number of cases, the country was unable to follow up and accurately distinguish between the two.

[§] No adjustment for imported and/or introduced cases due to incomplete information, data quality issues or use of different data sources for imported and introduced cases.

Note: Indigenous cases do not include non-human malaria cases or introduced cases.

Annex 4 – J. Reported malaria deaths, 2015–2023

WHO region Country/area	2015	2016	2017	2018	2019	2020	2021	2022	2023
AFRICAN									
Algeria[1,2]	0	0	0	0	0	0	0	0	0
Angola	7 832	15 997	13 967	11 814	18 691	11 757	13 676	12 474	10 089
Benin	1 416	1 646	2 182	2 138	2 589	2 440	2 990	2 955	2 759
Botswana	5	3	17	9	7	11	5	6	6
Burkina Faso	5 379	3 974	4 144	4 294	1 060	3 983	4 355	4 243	3 396
Burundi	3 799	5 853	4 414	2 481	3 316	2 276	2 292	2 374	1 831
Cabo Verde[1,2]	0	1	2	0	0	0	0	0	0
Cameroon	3 440	2 639	3 195	3 256	4 510	4 121	3 782	2 481	1 756
Central African Republic	1 763	2 668	3 689	1 292	2 017	1 779	2 412	1 547	2 070
Chad	1 572	1 686	2 088	1 948	3 374	2 955	3 065	2 692	2 864
Comoros	1	0	3	8	0	7	3	0	2
Congo	435	733	229	131	107	99	252	951	1 361
Côte d'Ivoire	2 604	3 340	3 222	3 133	1 693	1 316	1 276	1 555	1 452
Democratic Republic of the Congo	39 054	33 997	27 458	18 030	13 072	18 636	22 729	24 880	22 224
Equatorial Guinea	28	109	–	–	15	–	–	71	106
Eritrea	12	21	8	5	3	3	6	5	4
Eswatini	5	3	20	2	3	2	7	4	7
Ethiopia	662	510	356	158	213	173	175	180	296
Gabon	309	101	218	591	314	224	244	215	205
Gambia	167	79	54	60	41	73	42	62	69
Ghana	2 137	1 264	599	428	336	308	277	151	146
Guinea	846	867	1 174	1 267	1 881	1 119	1 117	1 368	1 456
Guinea-Bissau	477	191	296	244	288	–	–	461	318
Kenya	15 061	603	–	–	858	742	753	219	1 060
Liberia	1 379	1 259	758	–	602	–	248	353	188
Madagascar	841	443	370	927	657	674	547	291	393
Malawi	3 799	4 000	3 613	2 967	2 341	2 517	2 368	1 829	1 481
Mali	1 544	1 344	1 050	1 001	1 454	1 698	1 480	1 498	1 305
Mauritania	39	315	67	–	–	–	–	–	22
Mayotte[2]	–	–	–	–	0	–	–	–	0
Mozambique	2 467	1 685	1 114	968	734	563	408	423	356
Namibia	32	65	57	58	6	35	14	28	32
Niger	2 778	2 226	2 316	3 576	4 449	5 849	4 430	4 461	4 633
Nigeria	9 330	7 397	8 720	14 936	26 540	1 811	7 828	6 734	5 704
Rwanda	516	715	376	341	224	149	60	75	35
Sao Tome and Principe[2]	0	1	1	0	0	0	1	0	0
Senegal	526	325	284	555	260	373	399	273	199
Sierra Leone	1 107	1 345	1 298	1 949	2 771	1 648	2 107	3 151	2 637
South Africa	110	34	301	69	79	38	56	29	113
South Sudan	–	–	3 483	1 191	4 877	244	4 220	4 429	1 813
Togo	1 127	847	995	905	1 275	929	809	905	1 281
Uganda	6 100	5 635	5 111	3 302	5 027	4 252	3 158	4 817	2 793
United Republic of Tanzania	6 315	5 046	3 685	2 753	1 171	2 569	1 925	1 538	2 002
Mainland	6 313	5 045	3 684	2 747	1 163	2 549	1 916	1 534	1 971
Zanzibar	2	1	1	6	8	20	9	4	31
Zambia	2 389	1 827	1 425	1 209	1 339	1 972	1 503	1 361	1 616
Zimbabwe	200	351	527	192	266	400	131	177	317

WHO region Country/area	2015	2016	2017	2018	2019	2020	2021	2022	2023
AMERICAS									
Argentina[1,2]	0	0	0	0	0	0	–	0	0
Belize[1,2]	0	0	0	0	0	0	0	0	0
Bolivia (Plurinational State of)[2]	0	0	0	0	0	0	0	0	0
Brazil	35	35	34	56	37	51	58	50	73
Colombia	18	36	19	9	3	5	11	16	22
Costa Rica[2]	0	0	0	0	0	0	0	0	0
Dominican Republic[2]	3	1	1	1	4	2	1	0	0
Ecuador[2]	0	0	0	0	0	3	0	1	0
El Salvador[1,2]	0	0	0	0	0	0	–	–	0
French Guiana	0	0	0	0	0	0	–	0	–
Guatemala[2]	1	0	0	0	0	0	0	0	0
Guyana	12	13	11	6	15	13	16	–	–
Haiti	15	13	12	19	7	11	16	5	8
Honduras[2]	0	0	1	1	0	0	0	0	0
Mexico[2]	0	0	0	0	0	0	0	0	0
Nicaragua[2]	1	2	1	3	1	0	0	0	0
Panama[2]	0	0	0	0	0	0	0	0	0
Paraguay[1,2]	0	0	0	0	0	0	0	0	0
Peru	5	7	10	4	5	1	5	6	1
Suriname[2]	0	0	1	0	0	0	0	0	0
Venezuela (Bolivarian Republic of)	79	140	340	257	118	31	18	11	12
EASTERN MEDITERRANEAN									
Afghanistan[2]	49	47	10	1	0	0	0	0	0
Djibouti	23	5	–	–	0	–	19	62	42
Iran (Islamic Republic of)[2]	0	0	0	0	0	0	0	0	0
Pakistan	34	33	113	102	0	80	0	38	40
Saudi Arabia[2]	0	0	0	0	0	0	0	0	0
Somalia[2]	27	13	20	31	20	5	2	1	0
Sudan	868	698	1 534	3 129	1 663	701	1 679	1 760	851
Yemen	14	65	37	57	5	6	25	41	25
SOUTH-EAST ASIA									
Bangladesh	9	17	13	7	9	9	9	14	6
Bhutan[2]	0	0	0	0	0	0	0	0	0
Democratic People's Republic of Korea[2]	0	0	0	0	0	0	0	0	0
India	384	331	194	96	77	93	90	83	83
Indonesia	157	161	47	34	49	32	48	71	120
Myanmar	37	21	30	19	14	10	11	20	15
Nepal[2]	0	3	0	0	0	0	1	0	0
Sri Lanka[1,2]	0	0	0	0	0	0	0	0	0
Thailand[3]	33	27	15	15	13	3	0	1	5
Timor-Leste[2]	0	0	0	0	0	0	0	0	0

Annex 4 – J. Reported malaria deaths, 2015–2023

WHO region Country/area	2015	2016	2017	2018	2019	2020	2021	2022	2023
WESTERN PACIFIC									
Cambodia	10	3	1	0	0	0	0	0	1
China[1]	0	0	0	0	0	0	–	0	–
Lao People's Democratic Republic[2]	2	1	2	6	0	0	1	1	0
Malaysia[4]	4	2	12	12	6	5	13	9	14
Papua New Guinea	163	306	273	216	180	188	201	282	251
Philippines	20	7	4	1	4	3	3	0	8
Republic of Korea[2]	0	0	0	0	0	0	0	0	0
Solomon Islands	13	20	27	7	14	3	9	12	19
Vanuatu[2]	0	0	0	0	0	0	0	0	0
Viet Nam[2]	3	3	6	1	0	0	0	0	0
REGIONAL SUMMARY									
African	127 603	111 145	102 886	88 188	108 460	77 745	91 150	91 266	80 397
Americas	169	247	430	356	190	117	125	89	116
Eastern Mediterranean	1 015	861	1 714	3 320	1 688	792	1 725	1 902	933
South-East Asia	620	560	299	171	162	147	159	189	229
Western Pacific	215	342	325	243	204	199	227	304	293
Total	**129 622**	**113 155**	**105 654**	**92 278**	**110 704**	**79 000**	**93 386**	**93 750**	**81 968**

Data as of 8 October 2024

E-2025: eliminating countries for 2025; WHO: World Health Organization.

"–" refers to not applicable or data not available.

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

[2] There were no indigenous deaths in 2023.

[3] The malaria death reported in 2022 was due to infection with *P. knowlesi*.

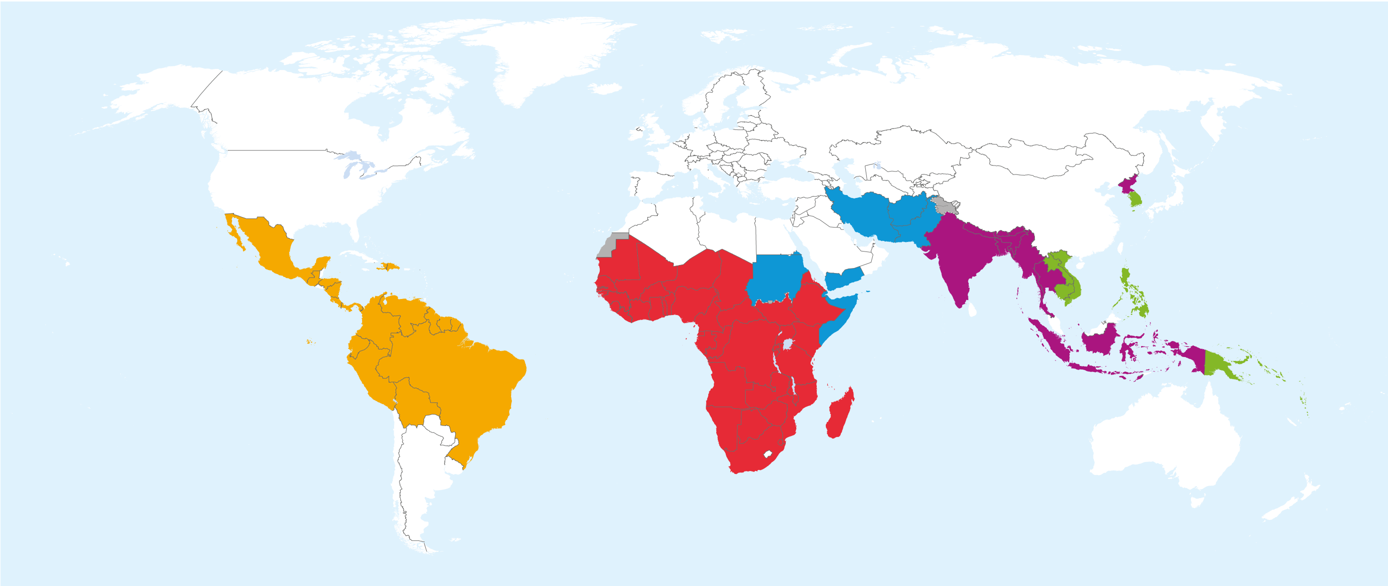
[4] All malaria deaths reported between 2018 and 2023, and 11 deaths in 2017, were due to infection with *P. knowlesi*.

Notes:

There have been no indigenous deaths reported in the WHO European Region since 2010.

Reported indigenous deaths are shown for countries where 100% of deaths have been investigated and classified, which may vary from year to year. The majority of these are E-2025 countries. For countries where case investigations are not carried out and/or deaths are not classified, all deaths are assumed to be indigenous.

Annex 4 – K. Malaria endemic countries and areas[1]



WHO AFRICAN REGION

Angola
Benin
Botswana
Burkina Faso
Burundi
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
Togo
Uganda
United Republic of Tanzania
Zambia
Zimbabwe

WHO REGION OF THE AMERICAS

Bolivia (Plurinational State of)
Brazil
Colombia
Costa Rica
Dominican Republic
Ecuador
French Guiana
Guatemala
Guyana
Haiti
Honduras
Mexico
Nicaragua
Panama
Peru
Suriname
Venezuela (Bolivarian Republic of)

WHO EASTERN MEDITERRANEAN REGION

Afghanistan
Djibouti
Iran (Islamic Republic of)
Pakistan
Somalia
Sudan
Yemen

WHO SOUTH-EAST ASIA REGION

Bangladesh
Bhutan
Democratic People's Republic of Korea
India
Indonesia
Myanmar
Nepal
Thailand

WHO WESTERN PACIFIC REGION

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

WHO: World Health Organization.

[1] In the *World malaria report 2024*, a country or area is considered endemic when it has reported at least one indigenous case since 2021.

Annex 4 – L. Countries and territories certified malaria free by WHO (1955–2024) and countries where malaria never existed or disappeared without specific measures

Countries that have achieved at least 3 consecutive years of zero indigenous cases are eligible to apply for a WHO certification of malaria free status.

WHO region	Country/territory	Countries certified malaria free[1,2,3,4,5]	Countries where malaria never existed or disappeared without specific measures[6]
AFRICAN	Algeria	2019	
	Cabo Verde	2024	
	Lesotho		2012
	Mauritius	1973	
	Seychelles		2012
AMERICAS	Antigua and Barbuda		2012
	Argentina	2019	
	Bahamas		2012
	Barbados		1968
	Belize	2023	
	Canada		1965
	Chile		1968
	Cuba	1973	
	Dominica	1966	
	El Salvador	2021	
	Grenada	1962	
	Jamaica	1966	
	Paraguay	2018	
	Saint Kitts and Nevis		2012
	Saint Lucia	1962	
	Saint Vincent and the Grenadines		2012
	Trinidad and Tobago	1965	
	United States of America	1970	
	Uruguay		2012
EASTERN MEDITERRANEAN	Bahrain		2012
	Egypt	2024	
	Jordan		2012
	Kuwait		1963
	Lebanon		2012
	Libya		2012
	Morocco	2010	
	Qatar		2012
	Tunisia		2012
	United Arab Emirates	2007	
EUROPEAN	Albania		2012
	Andorra		2012
	Armenia	2011	
	Austria		1963
	Azerbaijan	2023	
	Belarus		2012
	Belgium		1963
	Bosnia and Herzegovina	1973	
	Bulgaria	1965	
	Croatia	1973	
	Cyprus	1967	
	Czechia		1963
	Denmark		1963

WHO region	Country/territory	Countries certified malaria free[1,2,3,4,5]	Countries where malaria never existed or disappeared without specific measures[6]
EUROPEAN	Estonia		2012
	Finland		1963
	France (Metropolitan)		2012
	La Réunion (France)	1979	
	Germany		1964
	Greece		2012
	Hungary	1964	
	Iceland		1963
	Ireland		1963
	Israel		2012
	Italy	1970	
	Kazakhstan		2012
	Kyrgyzstan	2016	
	Latvia		2012
	Lithuania		2012
	Luxembourg		2012
	Malta		1963
	Monaco		1963
	Montenegro	1973	
	Netherlands (Kingdom of the)	1970	
	Norway		1963
	Poland	1967	
	Portugal	1973	
	Republic of Moldova		2012
	Republic of North Macedonia	1973	
	Romania	1967	
	Russian Federation		2012
	San Marino		1963
	Serbia	1973	
	Slovakia		1963
	Slovenia	1973	
	Spain	1964	
	Sweden		1963
	Switzerland		1963
	Tajikistan	2023	
	Turkmenistan	2010	
	Ukraine		2012
	United Kingdom of Great Britain and Northern Ireland		1963
	Uzbekistan	2018	
SOUTH-EAST ASIA	Maldives	2015	
	Sri Lanka	2016	

Annex 4 – L. Countries and territories certified malaria free by WHO (1955–2024) and countries where malaria never existed or disappeared without specific measures

Countries that have achieved at least 3 consecutive years of zero indigenous cases are eligible to apply for a WHO certification of malaria free status.

WHO region	Country/territory	Countries certified malaria free[1,2,3,4,5]	Countries where malaria never existed or disappeared without specific measures[6]
WESTERN PACIFIC	Australia	1981	
	Brunei Darussalam	1987	
	China	2021	
	Cook Islands		1963
	Fiji		1963
	Japan		2012
	Kiribati		2012
	Marshall Islands		1963
	Micronesia (Federated States of)		1963
	Mongolia		1963
	Nauru		1963
	New Zealand		1963
	Niue		1963
	Palau		1963
	Samoa		1963
	Singapore	1982	
	Tonga		1963
	Tuvalu		2012

[1] Until 1987, the register was known as the “WHO official register of areas where malaria eradication has been achieved”.

[2] For the purpose of this publication, reference is made to the official name of WHO Member States as of 11 June 2018.

[3] The Bolivarian Republic of Venezuela (northern) was certified as malaria free in June 1961.

[4] Taiwan (China) was certified malaria free in November 1965.

[5] La Reunion is a French overseas region which was certified malaria free independently from Metropolitan France.

[6] These countries are added to the Supplementary list (to the WHO official register of areas) where malaria never existed or disappeared years or decades ago and where full WHO certification of malaria elimination is not needed.

Annex 4 – M. Methods for Tables A, D, G, H, I and J

Annex 4 – A. Policy adoption, 2023

Information on existing policies and whether they were implemented in 2023 was reported by national malaria programmes (NMPs). Policy implementation in 2023 was adjusted for the following variables, based on whether supporting data were available and reported by NMPs to the world malaria report database: distribution of insecticide-treated mosquito nets (ITNs) through antenatal care (ANC), the Expanded Programme on Immunization or mass campaigns, indoor residual spraying (IRS), intermittent preventive treatment of malaria in pregnancy (IPTp), seasonal malaria chemoprevention (SMC), rapid diagnostic tests (RDTs) used at community level and artemisinin-based combination therapies (ACTs) used for the treatment of *Plasmodium falciparum* infection. There are 38 countries with IPTp policies and 19 countries with SMC policies: a setting of "not applicable" was automatically assigned to countries where these interventions were not applicable.

Annex 4 – D. Commodities distribution and coverage for malaria endemic countries, 2021–2023

See notes for **Fig. 7.1, Fig. 7.2, Fig. 7.3** and **Fig. 7.6**. Data sources for the number of malaria cases treated with ACTs were NMP reports captured in the world malaria report database. Before 2023, where NMP reports were unavailable, data from reports submitted to the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) were used.

Where data for ACT distributions or any first-line treatment courses delivered (including ACTs) were missing, these were calculated based on the ratio of distributions to the number of patients treated in the previous year multiplied by the number of patients treated in the current year. Between 2019 and 2022, where data from NMP reports for ACT distributions were missing, these were calculated based on the rate of ACT distributions to the number of patients treated with ACTs in the previous year multiplied by the number of patients treated with ACTs in the current year. Where these data were not available, the number of patients treated was used as a proxy for distributions. In some countries, numbers of ACT distributions were used to replace missing information for any first-line treatment courses delivered (including ACTs). For the number of ITNs distributed through mass campaigns, data reported to the Alliance for Malaria Prevention were used where data reported to WHO were missing or incomplete.

Annex 4 – G. Population denominator for case incidence and mortality rate, and reported malaria cases by place of care, 2023

Presumed and confirmed cases were reported for each health sector (public, private and community). Where data could not be separated into health sectors, they are shown for the public sector, indicating which data have been combined. Presumed cases were reported through outpatient registers. If the reported number of presumed cases was incomplete, the number of presumed cases was calculated as follows: test positivity rate × (suspected cases – tested). Confirmed cases were reported through a laboratory, unless the country indicated that confirmed cases from the outpatient register should be used, owing to incomplete or inaccurate laboratory data. Confirmed cases were corrected for double counting of microscopy and RDTs where the exact number of double counted cases was known. If the health sector where double counting occurred was not indicated, then data were combined, adjusted and displayed for the public sector.

Annex 4 – H. Reported malaria cases by method of confirmation, 2015–2023

Presumed and confirmed cases were calculated based on the sum of confirmed cases from the laboratory (adjusted for double counting) or the outpatient register (see notes on **Annex 4 – G**) and the presumed cases reported from the outpatient register. Confirmed cases include indigenous, imported, introduced, relapsing and recrudescent cases, as well as all species, including zoonotic malaria *P. knowlesi*. Between 2015 and 2018, unless reported retrospectively by the country, suspected cases were calculated based on the formula: suspected cases = presumed + microscopy examined + RDT examined. From 2019 onwards, suspected cases were reported by countries. If data quality issues were detected, suspected cases were recalculated by applying the formula used in 2015–2018. Suspected cases were adjusted for double counting of RDTs and microscopy tests, if indicated by the country (e.g. if 100% of patients were examined by microscopy and RDT, then suspected cases = presumed + RDT examined). Reporting completeness is reported by the country based on the number of reports received divided by the number of reports expected from health facilities.

Annex 4 – I. Reported malaria cases by species, 2015–2023

Indigenous cases and species were reported based on the following: total confirmed cases, where no case investigations and case classifications had been carried out; total confirmed cases minus imported and introduced cases, where data were available; and reported indigenous cases for countries that were part of the malaria eliminating countries for 2025 (E-2025) initiative and where the number of cases classified equalled the total number of confirmed cases. *P. knowlesi* cases were excluded in all three approaches. For countries where reported indigenous cases are used, any unclassified cases were reclassified as indigenous and added to the reported indigenous cases.

Annex 4 – J. Reported malaria deaths, 2015–2023

All malaria deaths were reported, except those in E-2025 countries and other countries where 100% of cases and deaths are investigated and classified, in which case, indigenous deaths are shown. The proportion of cases that are investigated and classified can vary from year to year.

Notes

For further information please contact:

Global Malaria Programme
World Health Organization
20, avenue Appia
CH-1211 Geneva 27
Web: www.who.int/teams/global-malaria-programme
Email: GMPinfo@who.int