



Advancing the Global Health Agenda of G7

The Challenge of Malaria Elimination



by Irene Paviotti, Ettore Greco and Francesca Maremonti



Paper produced in the framework of the IAI project “Global Health Security and Malaria: Strengthening Resilience in a Climate Change and AMR World”, funded by Friends of the Global Fund Europe.



Irene Paviotti was a Junior Researcher in the Multilateralism and Global Governance Programme of the Istituto Affari Internazionali (IAI).

Ettore Greco is Head of the IAI's Multilateralism and Global Governance Programme.

Francesca Maremonti is Researcher for the IAI's Multilateralism and Global Governance Programme.

The authors would thank Rita Saponara, intern in the IAI's Multilateralism and Global Governance Programme.

Copyright © 2024 Istituto Affari Internazionali (IAI)
Via dei Montecatini, 17 – I-00186 Rome
Tel. +39 066976831
iai@iai.it
www.iai.it

ISBN 978-88-9368-326-5

Advancing the Global Health Agenda of G7

The Challenge of Malaria Elimination

by Irene Paviotti, Ettore Greco and Francesca Maremonti

Introduction

Covid-19 placed global health security back on top of the political agenda, in a way that had not been seen since the AIDS crisis in the early 2000s. In May 2023, the World Health Organisation (WHO) declared Covid-19 to be no longer a global health emergency. Nevertheless, several other diseases – in some cases real epidemics – has continued affecting people's health, with a greater impact than Covid-19, especially on populations of low and middle countries. During the active phase of Covid-19, while global health and pandemics as a whole received more attention, lockdowns and repurposing of funding and health systems capacities toward Covid-19 disrupted life-saving services against other diseases, such as malaria.

Malaria is indeed a telling example of such a dynamic. During the 2000s and early 2010s, its incidence decreased by around 30 per cent, and its mortality rate by 47 per cent. Between 2015 and 2019, the rate of decline was decidedly lower, at around 2 per cent,¹ despite a commitment by WHO to achieve a 90 per cent decrease in malaria incidence and mortality worldwide by 2030.² The Covid-19 pandemic further hamstrung the progress towards this goal. Between 2019 and 2020, malaria cases worldwide increased from 232 million to 245

¹ Evelyn K. Ansah et al., "Rethinking Integrated Service Delivery for Malaria", in *PLOS Glob Public Health*, Vol. 2, No. 6 (June 2022), Article e0000462, p. 2, <https://doi.org/10.1371/journal.pgph.0000462>. See also Harvard University, "Rethinking Integrated Service Delivery for Malaria", in *Defeating Malaria Discussion Papers*, 2021, <https://nrs.harvard.edu/URN-3:HUL.INSTREPOS:37369526>.

² World Health Organisation (WHO), *Global Technical Strategy for Malaria 2016-2030*, Geneva, WHO, 2015, p. 3, <https://www.who.int/publications/i/item/9789241564991>; WHO, *Global Technical Strategy for Malaria 2016-2030. 2021 Update*, Geneva, WHO, 2021, p. 1, <https://www.who.int/publications/i/item/9789240031357>.

million; in 2021, they were 247 million.³ In 2022, they reached 249 million.⁴ In addition to social distancing and the interruption of key health programmes mentioned above, another major factor was the disruption of supply chains worldwide, including those related to health material and products.

The fight against malaria in 2024, however, looks starkly different from the early 2000s, when the momentum to tackle⁵ this disease accelerated. Climate change, in particular, has now turned into a crisis. Its disruptive effects are being displayed with new, alarming frequency. A changing climate alters both the living conditions of humans and the vector breeding pattern. This results in increasing uncertainty as to where, when, how and to what scale malaria transmission occurs. The increasingly evident connection and interdependency between the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) manifestly applies to malaria. The response to malaria needs therefore to be put squarely in the context of One Health approach,⁶ which “aims to sustainably balance and optimise the health of people, animals and ecosystems”⁷ by addressing the full spectrum of disease control (detection, preparedness, response and management). Hence, the One Health approach requires cross-sectoral cooperation and coordination among the actors involved in global health security.

Another factor that has further complicated malaria elimination is anti-microbial resistance (AMR) which reduces the effectiveness of insecticides and treatments and may also complicate diagnostics. Drug-resistant parasites have been recorded across some of the most affected regions, i.e. South-East Asia and Eastern Africa. To prevent them from further spreading, which may reverse the gains made in the past 20 years, innovative tools need to be developed, including, in particular, new vector control tools, new drugs and new diagnostics methods.

³ WHO, *World Malaria Report 2022*, Geneva, WHO, 2022, p. 15, <https://www.who.int/publications/i/item/9789240064898>.

⁴ WHO, *World Malaria Report 2023*, Geneva, WHO, 2023, p. 8, <https://www.who.int/publications/i/item/9789240086173>.

⁵ WHO defines elimination as the “interruption of local transmission of a specified malaria parasite species in a defined geographical area as a result of deliberate activities”, which requires “[c]ontinued measures to prevent re-establishment of transmission”. See WHO, *Malaria (Fact Sheet)*, 4 December 2023, <https://www.who.int/news-room/fact-sheets/detail/malaria>.

⁶ See WHO website: *One Health*, <https://www.who.int/health-topics/one-health>.

⁷ Ibid.

Box 1. Malaria: the basics

Malaria is transmitted by *Plasmodium* parasites, mainly *P. falciparum* and *P. vivax* (*P. ovale*, *P. malariae* and *P. knowlesi* are also vectors). Parasites infect *Anopheles* mosquitoes, which then carry the disease to humans. The most favourable geographic conditions for mosquitoes to transmit malaria are usually warmer regions, where malaria is permanent, but also slightly cooler areas, where malaria might be seasonal.

The usual symptoms of malaria are fever, chills, headache, aching muscles, tiredness; nausea, vomiting and diarrhoea might also ensue; in the most severe cases, kidney failure, seizures, mental confusion and coma might occur. The most vulnerable population groups are children under five years of age and pregnant women, although all populations living in endemic areas are at risk. The gendered dimension of the malaria burden is also worth keeping in mind. Pregnant women, as well as children, are at a higher risk of suffering from the disease. Moreover, over the past two decades, in malaria-endemic countries women have constituted up to 70 per cent of the community health workforce involved in malaria cases and deaths in remote and rural communities. Women and adolescent girls are also at the forefront of informal “care economy”, taking care of family members suffering from malaria. This domestic responsibility often prevents them from steady work or school attendance.

Traditional prevention tools encompass:

- Personal protective equipment: mosquito nets, repellents, coils; protective clothing; window screens.
- Vector control at the environmental level: indoor residual spraying (IRS) and insecticide-treated nets (ITNs).
- Preventive chemotherapy for the most vulnerable populations, either seasonally (SMC) or perennially (PMC), depending on the incidence of the disease, or at different stages of either pregnancy or early childhood.

Malaria caused by *P. falciparum* parasites is usually treated with artemisinin-based combination therapies (ACTs), where an artemisinin derivative is combined with a partner drug to reduce number of parasites in a patient’s blood. Chloroquine is used against the *P. vivax* parasite, where this drug is still effective. Primaquine is employed to prevent a relapse of infection by *P.*

vivax and *P. ovale* parasites.

In 2015, the WHO published its *Global Technical Strategy for Malaria 2016-2030*, setting goals for the fight against malaria:

- 90 per cent reduction in malaria incidence and mortality by 2030.
- Malaria elimination in at least 35 countries by 2030.
- Prevention of resurgence in malaria-free countries.

Sources: WHO, *Malaria (Fact Sheet)*, cit.; WHO, *Malaria: Artemisinin Partial Resistance*, 18 November 2022, <https://www.who.int/news-room/questions-and-answers/item/artemisinin-resistance>; WHO, *Global Technical Strategy for Malaria 2016-2030*, cit.; US Centers for Disease Control and Prevention (CDC) website: *Malaria Disease Basics*, last reviewed on 14 February 2024, <https://www.cdc.gov/malaria/about/index.html>; CDC, *Where Malaria Occurs*, last reviewed on 9 April 2020, <https://www.cdc.gov/malaria/about/distribution.html>; RBM and Malaria No More, *Achieving a Double Dividend: The Case for Investing in a Gendered Approach to the Fight against Malaria*, June 2021, <https://endmalaria.org/node/6662>.

The epidemics of Covid 19 – but also plague, cholera, yellow fever, ebola, SARS, AIDS, Mpox – are all direct consequences of the interdependence of human, animal and environmental health. The frequency of pathogen emergence or re-emergence is likely to increase with climate change and with the biodiversity crisis, carrying the potential to and the biodiversity crisis go from local to global. Reducing the malaria burden over health systems in highest transmission settings is a matter of global health security. Conversely, increased capacities to prevent, detect, diagnose and treat malaria among poor and rural communities can be leveraged to increase broader infectious disease surveillance and control.

However, given the scale of the disease, funding to cover care and treatment of malaria are not sufficient. This translates into lower opportunities for affected individuals and communities. The direct costs for malaria (e.g. illness, treatment, premature death) are estimated to amount to 12 billion US dollars per year, although the cost in lost economic growth is much higher.⁸ Indeed, malaria is a major factor that keeps lower-income countries -particularly in the African continent, where the majority of malaria cases and deaths occur – from climbing the development ladder.

⁸ US Centers for Disease Control and Prevention (CDC) website: *Malaria's Impact Worldwide*, last reviewed on 16 December 2021, https://www.cdc.gov/malaria/malaria_worldwide/impact.html.

Prevention, control and elimination of malaria are intrinsically linked to sustainable development. A comprehensive approach in the fight against malaria aimed at strengthening national health systems can accelerate the overall development of affected communities. Hence, reducing the malaria burden and eliminating the disease is at the core of the third point of the Sustainable Development Goals (SDGs), which aims to “Ensure healthy lives and promote well-being for all at all ages”.⁹ A specific target is set to address the burden caused by the “epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases”.¹⁰ Given the impact of malaria across many sectors of malaria-endemic communities, the goal of malaria elimination is enclosed in SDG 3, but it touches upon all the 17 SDGs. This reflects the cross-cutting impact of malaria and the consequent need for a cross-policy approach to fight it. On a broader level, malaria stands at the crossroads of priority policy tracks in the global health agenda, including the adaptation of the global health architecture, support for technological innovation, and promotion of local production.

This paper illustrates the current state of malaria and highlights its incidence, the challenges linked to climate change and AMR, and its importance for other G7 health priorities, such as PPR, global health architecture, innovation, R&D and local production. It also provides an overview of the main public and private bodies and partnerships committed to malaria elimination and concludes with a set of recommendations for the 2024 Presidency of the G7.

The economics of malaria elimination

.....

Malaria elimination is valuable not only for its public health dimension, but also for the broader impact on economic development at the micro and macro level. At the micro level, good health leads to higher productivity on the workplace – especially in relation to farming – and at school, which in turn translates into higher current and future income and savings. At the macro level, savings in

⁹ RBM Partnership to End Malaria website: *Malaria & Sustainable Development Goals*, <https://endmalaria.org/node/10159>.

¹⁰ Ibid.

healthcare spending offer, in principle, more fiscal space for higher investment in physical and human capital. Both at the micro and macro level, there is a correlation between higher income and better health, which reinforces the health-economic development nexus.

Malaria incidence, even more than other diseases, breaks this potential virtuous cycle. A research analysing data between 2000 and 2017 found that “a 10% decrease in malaria case incidence is associated with an increase in [gross domestic product (GDP) per capita] of 1.9% on average”;¹¹ and that “industries with the same level of labor intensity [...] tend to grow slower in countries with higher malaria”.¹² This aligns with findings that link reduction of malaria incidence to between 5 to 20 per cent higher incomes in Uganda.¹³ This correlation can be easily understood by considering the financial costs that malaria prevention and treatment imply for low-income families. Opportunity costs of malaria include absenteeism from school or work, hence a loss of educational and income gains.¹⁴ More specifically, it might impact productivity levels during the farming season – which overlaps with malaria’s peak – hindering food security of endemic areas.¹⁵

Estimates of the economic burden of malaria on public finances vary by country – in Tanzania, for example, it was found to account for 1.1 per cent of GDP and 39 per cent of public health spending.¹⁶ It becomes apparent that the elimination of malaria in endemic countries would remove a significant obstacle to economic development and reduce the persisting global health inequalities.

¹¹ Nayantara Sarma et al., “The Economic Burden of Malaria: Revisiting the Evidence”, in *The American Journal of Tropical Medicine and Hygiene*, Vol. 101, No. 6 (December 2019), p. 1405-1415 at p. 1411, <https://doi.org/10.4269/ajtmh.19-0386>.

¹² Ibid., p. 1413.

¹³ Jeremy Barofsky, Tobenna D. Anekwe and Claire Chase, “Malaria Eradication and Economic Outcomes in sub-Saharan Africa: Evidence from Uganda”, in *Journal of Health Economics*, Vol. 44 (2015), p. 118-136, <https://doi.org/10.1016/j.jhealeco.2015.08.002>.

¹⁴ Mônica V. Andrade et al., “The Economic Burden of Malaria: A Systematic Review”, in *Malaria Journal*, Vol. 21 (2022), Article 283, <https://doi.org/10.1186/s12936-022-04303-6>.

¹⁵ Olarewaju Abdulkareem Babamale et al., “Association between Farming Activities and Plasmodium falciparum Transmission in Rural Communities in Nigeria”, in *Malaysian Journal of Medical Sciences*, Vol. 27, No. 3 (2020), p. 105-116, <https://doi.org/10.21315/mjms2020.27.3.11>.

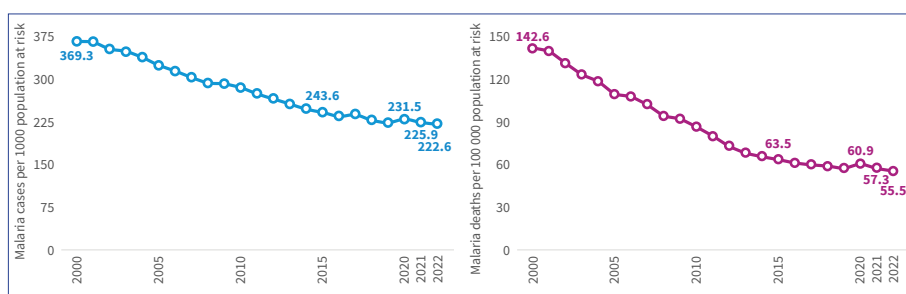
¹⁶ Matthew Jowett and Nigel J. Miller, “The Financial Burden of Malaria in Tanzania: Implications for Future Government Policy”, in *The International Journal of Health Planning and Management*, Vol. 20, No. 1 (January/March 2005), p. 67-84, <https://doi.org/10.1002/hpm.796>.

1. The state of malaria in 2024

1.1 Incidence and epidemiology

In 2022,¹⁷ the total number of malaria cases amounted to 249 million in 85 endemic countries – an absolute increase over 2021, mostly in Pakistan, Ethiopia and Nigeria. On the other hand, the number of deaths globally decreased, from 631,000 in 2020 to 608,000 in 2022. After an increase in 2020, the 2022 mortality rate fell to 14.3 per 100,000 population at risk, close to the 14 recorded in 2019. In 2022, four African countries – Nigeria, Democratic Republic of the Congo (DRC), Uganda and Mozambique – represented 50 per cent of global cases. More generally, the African continent accounted for 94 per cent of global cases, i.e. 233 million. The number of deaths also decreased in 2022, bringing the mortality rate to 56 deaths per 100,000 population at risk, slightly below pre-pandemic levels (57). In addition to one country, Cabo Verde, eventually achieving the malaria-free status after reporting zero indigenous cases for four consecutive years,¹⁸ two other African countries showed significant decreases in indigenous transmissions globally: Botswana (-43.5 per cent) and South Africa (-31.3 per cent).

Figure 1 | Malaria case incidence (cases per 1,000 population at risk) – left – and mortality rate (deaths per 100,000 population at risk) – right



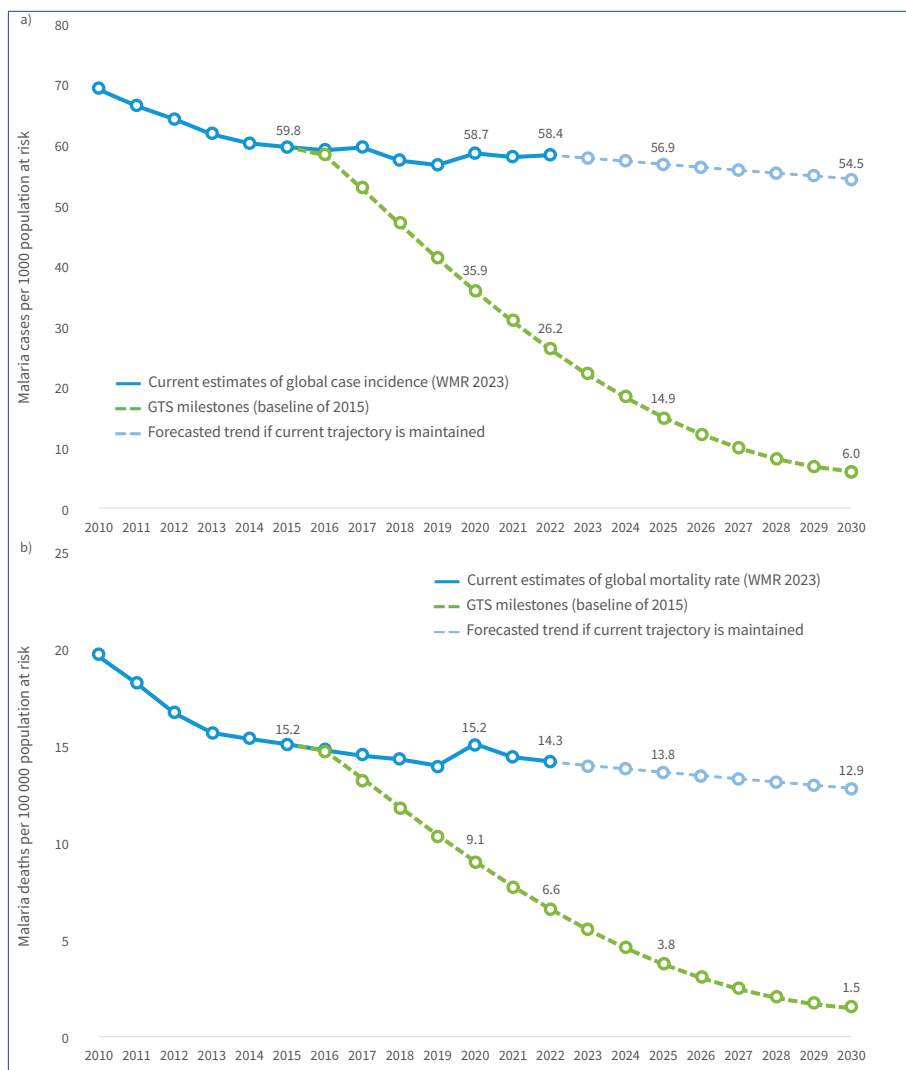
Source: WHO, *World Malaria Report 2023*, p. 13.

¹⁷ Unless specified otherwise, all the figures in this section are sourced from WHO, *World Malaria Report 2023*, cit.

¹⁸ WHO, *WHO Certifies Cabo Verde as Malaria-free, Marking a Historic Milestone in the Fight against Malaria*, 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>.

The 2022 data shows that the 2025 targets of the 2015 Global Technical Strategy (GTS) are unlikely to be reached, as the case incidence is 55 per cent higher than expected (58 cases per 1,000 population at risk instead of 26).

Figure 2 | 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, *World Malaria Report 2023*, p. 73.

1.2 New challenges: Climate change and AMR

The global rise in temperatures is estimated to put 51 to 62 million people at risk of endemic malaria in Central, Eastern and Southern Africa by 2030, with the number of people at risk amounting to 3 billion in total.¹⁹ There are three direct pathways through which climate change can alter the incidence of malaria. First, higher temperatures might shorten the growth cycle of parasites in mosquitoes, which can therefore start spreading malaria earlier in their life. Second, higher uncertainty as to when transmission seasons starts and ends makes it harder to plan for seasonal anti-malaria interventions, such as seasonal chemoprevention and seasonal vaccination. Third, higher temperatures worldwide might extend the geographic reach of mosquitoes, which might appear in non-endemic or former-endemic zones.²⁰ The Ethiopian highlands, for example, which so far displayed unfavourable temperatures for breeding and transmission, might be added to the list of malaria regions.²¹ Beyond warmer temperatures, however, climate change results in more frequent and disruptive natural disasters, such as floods. When these occur in malaria endemic regions that lack proper infrastructure, water might stagnate, providing breeding ground for malaria-carrying mosquitoes. In the aftermath of an extreme weather event – especially in countries with both higher risk to be adversely affected and lower capacity to cope or adapt – it becomes difficult to treat mosquito breeding sites with pesticides, or to test and treat malaria cases in a short timeframe. These factors may increase the incidence of malaria, as it happened in Mozambique in the aftermath of Cyclone Idai in 2019, when 14,800 cases were recorded in less than a month in the most affected region.²² Evidence also showed that people living in housing facilities struck by the Cyclone were three times more at risk of contracting malaria.²³

¹⁹ Sadie J. Ryan, Catherine A. Lippi and Fernanda Zermoglio, “Shifting Transmission Risk for Malaria in Africa with Climate Change: A Framework for Planning and Intervention”, in *Malaria Journal*, Vol. 19 (2020), Article 170, <https://doi.org/10.1186/s12936-020-03224-6>.

²⁰ WHO, *World Malaria Report 2023*, cit.

²¹ Bradfield Lyon et al., “Temperature Suitability for Malaria Climbing the Ethiopian Highlands”, in *Environmental Research Letters*, Vol. 12, No. 6 (2017), Article 064015, <https://doi.org/10.1088/1748-9326/aa64e6>.

²² UNICEF, *Nearly 15,000 Cases of Malaria Reported in Areas of Mozambique Affected by Cyclone Idai*, 25 April 2019, <https://www.unicef.org/press-releases/nearly-15000-cases-malaria-reported-areas-mozambique-affected-cyclone-idai-unicef>.

²³ Kelly M. Searle et al., “Long-lasting Household Damage from Cyclone Idai Increases Malaria Risk in Rural Western Mozambique”, in *Scientific Reports*, Vol. 13 (2023), Article 21590, <https://doi.org/10.1038/>

Similarly, in 2022, after Pakistan witnessed “the worst flooding in its history”, which affected 33 million people, the most severe malaria outbreak since 1973 erupted, due to stagnant waters. Districts that were already affected by malaria were particularly affected, together with lowest-income social groups. This resulted in “a four-fold increase in the reported number of malaria cases after the floods”, from 400,000 in 2021 to 1.6 million in 2022. The destruction caused by the floods themselves also made it difficult to deliver relief, slowing down the malaria response.²⁴

In addition to natural disasters, climate change-related droughts are also likely to drive population movements. People from non-malaria endemic zones might settle into areas with high malaria incidence and be more at risk of developing more severe malaria symptoms because of their lower immunity. Moreover, while malaria has so far been mainly a ‘rural’ disease in Africa, new species of vectors have been found in urban areas too. *An. stephensi* is one of these. While this vector first originated in South-East Asia, it has been reported in Ghana, Nigeria, Ethiopia, Somalia, Djibouti, Kenya and Sudan. It has shown to be able to adapt quickly to new environments and to resist to droughts and dry seasons – given its ability to reproduce even with scarce availability of water. In addition, there are reported cases of *An. stephensi*’s resistance to three out of four types of insecticides (see below) in the Horn of Africa. It is still unclear how its transmission capacity compares to other vectors in the same areas, but its presence in overpopulated urban areas might pose new significant challenges to malaria control.²⁵

Secondly, WHO lists AMR among the top 10 threats for global health.²⁶ AMR is recognised as playing a crucial role for PPR and within the One Health agenda. The resistance to antimalarial drugs – artemisinin-based derivatives combined with partner drugs (ACTs) – can imply either partial resistance or inefficacy. This scenario raises concerns about a potential ACT resistance in the scale of what

s41598-023-49200-3.

²⁴ WHO, “It Was Just the Perfect Storm for Malaria” – Pakistan Responds to Surge in Cases Following the 2022 Floods, 18 April 2023, <https://www.who.int/news-room/feature-stories/detail/it-was-just-the-perfect-storm-for-malaria-pakistan-responds-to-surge-in-cases-following-the-2022-floods>.

²⁵ Abraham Mnzava, April C. Monroe and Fredros Okumu, “Anopheles stephensi in Africa Requires a More Integrated Response”, in *Malaria Journal*, Vol. 21 (2022), Article 156, <https://doi.org/10.1186/s12936-022-04197-4>; WHO, *World Malaria Report 2023*, cit.

²⁶ UNEP website: *Antimicrobial Resistance: A Global Threat*, <https://www.unep.org/node/28188>.

has been observed in the Greater Mekong area. While artemisinin-based drugs remain effective, there have been cases of treatment failure due to partner drug resistance.

On the African continent, ACTs continue to show efficacy, but partial resistance has been detected in cases in Rwanda, Uganda, Eritrea, Tanzania and, most recently, in Ethiopia.²⁷ Resistance to partner drugs has not been confirmed, but there is a risk of underreporting, due to low data availability. While it is difficult to quantify the current impact of AMR in Africa, models estimate that “widespread artemisinin partial resistance and high partner drug resistance could result in about 16 million additional malaria cases and around 360,000 hospitalised severe cases”, which might entail 80,000 excess deaths per year and an economic impact of 1 billion US dollars.²⁸

In 2022 the WHO developed a strategy to improve the detection of resistance, defer artemisinin resistance and partner drug resistance, and limit the spread of identified resistant parasites. The WHO strategy is based on four pillars:

- “Strengthen surveillance of antimalarial drug efficacy and resistance.
- Optimise and better regulate the use of diagnostics and therapeutics to limit drug pressure through pre-emptive measures.
- React to resistance by limiting the spread of antimalarial drug-resistant parasites.
- Stimulate research and innovation to better leverage existing tools and develop new tools against resistance.”²⁹

Beyond treatment, however, malaria vectors are increasingly showing signs of resistance to commonly used preventive tools too, i.e. insecticides, which highlights the need to make progress in the innovation field.³⁰

²⁷ Abebe A. Fola et al., “Plasmodium falciparum Resistant to Artemisinin and Diagnostics Have Emerged in Ethiopia”, in *Nature Microbiology*, Vol. 8 (October 2023), p. 1911-1919, <https://doi.org/10.1038/s41564-023-01461-4>.

²⁸ WHO, *Strategy to Respond to Antimalarial Drug Resistance in Africa*, 2022, p. x, <https://www.who.int/publications/i/item/9789240060265>.

²⁹ Ibid., p. xi-xii.

³⁰ WHO website: *Global Malaria Programme. Insecticide Resistance*, <https://www.who.int/teams/global-malaria-programme/prevention/vector-control/insecticide-resistance>. For a detailed overview of the mechanisms of resistance, see Nannan Liu, “Insecticide Resistance in Mosquitoes: Impact, Mechanisms, and Research Directions”, in *Annual Review of Entomology*, Vol. 60 (2015), p. 537-559, <https://doi.org/10.1146/annurev-ento-010814-020828>; and Pierre Fongho Suh et al., “Impact of

2. Innovation in the fight against malaria

Efforts have been deployed to develop more effective tools to reduce malaria incidence and mortality. These include investment in the field of research and development (R&D), in the development of innovative protective tools, as well as of vaccines.

2.1 R&D

On the research and development side (R&D), studies are being conducted in parasite genomics and transcriptomics to better identify drug targets. In addition, research is ongoing into sequencing methods that help monitor markers of resistance, as well as gene editing. Two different approaches are considered for gene editing: a self-limiting approach for more urban malaria (envisaged for *Stephensi*) where mosquitoes are made sterile through gene editing,³¹ and self-sustaining gene drive mosquitoes that could transform on a wide-scale wild mosquito populations by either reducing their ability to reproduce or making them unable to transmit the parasite.³²

Furthermore, there is “growing capacity in sub-Saharan Africa for locally conducted phase 1 and 2 studies” so that drugs can be developed based on the population they are actually meant to serve.³³ “New vector control product classes, such as spatial repellents, attractive toxic sugar baits and endectocides” are also in the pipeline.³⁴ The presence of gene mutations in malaria parasites has so far been detected through laboratory tests.³⁵ New-generation RDTs

Insecticide Resistance on Malaria Vector Competence: A Literature Review”, in *Malaria Journal*, Vol. 22 (2023), Article 19, <https://doi.org/10.1186/s12936-023-04444-2>.

³¹ Bill Gates, “The World’s Newest Weapon Against Malaria? Mosquitoes”, in *GatesNotes*, 14 August 2023, <https://www.gatesnotes.com/Urban-mosquitoes-and-Oxitec>.

³² Tony Nolan, “Control of Malaria-Transmitting Mosquitoes Using Gene Drives”, in *Philosophical Transactions of the Royal Society B: Biological Sciences*, Vol. 376, No. 1818 (2020), Article 20190803, <https://doi.org/10.1098/rstb.2019.0803>.

³³ Matthew M. Ippolito et al., “Antimalarial Drug Resistance and Implications for the WHO Global Technical Strategy”, in *Current Epidemiology Reports*, Vol. 8 (2021), p. 46-62 at p. 52, <https://doi.org/10.1007/s40471-021-00266-5>.

³⁴ Unitaid, *Malaria Disease Narrative*, December 2019, p. 2, <https://unitaid.org/assets/Malaria-Disease-narrative.pdf>.

³⁵ Matthew M. Ippolito et al., “Antimalarial Drug Resistance”, cit.

that can similarly detect drug resistant strains (i.e. parasites with HRP2/3 gene deletions) have been recently developed.³⁶ Beyond nets, “new vector control product classes, such as spatial repellents, attractive toxic sugar baits and endectocides” are also in the pipeline.³⁷

2.2 Bed nets

Insecticide-treated nets are a pillar of malaria response and have contributed significantly to the decline in malaria cases and deaths over the years. Long-lasting insecticidal nets (LLINs) have been a powerful tool for malaria control, having prevented 68 per cent of malaria cases from 2000 to 2015.³⁸ These nets are treated with only one insecticide class – pyrethroids. However, the effectiveness of this measure is currently hindered by mosquitoes’ increasing resistance to this insecticide.³⁹

Years of research have led to the development of next generation dual-ingredient insecticide bed nets – Interceptor® G2 (IG2). Next generation nets provide protection from mosquitos that have developed resistance to standard pyrethroid-only nets.⁴⁰ With two active ingredients in the nets the resistance of mosquitoes is greatly reduced.⁴¹ This next generation nets have the potential to be a game-changer in the fight against malaria, having demonstrated approximately double the protection compared to standard nets.⁴² WHO has recommended using new generation, dual active-ingredients bed nets for

³⁶ Unitaid, *Malaria Disease Narrative*, cit.

³⁷ Ibid., p. 2.

³⁸ Helen Jamet, “Why the Interceptor G2 Net Could Be a Game Changer for Malaria Eradication”, in *Gates Foundation Ideas*, 18 August 2022, <https://www.gatesfoundation.org/ideas/articles/ig2-nets-malaria-eradication-financed-by-the-global-fund>.

³⁹ Innovative Vector Control Consortium (IVCC) website: *Interceptor® G2*, <https://www.ivcc.com/market-access/interceptor-g2>.

⁴⁰ BASF started developing a new net with a new insecticide, in partnership with the IVCC. In 2018, a critical milestone was met when the Global Fund to Fight AIDS, Tuberculosis and Malaria and Unitaid funded the New Nets Project (NNP), with support from the Gates Foundation and USAID.

⁴¹ WHO, *WHO Publishes Recommendations on Two New Types of Insecticide-treated Nets*, 14 March 2023, <https://www.who.int/news/item/14-03-2023-who-publishes-recommendations-on-two-new-types-of-insecticide-treated-nets>.

⁴² Global Fund and Unitaid, *Global Fund and Unitaid Welcome WHO Recommendation for Insecticide-treated Nets with Dual Active Ingredients*, 14 March 2023, <https://www.theglobalfund.org/en/news/2023/2023-03-14-global-fund-unitaid-welcome-who-recommendation-insecticide-treated-nets-dual-active-ingredients>.

malaria prevention in regions where vectors are resistant to pyrethroids.⁴³ Nevertheless, this achievement meets with barriers to widespread adoption including insufficient manufacturing capacity and delivery as well as higher costs. Unitaid and the GF have welcomed/endorsed WHO recommendations by launching The New Nets Project, with each agency investing 33 million US dollars of catalytic funding to promote the introduction of the new nets and to support affordability.⁴⁴

2.3 Vaccines

Most recently, vaccines have entered the set of tools that could be used to reduce malaria incidence and mortality. In 2021, WHO recommended the RTS,S/AS01 vaccine for malaria prevention in children. It had already been administered since 2019 in Ghana, Kenya and Malawi within the framework of the Malaria Vaccine Implementation Programme (MVIP), coordinated by WHO and funded by Gavi, the Vaccine Alliance, the Global Fund to Fight AIDS, Tuberculosis and Malaria (GF) and Unitaid. The MVIP was a WHO-led pilot evaluation study, which laid the foundations for the updated WHO recommendation. Developed and produced by GSK, the vaccine is meant to be administered in three initial doses, with the additional recommendation for an annual booster. It has been proved to reduce incidence of seasonal malaria by 75 per cent, It received WHO prequalification status in 2022, and after the end of the pilot phase in 2023, 12 African countries will administer a total of 18 million doses between 2023 and 2025.⁴⁵ Cameroon was the first country to do so in January 2024,⁴⁶ followed by Burkina Faso in February of the same year.⁴⁷

⁴³ WHO, *World Malaria Report 2023*, cit.; Gerry F. Killeen and Seynabou Sougoufara, “Getting ahead of Insecticide-Resistant Malaria Vector Mosquitoes”, in *The Lancet*, Vol. 401, No. 10375 (11 February 2023), p. 410-411, [https://doi.org/10.1016/S0140-6736\(23\)00102-2](https://doi.org/10.1016/S0140-6736(23)00102-2).

⁴⁴ Global Fund and Unitaid, *Global Fund and Unitaid Welcome WHO Recommendation*, cit.
⁴⁵ Gavi, WHO and UNICEF, *18 Million Doses of First-Ever Malaria Vaccine Allocated to 12 African Countries for 2023–2025*, 5 July 2023, <https://www.gavi.org/node/120111>.

⁴⁶ “Cameroon Begins Routine Malaria Shots in Global Milestone”, in *Reuters*, 22 January 2024, <https://www.reuters.com/world/africa/cameroon-launches-malaria-vaccination-programme-global-milestone-2024-01-22>.

⁴⁷ “Burkina Faso Becomes 2nd African Country to Include Malaria Vaccine in Immunization Program”, in *Africanews*, 5 February 2024, <https://www.africanews.com/2024/02/05/burkina-faso-becomes-2nd-african-country-to-include-malaria-vaccine-in-routine-immunization>.

In October 2023, a second malaria vaccine was recommended by WHO for prevention in children – the R21/Matrix-M.⁴⁸ Developed by Oxford University and produced by the Serum Institute of India, the R21 vaccine is also meant to be delivered in 4 doses. It showed a 66 per cent efficacy rate in the 12 months after the administration of the first three doses (a fourth dose is administered for maintenance). In areas where malaria transmission is seasonal, in particular, symptomatic malaria cases decreased by 75 per cent in the 12 months following the first three doses; a fourth dose administered at the end of these 12 months showed to keep this level of efficacy.⁴⁹ The phase 3 trial conducted in Burkina Faso, Kenya, Mali and Tanzania revealed a 78 per cent efficacy rate over 12 months following the administration of the first three doses for children aged 5 to 17 months.⁵⁰

While these vaccine developments are extremely positive, they are far from providing a cure-all solution to malaria. In addition to the logistical challenges of administering four doses,⁵¹ these vaccines target only a portion of the populations most at risk of malaria, with pregnant women and the broader population not covered. A cost-effectiveness analysis of the RTS,S vaccine also showed that, with its 9.30 US dollars cost per dose, administering RTS,S is more cost-effective in settings where ITNs are widely used, than in settings where ITNs are not widely used, where seasonal malaria chemotherapy is implemented at high coverage levels (where eligible), and where the level of malaria transmission is high – leading to a substantial decrease in malaria cases and deaths.⁵² Hence it remains crucial that malaria prevention strategies continue relying on the tools that have been used for decades, i.e. vector

⁴⁸ The vaccine obtained prequalified status in December 2023. See WHO, *WHO Prequalifies a Second Malaria Vaccine, a Significant Milestone in Prevention of the Disease*, 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>.

⁴⁹ WHO, *WHO Recommends R21/Matrix-M Vaccine for Malaria Prevention in Updated Advice on Immunization*, 2 October 2023, <https://www.who.int/news/item/02-10-2023-who-recommends-r21-matrix-m-vaccine-for-malaria-prevention-in-updated-advice-on-immunization>.

⁵⁰ University of Oxford, *New Phase 3 Trial Data Confirm the Uniquely High Efficacy and Good Safety Profile of the R21/Matrix-M Malaria Vaccine in African Children*, 1 February 2024, <https://www.ox.ac.uk/node/8766480>.

⁵¹ Sara Jerving, "Cameroon Launches Historic Malaria Vaccine Rollout", in *Devex*, 22 January 2024, <https://www.devex.com/news/106955>.

⁵² Hillary M. Topazian et al., "Modelling the Relative Cost-Effectiveness of the RTS,S/AS01 Malaria Vaccine Compared to Investment in Vector Control or Chemoprophylaxis", in *Vaccine*, Vol. 41, No. 20 (11 May 2023), p. 3215-3223, <https://doi.org/10.1016/j.vaccine.2023.04.011>.

control instruments and chemotherapy.⁵³ Scientists and WHO agree on the need to introduce the vaccine as a complementary measure, part of a broader malaria intervention package. Although cautious of abandoning and replacing existing protective and preventive measures, experts recognise the huge progress made in scientific development with the first anti-parasitic vaccine ever produced.

3. Malaria's global health architecture

3.1 National governments

.....

Countries remain at the core of the institutional architecture; the WHO is investing in the development of the countries' national health strategies and their engagement in bilateral and multilateral cooperation. Under the framework provided by the RBM Partnership, countries are supported in building stronger surveillance capacity in preparing robust project proposals to the Global Fund. The paramount importance of the engagement of national governments was strongly emphasised at the meeting held in March 2024 in Cameroon gathering together the Ministers of Health of 11 African countries with the highest malaria burden. The event signalled the commitment of participating states to accelerate the reduction of malaria mortality and their pledge to hold each accountable. Strengthening political will, building stronger collaborative partnerships, and enhancing cooperation as well as a multi-sectorial action are the key pillars highlighted at the Yaounde summit as necessary to reduce malaria mortality.⁵⁴

⁵³ See, for example, Gavi, UNICEF and WHO, *Shipments to African Countries Herald Final Steps toward Broader Vaccination against Malaria*, 22 November 2023, <https://www.gavi.org/node/123486>. It is also important to note that results from the pilot do not show a lower uptake of other childhood vaccines or use of bed nets in relation to the uptake of RTS,S – see Meredith Wadman, “First Malaria Vaccine Slashes Early Childhood Mortality”, in *Science*, Vol. 382, No. 6669 (27 October 2023), p. 357, <https://doi.org/10.1126/science.adl5521>.

⁵⁴ *Yaounde Declaration for Accelerated Malaria Mortality Reduction in Africa*, 6 March 2024, <https://www.afro.who.int/node/19073>.

3.2 International and regional actors

• *Global Fund* – The GF role in malaria is to financially support LMICs in deploying malaria control and elimination interventions (i.e. prevention, diagnosis, treatment), except for vaccines. Since the year 2000 the Global Fund has been among the largest provider of funding for the fight against malaria, accounting for 39 per cent of the 4.1 billion US dollars provided globally in 2022.⁵⁵ It provides about 65 per cent of international funding for anti-malaria programmes. It is also the first multilateral provider of grants for health systems support and strengthening.

The GF core strategy to achieve malaria elimination revolves around five pillars:

- “Ensure optimal vector control coverage”, both at the level of implementation within communities, availability of products that can detect insecticide resistance, and decision-making.⁵⁶
- “Expand equitable access to quality, early diagnosis and treatment of malaria, through health facilities, at the community level and in the private sector”, which implies promoting a gender-responsive approach to malaria, building capacity to include results of malaria services assessments in national programmes, “[promoting] the adoption of effective innovations to address biologic threats, including parasite drug resistance and diagnostic efficacy”, as well as private healthcare service support.⁵⁷
- “Implement malaria interventions, tailored to sub-national level, using granular data and capacitating decision-making and action”, which includes building capacity for data-based decision-making, strengthening surveillance, ensuring the accuracy of indicators, engaging stakeholders in national decision-making, delivering targeted interventions, as well as integrating climate change-related metrics in malaria data collection.⁵⁸
- “Drive toward elimination and facilitation prevention of reestablishment”, supporting national and regional approaches to elimination, fostering experience sharing and continuing support to countries on the path

⁵⁵ WHO, *World Malaria Report 2023*, cit.

⁵⁶ Global Fund, *Fighting Pandemics and Building a Healthier and More Equitable World – Global Fund Strategy (2023–2028)*, November 2021, p. 27, <https://reliefweb.int/node/3791054>.

⁵⁷ *Ibid.*, p. 27–28.

⁵⁸ *Ibid.*, p. 28.

- towards malaria-free certification.⁵⁹
- “Accelerate reductions in malaria in high-burden areas and achieve sub-regional elimination in select areas of sub-Saharan Africa to demonstrate the path to eradication.”⁶⁰

The GF is able to provide rapid and agile support to countries hit by natural disasters, through grants flexibilities and the Emergency Fund. Between 2016 and 2023, 46 per cent of the emergency fund resources have been used for supporting rapid country response to climate related disasters. In the case of Cyclone Freddy that struck Mozambique, for example, more than 900,000 US dollars were disbursed to distribute bed-nets, conduct indoor residual spraying and apply larvicides, as well as providing emergency shelters. Similarly, in response to Pakistan’s 2022 floods, 30 million US dollars from the Emergency Fund were mobilised to support malaria control efforts, such as tests and treatment, distribution of ITNs, IRS and awareness campaigns.⁶¹

On a broader level, 71 per cent (9.3 billion US dollars) of the seventh grant cycle will be invested in disbursed in favour of the 50 most climate vulnerable countries, which in total account for 226 million malaria cases annually. This funding will support SMC; increased disease surveillance and early warning systems to better detect and manage “climate-sensitive disease outbreaks and health emergencies”; and the Emergency Fund that can be deployed in case of climate change-driven natural disasters, as mentioned above.⁶² The recent adoption of Guiding Principles for Financing Climate and Health Solutions⁶³ has accelerated collaboration between health and climate actors, such as the launch of a partnership with the Green Climate Fund to increase climate funding that explicitly includes a health dimension.⁶⁴ Both initiatives align with

⁵⁹ Ibid., p. 29.

⁶⁰ Ibid.

⁶¹ Global Fund, *Thematic Update on Climate & Health*, 50th Board Meeting, Geneva, 14-16 November 2023, https://archive.theglobalfund.org/media/13533/archive_bm50-09-climate-health-thematic_update_en.pdf.

⁶² Global Fund, *The Global Fund to Spend 70% of Its Funding in Most Climate-vulnerable Countries*, 2 December 2023, <https://www.theglobalfund.org/en/news/2023/2023-12-02-the-global-fund-to-spend-70-of-its-funding-in-most-climate-vulnerable-countries>.

⁶³ Global Fund, *41 Funders, Partners Endorse New Guiding Principles for Financing Climate and Health Solutions to Protect Health*, 2 December 2023, <https://www.theglobalfund.org/en/news/2023/2023-12-02-41-funders-partners-endorse-new-guiding-principles-financing-climate-health-solutions>.

⁶⁴ Global Fund, *Green Climate Fund and Global Fund Join Forces to Tackle Impact of Climate Crisis*

and operationalise the Declaration on Climate and Health signed at COP28 in December 2023.⁶⁵

- *Unitaid* – Unitaid catalyses the availability and affordability of new health technologies and products for the communities in need. Malaria is one of its programmatic priorities, with two main goals: introducing and optimising prevention tools and improving access to quality case management.⁶⁶ Consequently, its investments in malaria control and elimination address vector control, chemoprevention, vaccines, case management and treatment. Nevertheless, its portfolio encompasses new technologies that are set to enter the market either in the short-to-medium term (up to 6 years) or the longer term (beyond 7 years). Some of these were previously mentioned – gene editing (longer term), new vector control tools beyond ITNs and IRS, as well as new rapid diagnostic tools that can detect drug resistant strains. In addition, Unitaid is also supporting the development of:

- preventive tools – long-acting chemoprevention and new vaccines;
- vector control instruments – new IRS application technologies, new active ingredients for ITNs and IRS, long-lasting endectocides;
- diagnostics – non-blood based rapid tests, new tests for other fever causes;
- treatments – “radical cure treatments” for *P. vivax* when at liver stage, single-dose treatments.⁶⁷

- *Gavi* – Gavi is the global health architecture’s lead expert on children vaccination and immunisation in LMICs. The organisation entered the global malaria architecture when the updated WHO recommendation on malaria vaccines marked the start of their large scale roll out. It later developed a mechanism with the vaccine manufacturer, GSK, and MedAccess to ensure the continued production of the RTS,S antigen after the initial batch of doses were donated by GSK and before WHO issued a recommendation on the use of the vaccine.⁶⁸ Gavi therefore leveraged its market shaping power by helping to

on Health, 3 December 2023, <https://www.theglobalfund.org/en/updates/2023/2023-12-03-green-climate-fund-global-fund-join-forces-tackle-impact-climate-crisis-health>.

⁶⁵ COP28 UAE Declaration on Climate and Health, 2 December 2023, <https://www.cop28.com/en/cop28-uae-declaration-on-climate-and-health>.

⁶⁶ Unitaid, *Strategy 2023-2027*, 2022, https://unitaid.org/assets/Unitaid_Strategy_2023-2027.pdf.

⁶⁷ Unitaid, *Malaria Disease Narrative*, cit.

⁶⁸ Gavi, *Malaria Vaccine Programme Investment Case, Report to the Board*, 30 November-2 December 2021, <https://www.gavi.org/news/document-library/08-malaria-vaccine-programme-investment-case-pdf>.

create a burgeoning market for malaria vaccines. This effort was later codified in Gavi's 2023 Market Shaping Roadmap, which aims to:

- "Increase vaccine supply so that it meets demand as soon as possible, and no later than 2026.
- Increase the number of vaccine suppliers, including at least one that manufactures in Africa in the medium-to-long term (3-15 years), and dramatically reduce the price of malaria vaccines.
- Improve understanding of vaccine demand, help implementing countries ensure they are ready for vaccine introduction by the time supplies are available and ensure countries continue their malaria vaccination programmes after they transition out of Gavi support.
- Establish an enabling environment for innovation in both existing and pipeline products."⁶⁹

In addition to the Global Fund, Gavi and Unitaid, there are other global initiatives to fight against malaria, that generate either from governments, civil society or international organisations.

- *Bill & Melinda Gates Foundation* – For two decades, the Bill and Melinda Gates Foundation has partnered up with the global community, devoting resources and expertise to work towards malaria elimination. The Foundation financial contribution accounts approximately for 5 per cent of the global funding invested annually in the fight against malaria. The effort of the Foundation is to act as catalyst, with investments across four main areas of intervention: "expanding access to existing tools; using data to better track and target the disease; advancing research on potentially transformative innovations; and advocating for others to join in the effort to end malaria."⁷⁰

- *ALMA* – The African Leaders Malaria Alliance is a coalition of Heads of State and Government from 55 African countries. Created in 2009 with the purpose of ending malaria on the continent by 2030, aligning with the African Union's Agenda 2063. Though it has since expanded to cover other pressing public health issues (neglected tropical diseases, nutrition, child and maternal health),

⁶⁹ Gavi, *Malaria Vaccine Market Shaping Roadmap*, April 2023, p. 1, <https://www.gavi.org/node/119826>.

⁷⁰ Gates Foundation website: *Malaria*, <https://www.gatesfoundation.org/our-work/programs/global-health/malaria>.

it focuses on keeping accountability for progress towards these goals. One way to do so is by publishing scorecards to track progress and obstacles in the elimination of malaria, which are then employed at continental, regional, national, subnational and community levels. In addition, the Alliance helps countries in the creation of national End Malaria Councils and Funds, to foster domestic resource mobilisation and support for malaria programmes across stakeholders. Third, ALMA works with African Regional Economic Communities to further entrench the African Union's malaria elimination agenda at all government levels.⁷¹

Hence, ALMA is thus a crucial actor to foster political engagement within and beyond the African continent. Given its structure, composition and its strategic position within the institutional architecture, the ALMA plays a key role at three main levels: domestic; intra-organisational; and international. At the domestic level, the organisation is able to exercise top-down pressure on the relevant national government departments to increase domestic spending on the health system. The ALMA also aims to involve business leaders at the national level, and more broadly the private sector, including the manufacturing sector, and other actors. Secondly, keeping track of indicators or metrics for success, the ALMA can exert peer pressure among member States, generating a positive spiral of intra-organisational competition which can boost progress in the fight against malaria. Lastly, the ALMA is instrumental in bringing visibility to the malaria fight, at a time when people's attention tends to drift away due to other pressing issues.

- *PMI* – The US President's Malaria Initiative (PMI) was established in 2005 to decrease malaria deaths by 50 per cent in 15 African countries by 2010. It has then expanded its portfolio to cover 27 countries in sub-Saharan Africa and 3 countries in South-East Asia, making the U.S. the largest funder of malaria programmes globally. PMI is the main bilateral player in the global malaria architecture, working with partner countries to “reduce mortality in high-burden countries, reduce morbidity in high and moderate burden countries, and reduce transmission to achieve elimination in low-burden countries.” It pursues these objectives by funding the upscale of “proven, cost-effective

⁷¹ ALMA website: *About ALMA*, <https://alma2030.org/?p=32697>; and *Our Role*, <https://alma2030.org/?p=120256>.

interventions”, by helping to strengthen local health systems and technical capacities, as well as investing in innovations to fight malaria. Its areas of activity encompass the entire range of malaria prevention and treatment tools (ITNs, IRS, diagnosis and treatment, entomological monitoring, SMC), as well as malaria programme management (social and behavioural change, health systems strengthening, monitoring and evaluation, operational research, community health).⁷²

- *The RBM Partnership to End Malaria* – The RBM partnership to end malaria gathers a varied range of stakeholders – community health workers, malaria researchers, representatives of malaria-endemic countries, donor countries, the private sector, international organisations – to “galvanise global action across all sectors to end malaria for good.” As an advocacy platform, it raises awareness, shares technical information and mobilises funding, by convening stakeholders, coordinating them, identifying resource gaps and mobilising them through solid business cases, sharing experience and best practices, and helping to increase political will in malaria-endemic countries.⁷³

3.3 Institutional coordination

.....

The actors presented above are key players of the institutional architecture of malaria, and are the pillars of multilateral initiatives in support of fighting malaria. Efforts materialise on the normative side (e.g. RBM, WHO) as well as on the financial side (e.g. GF, Unitaid, with the recent addition of Gavi), seeing actors working collaboratively and providing support, each through their own specific mandates and expertise. For the first case, the RBM Partnership to End Malaria (RBM) offers a good example of an umbrella organisation that can promote synergies and coordination among the different partners and stakeholders. The WHO also plays a coordination and convening role on global health more broadly, which includes initiatives targeting malaria. Additionally, the GF is a partnership by design and has all key malaria players (RBM, WHO, PMI, Unitaid, endemic countries, civil society, private sector, private foundation) represented

⁷² PMI website: *About Us*, 2024, <https://www.pmi.gov/about-us>; and *What We Do*, <https://www.pmi.gov/what-we-do>.

⁷³ RBM website: *Coordinated Action towards Ending Malaria*, <https://endmalaria.org/node/1026>; and *What We Do*, <https://endmalaria.org/node/10169>.

on its Board. On the financial side, the WHO MVP project mentioned above – for the development and piloting of the RTS,S vaccine – saw the cooperation of Gavi, the GF and Unitaid, pooling 72.4 million US dollars.

3.4 Private sector

.....

The private sector, including the manufacturing industry, has also a key role to play particularly in the production of new technologies for prevention tools, such as longer lasting bed nets or more effective insecticides, which have the potential to substantially reduce transmission. African countries largely rely on imports of medicines (95 per cent). Policies to increase the domestic manufacturing capacity, one of the global health priorities of G7, are key to responding to endemic diseases, including malaria. The manufacturing industry is a crucial player for the production of vaccines on the African continent, today limited to a handful of countries, as highlighted by IAI's publication "Boosting Health Product Manufacturing Capacity in Africa: Recommendations for the 2024 G7 Presidency". An example of Africa-led innovation and production is the Institut Pasteur of Dakar whose research unit has developed a new diagnostics technology for malaria, which was adapted to Covid-19.⁷⁴

⁷⁴ Institut Pasteur, "Test sanguin : un nouvel outil potentiel pour contrôler les infections", in *Le journal de la recherche*, 20 May 2020, <https://www.pasteur.fr/fr/node/13587>; Rhea J. Longley et al., "Development and Validation of Serological Markers for Detecting Recent Plasmodium vivax Infection", in *Nature Medicine*, Vol. 26, No. 5 (May 2020), p. 741-749, DOI 10.1038/s41591-020-0841-4.

Box 2. Successes in malaria elimination

.....

What does it take for a country to achieve the malaria-free status? Cabo Verde, the latest country to be certified 'malaria-free', gave impetus to elimination efforts in the 2000s by including malaria elimination as a specific objective in its national health policy. This was followed by a strategic malaria plan, which focused on expanding the diagnostic reach, treating cases early and effectively, as well as reporting and investigating all cases; free diagnostic and treatments services were provided to people travelling from abroad. During the Covid-19 pandemic, to prevent losing the gains made over years, Cabo Verde "focused on improving the quality and sustainability of vector control and malaria diagnosis, strengthening malaria surveillance". The involvement of multiple ministries beyond the Ministry of Health, as well as community-based and civil society organisations was also crucial.

Cabo Verde's experience echoes Sri Lanka's, which was certified as 'malaria-free' in 2016. From 1999, a push towards greater malaria control resulted in early diagnosis and treatment, vector surveillance and control, as well as awareness campaigns and community engagement. These actions were underpinned by the national Anti Malaria Campaign within the Ministry of Health, which heavily decentralised malaria control to district authorities. This allowed to reach rural areas and high-risk populations, as well as conducting intensive contact tracing and screening and isolation of malaria cases. Coordination between district authorities made contact tracing more effective. While the civil war was ongoing, malaria control activities focused on areas under government control, expanding to previously rebel-held areas from 2009 onwards; nevertheless, even in war zones the warring parties cooperated on malaria control and immunisation programmes. Adequate technical knowledge, testing capacity and supply of necessary tools also played a key role in bringing malaria under control.

Sources: WHO, *WHO Certifies Cabo Verde as Malaria-free*, cit.; Risintha Premaratne et al., "Technical and Operational Underpinnings of Malaria Elimination from Sri Lanka", in *Malaria Journal*, Vol. 18 (2019), Article 256, <https://doi.org/10.1186/s12936-019-2886-8>.

4. Malaria's funding landscape

Despite the sustained financial effort of the Global Fund, PMI, Unitaid and endemic countries' governments, funds poured into the elimination of malaria have been well below the level needed to achieve universal coverage. This is particularly true in high-burden countries like Nigeria, the DRC, Mozambique and Uganda. Resource constraints remain one of the biggest challenges of malaria control. Over the past 20 years, the amount of funding has been stable, while the need has grown and the population at risk has expanded. In 2022, the global funding available for malaria response amounted to 4.1 billion US dollars, which only covered half of the needed budget.

WHO estimated that to reach the Global Technical Strategy goals for malaria control and elimination, 7.8 billion US dollars in global funding is needed annually, a figure that does not include investments for malaria vaccines commodities and delivery. In 2022, total funding for malaria control and elimination reached around 4.1 billion US dollars; while this was an increase over the 3.5 billion provided in 2021, it still left a 3.7 billion funding gap. In addition, funding for R&D fell to its lowest level, amounting to 603 million US dollars, with decreasing shares for all R&D items – vaccines, basic research and medicines.⁷⁵

Low funding, climate change and AMR contribute to the financial challenges for malaria control and elimination. In addition, the underlying research component needed to produce these tools – genomic sequencing – is also costly.⁷⁶ Nevertheless, like RDT and ACT drug production, genomic sequencing also follows economies of scale – the more samples are collected and studied together, the less expensive it becomes to analyse a single sample and understand its genomic sequence.⁷⁷

⁷⁵ WHO, *World Malaria Report 2023*, cit.

⁷⁶ Beyond cost, there are also logistical barriers to acquiring all the necessary – clinical, phenotypic, and genotypic – data to detect antimalarial drug resistance “in the resource deprived settings where malaria is endemic.” See Matthew M. Ippolito et al., “Antimalarial Drug Resistance”, cit., p. 51.

⁷⁷ Dominic Kwiatkowski, “Malaria Genomics: Tracking a Diverse and Evolving Parasite Population”, in *International Health*, Vol. 7, No. 2 (March 2015), p. 82-84, <https://doi.org/10.1093/inthealth/ihv007>.

Beyond the price of commodities, from an operational point of view, malaria programmes are conducted in fragile health systems. Many malaria endemic countries are also low-income countries, with very limited fiscal space, multiple health and development gaps, higher vulnerability to climate change, and more prone to conflict and instability. In these countries, malaria cannot be tackled without external financial support, and domestic resource cannot compensate for insufficient external sources of funds.

Concluding remarks and recommendations

As emphasised by the World Health Organisation (WHO) “a malaria-free world means millions of lives saved”. However, the fight against malaria has reached a critical point. In the last few years progress towards the target of malaria elimination outlined in the UN SDG agenda has plateaued and new daunting challenges have emerged, both short and long term, including the accelerating climate change and increasingly evident anti-microbial resistance (AMR).

As malaria is one of the most climate sensitive diseases, climate perturbations risk to become – and indeed already appear to be – a major complicating factor in the fight against it. AMR reduces the effectiveness of insecticides and treatments and may also complicate diagnostics. The connection between ecosystems, animals and human health manifestly applies to malaria. The response to malaria needs therefore to be put squarely in the context of the One Health approach, a central element of the Global Health Agenda.

Keeping malaria elimination high on the global agenda is also a matter of global health security. The fight against malaria is key to build and expand access to holistic, integrated prevention, diagnosis, and care among poor, remote communities, especially among children under five and pregnant women. Community-based service delivery models developed for malaria have demonstrated their resilience, their cost-effectiveness, and their ability to be leveraged – as during the Covid-19 crisis – for broader outbreak surveillance and control. Indeed, the fight against malaria can be leveraged as a pathway to build primary healthcare systems and to strengthen pandemic prevention,

preparedness and response. Reducing malaria incidence and morbidity also reduces the burden of the disease on secondary and tertiary health infrastructures, such as health centres and hospitals, and liberates human and financial resources for other diseases.

Improving malaria prevention and control benefits not only the health systems but it is also a key condition for economic development and inequality reduction. Malaria elimination in endemic countries would remove significant obstacles to economic development. Malaria should therefore be addressed by taking into due account the broader health-economic development nexus, of which it is one of the most glaring examples. The massive investments made by the Global Fund in malaria control and elimination over the past decade have reduced the epidemiological and financial burden of malaria on the communities and economies in endemic regions, and have created the conditions for the emergence of regional R&D and production of malaria commodities, such as impregnated bed nets and diagnostics.

Thanks to investments in R&D innovative instruments have been created and are being deployed, including new drugs, insecticides, and diagnostics methods. 2024 will see the introduction of routine malaria vaccination programmes in 15 African countries, with more to follow. These vaccination programmes are most effective when used in tandem with other interventions such as insecticide treated nets and the adoption of effective treatments.

However, to take full advantage of these developments, the fight against malaria needs to be adequately financed. Yet funding to support malaria control and elimination has plateaued over several years. While the investment needs continue to grow, the amount of funds has stayed about the same. This trend should be reversed.

Ending malaria by 2030 as stated in the UN SDGs agenda is the only way to durably protect communities from malaria resurgence. Reversing the plateauing trend of global malaria funding is urgent to avoid losing ground against the pandemic. Massive increases of financial investments are needed from all sources: G7, G20, endemic countries and the private sector. Addressing the debt crisis is a pivotal lever to unlock additional domestic investments against malaria in endemic countries.

The G7 has a key role to play in promoting and supporting international community solidarity in the fight against malaria, averting the risk of political complacency and epidemic reversal.

The universal health coverage (UHC) agenda of the G7 and the malaria agenda are inextricably linked. This applies to the other two fundamental commitments of G7 in the health sector: the promotion of health innovations and the development and strengthening of the global health architecture.

Moreover, giving a renewed impulse to the fight against malaria should be also seen as an integral part of the G7's outreach effort to rebalance the international power agenda on health towards the Global South, particularly Africa, which the Italian Presidency has chosen as its regional focus.

In view of the above concluding remarks and the analysis offered in the paper, the G7 under the Italian leadership should consider taking the following positions:

1) *Relevance of malaria in the G7 agenda*

- Reaffirm the role of existing and future pandemics, such as malaria, as key determinants of economic growth, stability, and security, and *the urgency to accelerate progress towards SDG 3*;
- Endorse the objective of malaria elimination as an integral component of the global health agenda, at the crossroads of the UHC, PPR, One Health and AMR priorities of the Italian G7 presidency, and *mobilise the G20 at political and financial level in the fight against malaria, in partnership with States where malaria is endemic*.
- Recognise climate change as a factor of emergence, re-emergence, and resurgence of pandemics, such as malaria, and *promote the inclusion of health as an integral and critical part of the global climate adaptation agenda*.
- Considering the human toll of malaria among children under five and pregnant women in endemic regions, and the strain caused by the disease on communities and health systems, scale up investments in existing and new instruments and programmes for *early diagnosis and treatment of malaria* as a key component of universal health coverage and health systems strengthening.

- *Recognise the relevance of malaria in the G7 commitment to foster regional manufacturing, building on existing advanced regional malaria R&D and production hubs, as well as the opportunity to strengthen and leverage them for other infectious diseases. Renew the G7 commitment to multilateralism, public-private partnership, transparency, and country-ownership as core features to deliver impact and equity for global health and global public goods, as demonstrated by the example of the Global Fund that has invested 60.4 billion US dollars, saved 59 million lives, and contributed to reducing malaria deaths by 28 per cent since its creation at the G7 Genoa summit.*

2) *The fight against malaria as a laboratory for innovative global health strategies*

- Invest in the scale up of community-level programmes malaria control and elimination interventions, as a critical pathway to build multi-pathogen surveillance, diagnosis, and control at primary level among the world's poorest and most remote communities, as part of the global PPR agenda. In particular, catalyse recognition of, and *investments in community health workers to increase resilience, cost-effectiveness, and differentiation of coverage.*
- Contribute to initiatives aimed at removing financial, policy, supply, and other barriers to the deployment of innovations – such as vaccines and new generation bed-nets – alongside existing pre-existing tools.
- In particular, reinforce the Global Fund, Unitaid and Gavi, in their pivotal efforts to incentivise innovation, to shape markets, and to create the conditions for quality and cost-effective regionally-produced commodities, in partnership with endemic countries and other relevant private and public stakeholders.
- Foster initiatives to support endemic countries in building upon the unique position of malaria at the nexus of human, animal, and environmental health to model a One Health approach to malaria control and elimination strategies.
- Support global, regional, and local initiatives to accelerate research and development of new malaria tools and strategies addressing resistance to drugs – as part of the global AMR agenda – as well as in diagnostics and insecticides, as part of the of the AMR agenda.
- Endorse the efforts of multilateral partnerships in global health to adapt to new trends in the global epidemiology of malaria and pandemics and

to the emergence of new stakeholders such as Africa CDC; accompany the action by multilateral partnerships to further reduce transactions costs for partner countries, and to strengthen the role of civil society, communities and other non-governmental partners in the design, governance, and implementation of public health policies.

3) *The global fight against malaria as an investment*

- Recognise the value of investing in health, which, as illustrated by the case of malaria, has a measurable impact on life expectancy among children under five and pregnant women in Africa, as well as on broader access to education, poverty, and gender equality, and a return on investment estimated at 40:1 globally and 60:1 in Sub-Saharan Africa.
- Commit to *substantially increase investments in malaria control, elimination, research, and development*, consistently with the objective to reduce malaria cases and deaths by 90 per cent by 2030. This entails providing a strong support to the replenishment processes of multilateral partnerships such as Global Fund, Gavi and Unitaid.
- Reiterate full financial support of the G7 to the 8th replenishment of the Global Fund, that represents 65 per cent of international investments in malaria control and elimination, and consider immediate pledging additional resources to the Global Fund to finance unfunded quality country demand, that reaches 5.049 billion US dollars including a 1.2 billion US dollars funding gap for malaria interventions.
- Reiterate full financial support of the G7 to the replenishment of Gavi for its 2026-2030 cycle, which will be critical for the roll-out of malaria vaccination programmes in endemic countries.
- In the light of the vaccine roll out, promote *closer coordination among the various actors* of the complex malaria architecture to avoid overlapping and duplications and ensure a holistic approach to the fight against the epidemic.

List of abbreviations

ACT	Artemisinin-based combination therapy
AIDS	Acquired immunodeficiency syndrome
ALMA	African Leaders Malaria Alliance
AMR	Anti-microbial resistance
CDC	US Centers for Disease Control and Prevention
COP28	2023 United Nations Climate Change Conference
DRC	Democratic Republic of the Congo
Gavi	Global Alliance for Vaccines and Immunisation
GDP	Gross domestic product
GF	Global Fund to Fight AIDS, Tuberculosis and Malaria
GSK	GlaxoSmithKline
GTS	Global Technical Strategy for Malaria
HRP	Hidistin-rich protein
IRS	Indoor residual spraying
ITS	Insecticide-treated net
LLIN	Long-lasting insecticidal net
LMIC	Low and middle-income country
Mpox	Monkeypox disease
MVIP	Malaria Vaccine Implementation Programme
PMC	Perennial malaria chemotherapy
PMI	US President's Malaria Initiative
PPR	Pandemic preparedness and response
R&D	Research and development
RBM	Roll Back Malaria
RDT	Rapid diagnostic tool
R21	R21/Matrix-M vaccine
RTS,S	RTS,S/AS01 vaccine
SARS	Severe acute respiratory syndrome
SDG	Sustainable Development Goal
SMC	Seasonal malaria chemotherapy
UHC	Universal health coverage
WHO	World Health Organisation
WMR	World Malaria Report

Advancing the Global Health Agenda of G7 The Challenge of Malaria Elimination

This report illustrates the current state of malaria and highlights its incidence, the challenges linked to climate change and anti-microbial resistance, and its importance for other G7 health priorities, such as pandemic preparedness and response, global health architecture, innovation, R&D and local production. It also provides an overview of the main public and private bodies and partnerships committed to malaria elimination and concludes with a set of recommendations for the 2024 Presidency of the G7.



The Istituto Affari Internazionali (IAI) is a private, independent non-profit think tank, founded in 1965 on the initiative of Altiero Spinelli. IAI seeks to promote awareness of international politics and to contribute to the advancement of European integration and multilateral cooperation. Its focus embraces topics of strategic relevance such as European integration, security and defence, international economics and global governance, energy, climate and Italian foreign policy; as well as the dynamics of cooperation and conflict in key geographical regions such as the Mediterranean and Middle East, Asia, Eurasia, Africa and the Americas.

Istituto Affari Internazionali (IAI)

Via dei Montecatini, 17 - Rome - T. +39 066976831

iai@iai.it - www.iai.it