The Economist INTELLIGENCE UNIT

The path to malaria elimination in sub-Saharan Africa

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Contents

About this report

The path to malaria elimination in sub-Saharan Africa is an Economist Intelligence Unit report, sponsored by Abbott. The report looks at the strategies countries in sub-Saharan Africa are using to combat the disease and the challenges that countries are facing on the path to malaria elimination.

The report is informed by both desk research and expert insight with health officials and policymakers. We would like to thank the following individuals (listed alphabetically) who have generously contributed their views and insights for this report:

- Mr Moonga Hawela, Chief Parasitologist for the Minister of Health, National Malaria Administration, Zambia
- Dr Daniel Kyabayinze, Epidemiologist / Study Coordinator at FIND (Foundation for Innovative New Diagnostics), Kampala, Uganda
- Prof Olugbenga Mokuolu, Malaria Technical Director at Nigeria's National Malaria Elimination Program and Associate Professor of Paediatrics, University of Ilorin
- Dr Davis Nwakanma, Head of Laboratory Management of Medical Research Council Unit, The Gambia Unit
- Dr Felicia Owusu-Antwi, National Professional Officer for Malaria, World Health Organisation (WHO), Ghana
- Prof Robert W. Snow, Professor of Malaria Epidemiology, University of Oxford and Principal Investigator, KEMRI-Wellcome Trust Programme, Kenya

The report was written by Andrea Chipman and edited by Gerard Dunleavy.

Executive summary

Since 2000, 1.5 billion malaria cases and 7.6 million malaria deaths have been averted.[1] Despite this remarkable achievement, progress has strikingly slowed in the past five years, with global case incidence declining by less than 1% since 2015, compared with a drop of 28% between 2000 and 2015.[2] More worryingly, the number of malaria cases has even increased in some high-burden countries.[3]

Five countries account for more than half of the world's 229 million malaria cases in 2019. All of them are in sub-Saharan Africa: Nigeria (27%), the Democratic Republic of the Congo (12%), Uganda (5%), Mozambique (4%) and Niger (3%). In addition, 94% of the 409,000 malaria deaths worldwide were in Africa.[4]

The WHO *Global Technical Strategy for Malaria 2016-2030*, which the World Health Assembly adopted in May 2015, sets out a number of goals for 2030, including: reducing malaria cases by at least 90%; reducing malaria mortality rates by at least 90%; eliminating malaria in at least 35 countries.[5] However, due to a variety of reasons, including weak health systems, insufficient funding, and inadequate surveillance systems, most countries in sub-Saharan Africa are not on track to meet these ambitious targets.

After five years of stalled progress, efforts to reignite the previous headway made against malaria are further challenged by the Covid-19 pandemic. Lockdowns have disrupted supply chains, made it more logistically difficult to run preventive programs and treat populations affected by malaria, especially in remote areas. This could further undermine efforts to meet the 2030 goals. The latest WHO malaria report suggests that even a 25% disruption in access to effective anti-malarial treatment could lead to an additional 46,000 deaths in the sub-Saharan Africa region.[6]

Experts interviewed for this report emphasize that it is impractical to come up with a one-size-fits-all strategy for eliminating malaria. Rather, they say, it is important to stratify countries and regions within countries in order to identify those in which elimination is a realistic goal and those in which the interim goal should be reducing deaths and improving case management in order to move toward pre-elimination*.

Key findings:

- **Countries in sub-Saharan Africa are on very different trajectories with regard to malaria.** While elimination by 2030 is a genuine prospect for some countries,

[1] WHO. World Malaria Report 2020. [online] Available at: https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2020
[2] Ibid
[3] Ibid
[4] Ibid
[5] WHO. WHO Global Technical Strategy for Malaria 2016-2030. [online] Available at: https://www.who.int/malaria/areas/global_targets/en/
[6] WHO. World Malaria Report 2020. [online] Available at: https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2020

* Malaria control is the reduction of disease incidence, prevalence, morbidity, or mortality to a locally acceptable level as a result of deliberate efforts. Continued intervention is required to sustain control.
Pre-elimination consists of the period of reorientation of malaria control programmes between the sustained control and elimination stages, when coverage with good-quality laboratory and clinical services, reporting and surveillance are reinforced, followed by other programme adjustments to halt transmission in a defined geographic area.
Malaria elimination is the interruption of local transmission (that is, reducing the rate of malaria cases to zero) of a specified parasite in a defined geographic area. Continued measures are required to prevent the reestablishment of transmission.

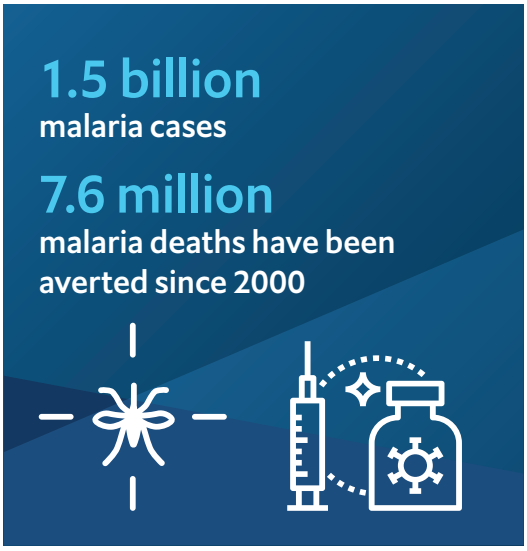
especially in southern Africa, many countries in Central and East Africa are struggling to reduce deaths and cut caseloads. In many cases, there are significant differences within countries as well. Until recently, there was a tendency to treat countries—and regions within countries—as if they are on the same trajectory for eliminating malaria, resulting in inefficient use of finite resources. In recent years, more stratified approaches have been taken to combat malaria across the region.

- **Covid-19 disruptions could lead to setbacks:** Disruptions to malaria prevention, diagnosis and treatment services due to Covid-19 could increase deaths from malaria by up to 36% over 5 years.[7] The impact of Covid-19 on the functioning of health services has led to a drop in testing for malaria, and, in some cases, a reduction in the number of children presenting at hospital with malaria. There is also evidence of disruption in imports of commodities, which has affected both treatment and diagnostics.
- **Greater investment is needed to get back on track to meet 2030 goals.** Annual global expenditure for malaria is estimated to be $4.3 billion, $2 billion short of what is needed to meet the goals of the WHO's *Global Technical Strategy for Malaria 2016-2030* (GTS).[8] While the current annual costs are high, and will even increase as countries move towards elimination, the returns will be even greater. Achieving the goals of WHO's GTS is projected to generate US$4 trillion in economic output.[9] With an estimated return on investment of 60 to 1 for sub-Saharan Africa, malaria interventions represent one of the highest returns on investment in public health.[10]
- **Surveillance remains a serious challenge, given the limited availability of high-quality data that is up to date.** The swift uptake of District Health Information Systems 2 to manage health information across sub-Saharan Africa is a positive step. However, the majority of countries in sub-Saharan Africa use models that rely on intermittent community parasite prevalence data to estimate their malaria burden. Such an approach underestimates the true burden and is especially less reliable at capturing recent trends, depriving policymakers of the essential data needed to make the most appropriate and informed decisions. Digital technologies and mobile devices hold great promise, offering the opportunity to map, track, prevent and treat malaria outbreaks in real-time.
- **Multi-pronged approaches are essential to reinvigorate progress:** Acknowledging the heterogeneity of malaria within national borders, policymakers are increasingly aware of the need to tailor, multi-pronged approaches to combat malaria. Experts interviewed highlighted that a whole package approach is needed to reinvigorate progress in malaria control and elimination.

[7] Hogan AB, Jewell BL, Sherrard-Smith E, et al. Potential impact of the COVID-19 pandemic on HIV, tuberculosis, and malaria in low-income and middle-income countries: a modelling study Lancet Glob Health. 2020 Sep; 8(9): e1132–e1141.
[8] Feachem RGA, Chen I, Akbari O, et al. Malaria eradication within a generation: ambitious, achievable, and necessary. Lancet. 2019 Sep 21;394(10203):1056-1112.
[9] WHO on behalf of the Roll Back Malaria Partnership Secretariat. 2015. *Action and Investment to defeat Malaria 2016-2030*. [online] Available at: https://www.mmv.org/sites/default/files/uploads/docs/publications/RBM_AIM_Report.pdf
[10] Ibid

Remarkable progress has stalled

Considerable progress has been made in the fight against malaria since the turn of the millennium as funding to support the coverage of malaria interventions has increased dramatically. Between 2000 and 2016, this investment resulted in 36% and 60% reductions in the incidence of malaria infection and mortality rates, respectively.[11] However, progress has worringly stalled in recent years due to a variety of reasons, including weak health systems, insufficient funding, and inadequate surveillance systems.



In 2019, there were an estimated 229 million cases of malaria worldwide.[13] Five countries account for more than half of all malaria cases in the world. All of them are in sub-Saharan Africa: Nigeria (27%), the Democratic Republic of the Congo (12%), Uganda (5%), Mozambique (4%) and Niger (3%). In addition, the estimated number of malaria deaths globally stood at 409,000 in 2019, 94% of these were in Africa. Plasmodium falciparum is the predominant malaria parasite in the WHO African Region and was responsible for 99.7% of malaria cases in the region in 2018.[14]

Children and pregnant women are especially vulnerable to malaria. Every two minutes, a child under the age of five dies from the disease, while it can lead to anaemia in pregnant women, stillbirth and low birth weights in their babies.[15]

The progress experienced in the past two decades has been attributed to the increased financing available to scale up effective interventions to tackle malaria. In 2019, 36% of households owned at least one insecticide-treated net (ITN) for every two people, up from 1% in 2000.[16] As ITNs are the most cost-effective intervention against malaria, greater effort is needed to increase their coverage further.[17]

Alongside effective vector control methods, the uptake of preventive therapies such as intermittent preventive treatment for

[11] Feachem RGA, Chen I, Akbari O, et al. Malaria eradication within a generation: ambitious, achievable, and necessary. Lancet. 2019;394(10203):1056-1112.
[12] WHO. *World Malaria Report 2020.* [online] Available at: https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2020
[13] Ibid
[14] WHO. 2020. *Malaria: Key Facts.* [online] Available at: https://www.who.int/news-room/fact-sheets/detail/malaria
[15] UNICEF. 2020. *Malaria.* [online] Available at: https://data.unicef.org/topic/child-health/malaria/
[16] WHO. *World Malaria Report 2020.* [online] Available at: https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2020
[17] Walker PGT, Griffin JT, Ferguson NM, et al. Estimating the most efficient allocation of interventions to achieve reductions in Plasmodium falciparum malaria burden and transmission in Africa: a modelling study. The Lancet Global Health. 2016;4(7):e474 - e484.

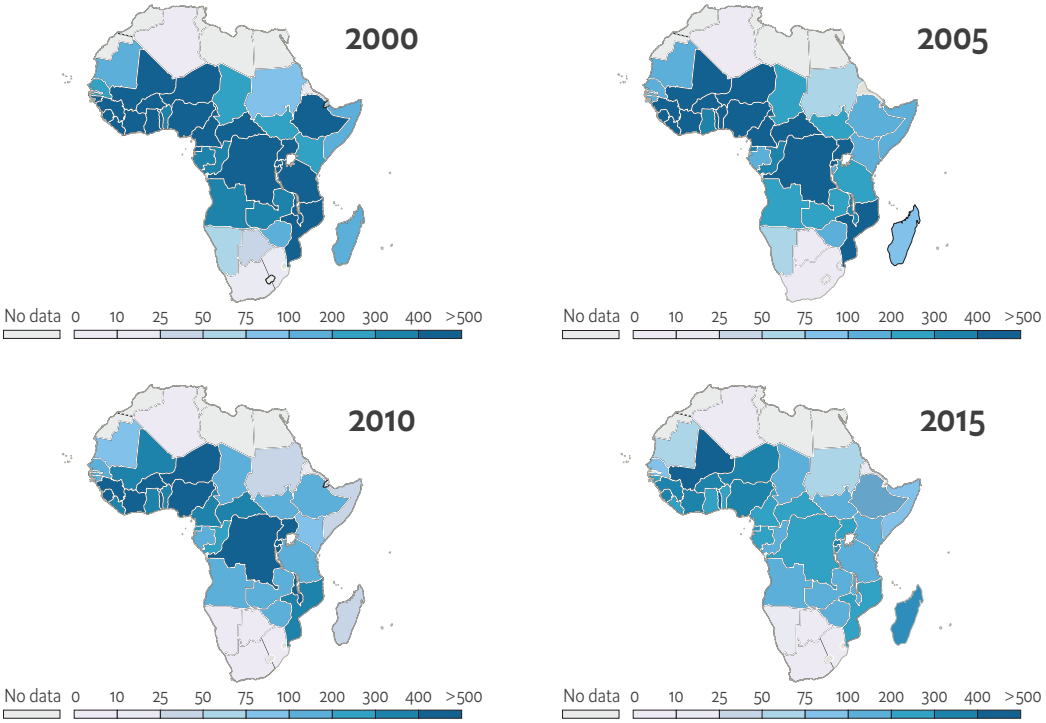
pregnancy (IPTp) has also increased. In 2019, 34% of eligible pregnant women received the recommended three or more doses of IPTp, a significant increase on the 2% recorded in 2010, and even on the 22% reported in 2017.[18]

The use of diagnostic testing has also drastically increased. In 2010, the WHO revised its recommendations to require confirmation of malaria infection prior to treatment with artemisinin-based combination therapy (ACT). Since then, the percentage of children with a fever that received a diagnostic test before antimalarial treatment in public health facilities rose from 48% in 2010–2013 to 76% in 2015–2018.[19]

This increase is largely driven by the greater availability of low-cost and high-quality rapid diagnostic tests (RDTs) in the public sector.

The gains from malaria-related interventions in sub-Saharan Africa are illustrated by the fact that in the year 2000, 17 countries reported an annual parasitic index[20] of 400–500, while in 2015 such high burden was recorded in Mali only. While this is proof that progress is possible, such progress has all but halted. Malaria case incidence declined by less than 1% since 2015, compared with a drop of 28% between 2000 and 2015, providing a stark reminder that the path to eliminating malaria is a long one.

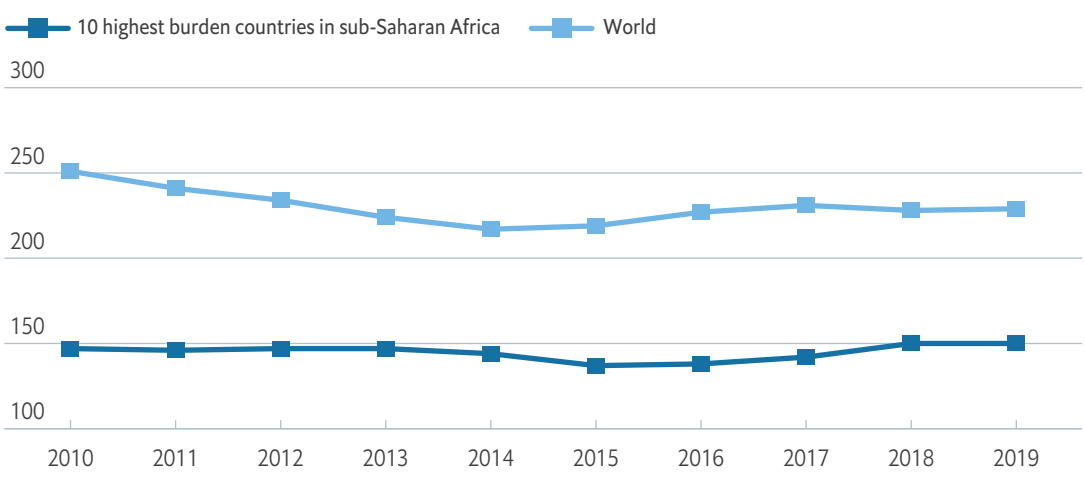
Figure 1: Incidence of malaria in sub-Saharan Africa over time



Source: www.ourworldindata.org/malaria.

[18] WHO. *World Malaria Report 2020*. [online] Available at: https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2020
[19] WHO. *World Malaria Report 2019*. [online] Available at: https://www.who.int/publications/i/item/9789241565721
[20] A parasitic index is the number of new cases from malaria registered in a specific year and expressed per 1,000 individuals under surveillance in a given country, territory or geographic area

Figure 2: Malaria cases worldwide vs 10 highest burden countries in sub-Saharan Africa, 2010-2019



Source: World Health Organization, 2019

Covid-19 takes a toll

While lockdowns due to the novel coronavirus pandemic have generally been shorter in countries in Africa compared to those in Europe and North America, the pandemic has still disrupted malaria prevention, diagnosis and treatment efforts. A recent modelling study projected that the excess deaths from malaria could increase by up to 36% over 5 years in high-burden countries, as a result of the pandemic.[21]

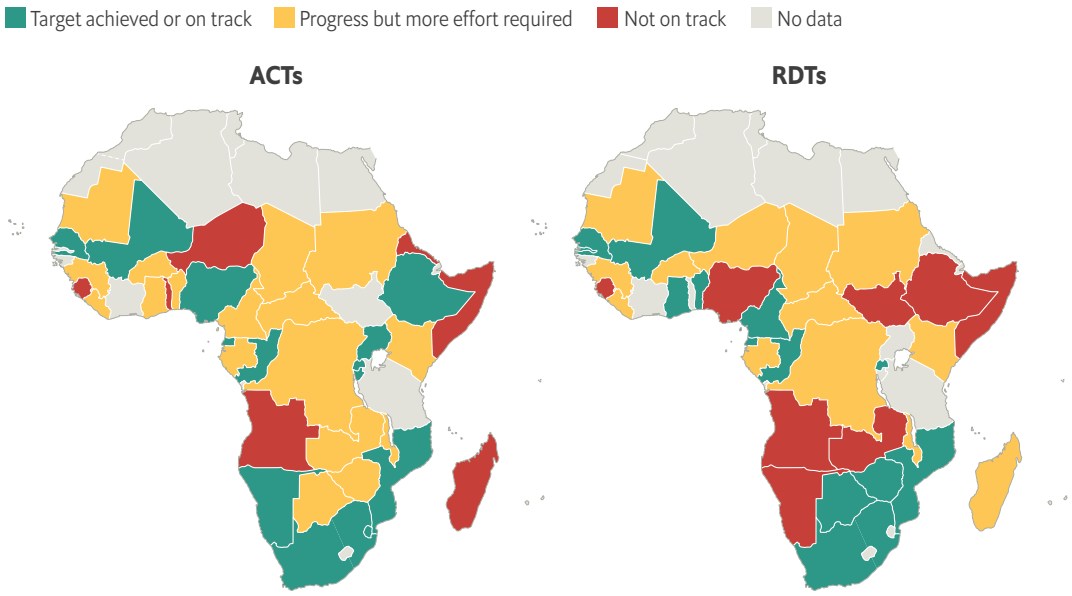
"It's been an utter disaster," says Prof Robert W. Snow, Professor of Malaria Epidemiology, University of Oxford and Principal Investigator, KEMRI-Wellcome Trust Programme, Kenya, noting that there has been a clear impact from the temporary halt to field activities such as the distribution of treated bed nets, residual house spraying, mothers attending antenatal health clinics and the suspension of some clinical services in recent months. "Those who were admitted to hospital are much sicker," he added, and he predicted that "the collateral damage caused by Covid will be greater than Covid itself."

The African Leaders Malaria Alliance (ALMA), a coalition of 49 African heads of state and governments committed to ending malaria, produce the ALMA Scorecard quarterly which tracks a number of priority malaria indicators. Based on the latest data provided in their third-quarter scorecard, the below map illustrates the delays experienced in the delivery of essential antimalarial commodities including ACTs and RDTs across sub-Saharan Africa.

[21] Hogan AB, Jewell BL, Sherrard-Smith E, et al. Potential impact of the COVID-19 pandemic on HIV, tuberculosis, and malaria in low-income and middle-income countries: a modelling study Lancet Glob Health. 2020 Sep; 8(9): e1132–e1141.

Moonga Hawela, chief parasitologist for the Ministry of Health's National Malaria Administration in Zambia, highlighted supply chain issues noting "some flights were suspended, and some shipments were late", leaving their health system with lower stocks of RDTs and ACTs. In Nigeria, interruption of services was compounded by some companies switching from production of malarial supplies to other treatments, according to Prof Olugbenga Mokuolu, Malaria Technical Director at Nigeria's National Malaria Elimination Program and an associate professor of paediatrics at University of Ilorin.

Figure 3: Stock of essential antimalarial commodities (>9 months)



Source: ALMA Summary Report 3rd-Quarter 2020.

Avoidance of health clinics during the pandemic was a concern in the Gambia, according to Dr Davis Nwakanma, a malaria geneticist and head of laboratory services for the Medical Research Council's Gambia unit. He retold how the numbers of people treated in the Gambia's outpatient malaria clinics fell from up to 200 a day to 10-20 a day.

In Uganda, a planned universal net distribution was suddenly more expensive as health officials were forced to factor in the cost of personal protective equipment (PPE) and extra staffing, according to Dr Daniel Kyabayinze, an epidemiologist and study coordinator at the Foundation for Innovative New Diagnostics. An additional and perhaps

less anticipated impact of the virus was the fact that money from malaria budgets that had not already been spent was reprogrammed to support Covid-19 activities.

Digitalised mass distribution of ITNs

In Benin, the first case of Covid-19 was reported in mid-March 2020, days ahead of their scheduled campaign for the mass distribution of ITNs. Rather than postponing their campaign, which occurs once every three-years, they adapted. Instead of using centralised distribution points, as had been their plan, an army of 5,500 community healthcare workers were mobilised and went door-to-door, travelling by motorbikes and even tricycles, to deliver nets. The community health workers were trained and adequately equipped with PPE. They also used smartphones to track the delivery of nets and communicate in real-time with distribution teams. The campaign's agile approach resulted in the distribution of more than 8 million mosquito nets across Benin in just 20 days.[22]

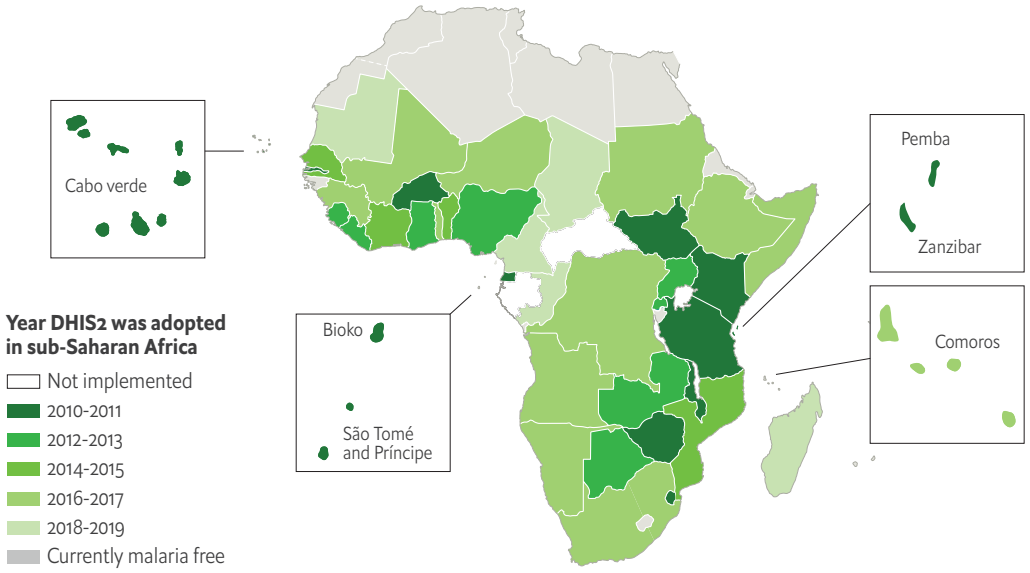
[22] Aïkpon R, Affoukou C, Hounpkatin B, et al. Digitalized mass distribution campaign of insecticide-treated nets (ITNs) in the particular context of Covid-19 pandemic in Benin: challenges and lessons learned. Malaria Journal. 2020;19(1):431.

Enhanced data and funding are needed to guide and sustain interventions

Improved data collection and comprehensive surveillance of malaria is an essential component of any country's approach to better managing their malaria burden, whether they are engaged in efforts to control or eliminate the disease. Indeed, pillar 3 of the *WHO's Global Technical Strategy for Malaria 2016-2030* (GTS), calls for the transformation of malaria surveillance into a core intervention to combat malaria.

WHO advocates the use of District Health Information Systems 2 (DHIS2)—a web-based open-source information system that includes visualization features such as charts and geographic information system mapping—to manage health information in resource-limited settings. The map below shows the swift uptake of DHIS2 across sub-Saharan Africa, which has been used to better inform health interventions and evaluate the impact of malaria programmes.[23] However, issues related to a lack of training, transparency, human resources, data quality and poor information technology infrastructure, need to be overcome in order to maximise the utility of the DHIS2 in malaria surveillance efforts in sub-Saharan Africa.[24]

Figure 4: The uptake and use of District Health Information Systems (DHIS2) in Africa for routine data management

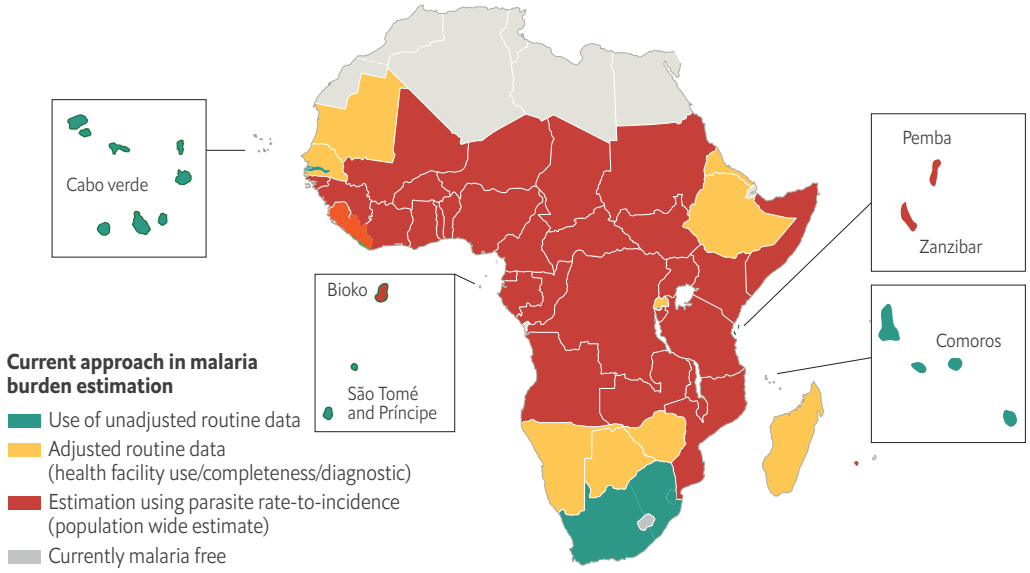


[23] Alegana VA, Okiro EA, Snow, RW. Routine data for malaria morbidity estimation in Africa: challenges and prospects. BMC Medicine. 2020;18(1):121.
[24] Dehnavieh R, Haghdoost A, Khosravi A, et al. The District Health Information System (DHIS2): A literature review and meta-synthesis of its strengths and operational challenges based on the experiences of 11 countries. *Health Inf Manag.* 2019;48(2):62-75.

Many health officials emphasize the importance of improving data collection and surveillance, as well as multi-sectoral cooperation, in order to further improve outcomes and move towards elimination. In some countries, cooperation across borders is one way of extending interventions and stretching scarce financial resources. The eight countries participating in the Elimination 8 initiative in southern Africa—Angola, Botswana, Eswatini, Mozambique, Namibia, South Africa, Zambia and Zimbabwe—have focused on widening access to testing and treatment through the establishment of malaria border posts and surveillance units at posts along the shared borders of the eight countries.[25]

Of these eight countries, South Africa and Eswatini are two of the few countries with high-quality surveillance systems that provide the actual number of cases of malaria each year to the WHO for the World Malaria Report.[26] For malaria estimation in Botswana, Eritrea, Ethiopia, The Gambia, Madagascar, Mauritania, Namibia, Rwanda, Senegal and Zimbabwe, routine data is adjusted to reflect cases that might have been missed from formal reporting systems. However, the majority of countries in sub-Saharan Africa use models that rely on intermittent community parasite prevalence data to estimate their malaria burden. Such an approach may underestimate the true burden of malaria and is especially less reliable in capturing recent trends. Reliable data is essential to adequately identify the geographical foci of transmission and populations at higher risk, and guide the most appropriate and informed responses.

Figure 5: Map of sub-Saharan Africa showing the current methodologies used to estimated malaria case burden



[25] See https://www.who.int/malaria/mpac/mpac-october2018-session6-border-malaria.pdf and http://malariaelimination8.org/
[26] Alegana VA, Okiro EA, Snow, RW. Routine data for malaria morbidity estimation in Africa: challenges and prospects. BMC Medicine. 2020;18(1):121.

Dr Felicia Owusu-Antwi, National Professional Officer for Malaria for the WHO in Ghana, notes that Ghana's surveillance efforts are hampered by struggles with building up capacity, in part because of attrition in the health sector. Increasingly, the country's health officials are seeking to work more closely with the private health sector, which includes private chemists, medical providers and laboratories.

The ability to collect, interpret and map data in a timely manner remains a challenge. Dr Daniel Kyabayinze notes that after community health workers report from the field, it can take three months to compile the data for Uganda's national database. "If it was a hotspot or an outbreak, knowing this three months later is just too late", adds Dr Daniel Kyabayinze.

Surveillance is likely to be more effective and comprehensive once data reporting moves from paper-based to an electronic data culture, Dr Kyabayinze says. "It will be a challenge in terms of technology and uptake and literacy, but we can't just wait," he adds. Although the Ugandan government is already funding the roll-out of electronic medical records starting with big hospitals, the process of extending the technology to community health workers will take a longer time.

In Guinea-Bissau, a partnership between the government, UNDP, the Global Fund to Fight AIDS, Tuberculosis and Malaria, and the World Bank has led to the development of a digital platform to map, track, prevent and treat malaria outbreaks in real-time. Data collected at local health centres is entered on mobile tablets and sent to the National Institute of Public Health. Viewing the malaria landscape in real-time enables policymakers to make evidence-based decisions about how to target responses and stock essential commodities at health facilities.

The ability to make informed decisions with real-time data has contributed towards the 16% decrease in malaria-related deaths in Guinea-Bissau between 2017 and 2018.[27]

Funding remains a concern

A few years into the WHO's GTS, and its ambitious targets of at least a 90% reduction in case incidence and mortality rates, and the goal of elimination in 35 countries by 2030, appear more aspirational than attainable for most countries right now. A key reason for this is that the funding needed to achieve these lofty goals has fallen short.

It's estimated that to achieve WHO's GTS goals, annual investments of US$6.4, US$7.7 and US$8.7 billion are needed in 2020, 2025 and 2030, respectively.[28] The current global expenditure is $4.3 billion, some $2.1 billion short of what is needed. While the overall investment seems immense, it equates to an annual spend of US$3.90-US$4.40 per person at risk of malaria in 2020 and 2030. The reason

[27] United Nations Development Programme. 2019. *Can data save lives? Digitizing the malaria response in Guinea-Bissau.* [online] Available at: https://stories.undp.org/is-the-digital-divide-hampering-the-malaria-response-in-africa
[28] Patouillard E, Griffin J, Bhatt S, et al. Global investment targets for malaria control and elimination between 2016 and 2030. BMJ Glob Health. 2017 May 16;2(2):e000176.

the required investment rises until 2030 is that more countries will be in the elimination phase by then and the cost of elimination efforts is greater than the cost of control.[29] The path to elimination requires even greater investments in robust surveillance systems to detect and respond to remaining cases, which co-exists alongside the challenge of maintaining domestic and international funding as rates of malaria decline.

Although achieving the 2030 malaria goals set out in WHO Global Technical Strategy for Malaria is estimated to cost over

US$ 100 billion,

the return on investment for sub-Saharan Africa is estimated to be

60 to 1.

However, the investment is necessary and the returns are vast. Malaria interventions represent one of the highest returns on investment in public health. The Roll Back Malaria Partnership's report *'Action and Investment to defeat Malaria 2016-2030'* estimated that achieving the GTSs goals would generate US$4 trillion in economic output.[30]

To reduce dependency on external funding, which currently makes up 69% of the current global spend on malaria each year, experts suggest that domestic spending should be increased to make up the bulk of the malaria financing gap.[31] Dr Daniel Kyabayinze recounts the financial challenges faced in Uganda. Only 70-80% of the government's last strategic plan was fully funded, leaving 20% that wasn't covered, he says. With 80% of its current malaria interventions coming from donor funding, Uganda needs to find ways of generating revenues and secure a bigger budget allocation to ensure that interventions that have been started aren't stopped, he adds. Increased government spending on malaria demonstrates a country-level commitment to elimination, however, it remains unclear where Uganda and other countries in the region will find additional money in already-stretched budgets.

It should be noted that investing in the elimination of malaria synergistically moves countries closer towards achieving universal health coverage (UHC). Increased financing to address malaria entails strengthening the capacity and infrastructure of primary health care systems, and ensures a sufficiently staffed and trained health workforce is available to expand access to care and deliver on the ambition of UHC.

[29] Shretta R, Avanceña AL, Hatefi A. The economics of malaria control and elimination: a systematic review. Malar J. 2016;15(1):593.
[30] WHO on behalf of the Roll Back Malaria Partnership Secretariat. 2015. *Action and Investment to defeat Malaria 2016-2030.* [online] Available at: https://www.mmv.org/sites/default/files/uploads/docs/publications/RBM_AIM_Report.pdf
[31] WHO. World Malaria Report 2020. [online] Available at: https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2020

Stratification and multi-pronged approaches

Countries in sub-Saharan Africa are taking different paths in their approach to combatting malaria. While some countries in western and southern Africa, notably Senegal, The Gambia and Zimbabwe, are farther along on the path to eliminating the illness, others, primarily in central and East Africa, among them Kenya and Uganda, are focusing on case management and reduction of mortality rates. As a result, most of the health officials interviewed say the most practical approach is stratifying national malaria strategies according to region.

Countries' National Malaria Strategic Plans (NMSPs) outline their malaria goals and approach to reducing its burden, detailing planned interventions, costs and timelines. A recent report shows that less than one-third of NMSPs in sub-Saharan Africa specify that elimination is currently a targeted goal, while the majority of countries in sub-Saharan Africa are not actively implementing elimination activities and are instead focused on control efforts to reduce the national case incidence.[32]

"The policy in Zambia is to have malaria eliminated in phases," Mr. Moonga Hawela says. This means implementing vector control measures, wide distribution of bed nets and the rethinking of the use of mass drug administration for reduction of malaria in areas of high incidence, while applying it in areas where authorities believe only reservoirs of the disease remain.

Elsewhere, management of caseloads is the cornerstone of national strategy. Ghana is one country that is taking this approach. Although some parts of the country have low caseload levels and have the capacity to get to the level of pre-elimination, others are at a less advanced phase, adds Dr Felicia Owusu-Antwi.

Considering the approach countries in the region would need to take to eliminate malaria by 2030, Dr Felicia Owusu-Antwi observed that the extension of both preventive actions and better case management will be required. In particular, coverage of interventions needs to be extended across countries.

"If you have interventions where coverage is not optimal, you need to sustain them and scale them up," she adds. This includes monitoring areas of insecticide resistance and ensuring that bed nets are used consistently. It also requires health officials to educate communities about potential risks from areas of stagnant water, especially important in a country where illegal mining is common. "The behavioural challenge is a big one. We know the organism breeds in certain environments, so you have to make sure there is containment. Education on environmental action is something we really need to do moving forward." Climate change is an additional factor that is making it difficult to do logistical planning for vector control.

In Uganda, which accounts for 5% of all malaria cases worldwide, the government launched a new malaria strategy plan in March 2020, shortly before the Covid-19 pandemic lockdown. The plan notes that malaria transmission in the country is heterogeneous and cannot be effectively addressed through a "one-size-fits-all" approach. It divides the

[32] Alegana VA, Okiro EA, Snow, RW. Routine data for malaria morbidity estimation in Africa: challenges and prospects. *BMC Medicine*. 2020;18(1):121.

country into two tiers, one concentrating on burden reduction and one moving towards "pre-elimination," according to Dr Daniel Kyabayinze.

In areas in the first tier – which accounts for nearly half of the country - the prevalence of malaria is less than 5% and the use of high-sensitivity RDTs is being ramped up to try to identify hot spots of the disease still remaining. Although regular RDTs and microscopy continue to be used to test for malaria, both have been found to have high rates of false-negative results and, in the case of microscopy, cannot always meet time constraints for obtaining a quick diagnosis. By contrast, high sensitivity RDTs are designed to detect low-density, asymptomatic malaria infections in populations, such as pregnant women, where they might not otherwise be identified.

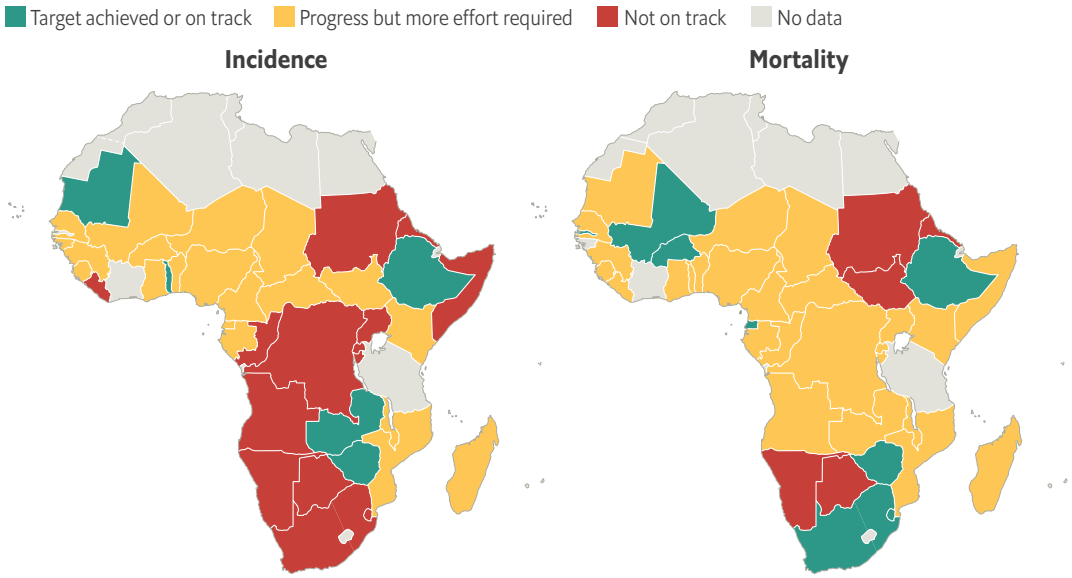
Elsewhere in Uganda, where the overall prevalence of malaria is 9% but can be as high as 27% in some areas, the government is focusing on case management. Health officials have also stepped up surveillance of urban and western areas of the country. Overall, Dr Daniel Kyabayinze identified several key steps to moving towards the elimination of malaria in Uganda by 2030: full enactment of the new strategic plan; stratification of the country in terms of intervention targets to tailor actions to the needs of individual areas; mobilisation of additional resources and mass efforts to reduce malaria at the community level.

Staying on track

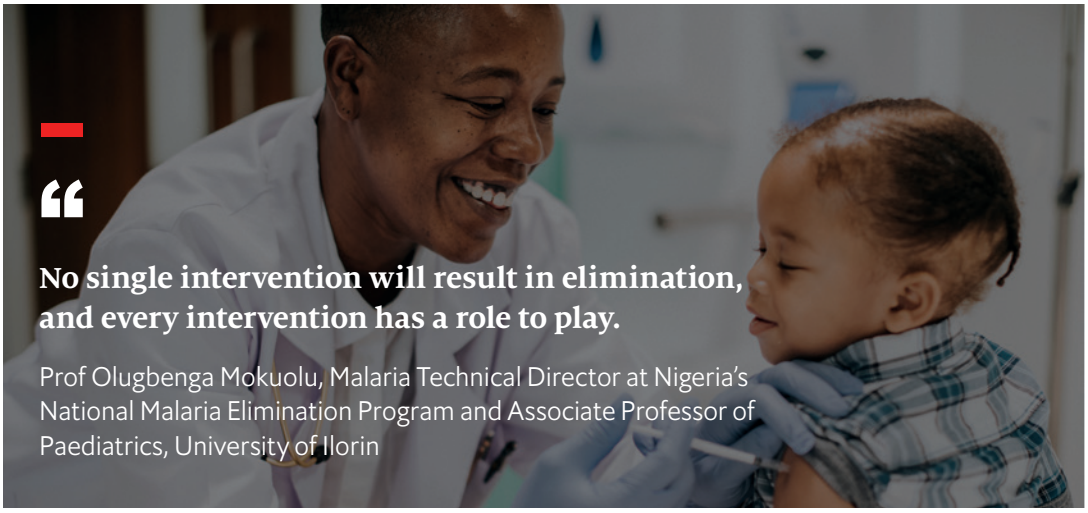
Zimbabwe is one of the few countries in sub-Saharan Africa that is on track to meet the WHO's GTS 2020 milestones of reducing case incidence and mortality by at least 40% by 2020 (compared with 2015). Zimbabwe's Malaria Strategic Plan 2016-2020 outlines seven core intervention areas which contributed to this achievement: vector control; malaria case management;

> **Diagnostics are key to case management—there is no way we can measure combined interventions if we can't adequately diagnose malaria.**
>
> Dr Daniel Kyabayinze, Epidemiologist / Study Coordinator at FIND (Foundation for Innovative New Diagnostics), Kampala, Uganda

Figure 6: On track to reduce malaria case incidence and mortality rates by ≥40% by 2020 (vs 2015)



Source: The Economist Intelligence Unit.



malaria in pregnancy (including IPTp); social and behavioural change communication; surveillance, monitoring, evaluation and operational research; malaria elimination; and partnerships coordination, integrations and program management.

In order to optimize the implementation of malaria interventions, Zimbabwe has also stratified its districts, classifying almost half of its 63 districts as elimination districts. This stratification enables the country to employ different strategies in the elimination and control districts of the country, including buffer districts which are between the two.

Zimbabwe's recent progress has been attributed to both this stratification and their multi-pronged approach. Experts interviewed, agree that it is not one single intervention or effort that is needed but a whole package approach to malaria control and elimination.

Nigeria, one of many countries not on track to meet WHO's GTS milestones for 2020, has the highest malaria prevalence in sub-Saharan Africa. The country has struggled with a number of challenges: low rates of ITN ownership and use; pockets of widespread insecticide resistance; inadequate healthcare infrastructure particularly in rural areas; poverty leading to poorly constructed rural dwellings; and security challenges in conflict regions of the country.

The national malaria program has sought to balance locally targeted interventions, such as the deployment of ITNs that are specifically suited to individual parts of the country, with centralisation of surveillance through its National Malaria Data Repository. But like elsewhere, "the funding gap is the major challenge in Nigeria" notes Prof Olugbenga Mokuolu, adding that over the past five years, the antimalarial program was only able to cover two-thirds of the country.

Conclusion

Countries in sub-Saharan Africa have made significant progress in reducing the burden of malaria on their populations since the turn of the millennium. However, this progress has worryingly slowed over the last five years. While a small number of countries are on track to eliminate malaria within the next ten years, many governments are still focusing on the interim goal of reducing deaths and improving case management in order to move toward pre-elimination. Most will need broader, sustainable investment in antimalarial programs and health systems, to get them there.

The impact of the Covid-19 pandemic and the dislocation it has caused to health systems and donor budgets is likely to leave many countries in sub-Saharan Africa playing catch-up in their efforts to achieve strategic goals related to the disease. The pandemic has further illustrated the need for high-quality surveillance systems in dealing with infectious diseases, something that is distinctly lacking in the fight against malaria in sub-Saharan Africa.

Health officials interviewed for this paper are pragmatic about the next steps. They acknowledge the absence of a one-size-fits-all plan that can be applied across countries, or even across regions within countries. Instead, most countries with affected areas are likely to see several policy "tracks" running concurrently. These "tracks" will be best served if they are informed by high-quality and timely malaria data surveillance. Utilising digital platforms and mobile technologies to map, track, prevent and treat malaria outbreaks in real-time is a promising means to reinvigorate progress on the path to eliminating malaria.

However, these data systems will require substantial investment, which has been an immense challenge for malaria programs in sub-Saharan Africa. The current annual global expenditure for malaria is $4.3 billion, $2.1 billion short of what is needed to meet the goals of WHO's GTS. Accelerating progress will depend on mobilising additional resources, especially from domestic sources. While the investment is significant, the returns will be even greater.

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