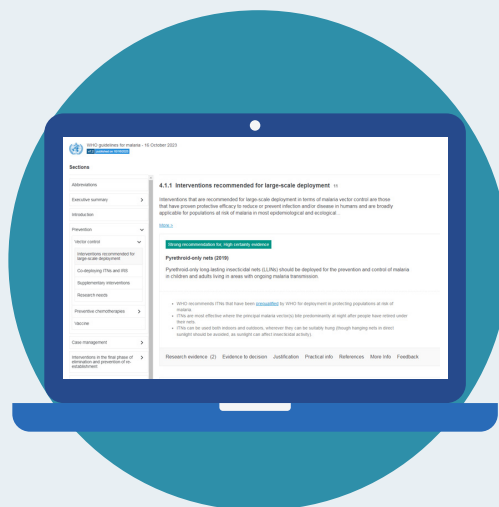


Malaria Ministerial Conference: “Tackling malaria in countries hardest hit by the disease”

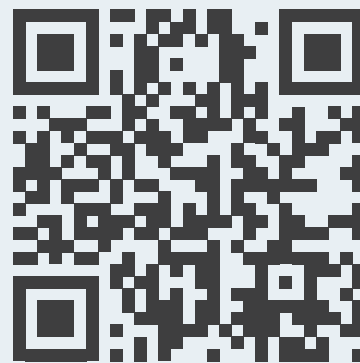
Yaoundé, Cameroon, 6 March 2024

Technical briefs

WHO's consolidated malaria guidelines



MAGICapp

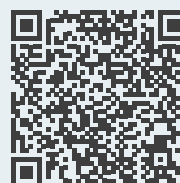


iOS



Malaria Toolkit app

Android



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Malaria in the broader context of primary health care

Background

Malaria is a disease that disproportionately affects the socioeconomically disadvantaged, with infants and young children suffering the greatest mortality. Socioeconomic inequalities in the malaria burden call for a response that improves equitable access to health services and addresses the disparities related to poverty and other forms of social disadvantage.

Primary health care (PHC) is the most equitable, efficient and effective strategy to enhance the health of populations. PHC has been shown to narrow the gap in health outcomes between socially advantaged and disadvantaged populations. It is rooted in a commitment to social justice, equity and participation and based on the recognition that the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.

Governments are responsible for making quality essential health services available and accessible. While the delivery of high quality and safe primary care is critical to a PHC approach, it is not sufficient. Multisectoral policies and actions, empowered people and communities and essential public health functions are also required.

WHO response

To accelerate progress towards the goal of universal health coverage, WHO is working with countries to reorient health systems towards primary health care – an approach that can help deliver 90% of essential health services while saving 60 million lives by 2030.

Primary health care is a whole-of-society approach to strengthen national health systems. It has 3 components, all of which are critically important for getting the malaria response back on track:

- integrated and comprehensive health care to meet people's health needs throughout their lives;
- addressing the broader determinants of health through evidence-informed policies and actions across all sectors;

- empowering individuals, families and communities to optimize their health, shape health services and advocate for policies that protect health and well-being.

Malaria and PHC

By reorienting health systems towards PHC we can ensure that:

- people suffering from malaria can receive quality health care, close to where they live and work;
- communities are fully engaged in the malaria response as care seekers, care providers and in addressing the local factors that increase malaria risk and transmission;
- there is an appropriate focus and action on underlying determinants of malaria such as education, environment, poverty and gender;
- all malaria control interventions are included in universal health coverage (UHC) packages that benefit from financial protection through health insurance or other health financing schemes.

Controlling malaria and other vector-borne diseases through indoor residual spraying

Background

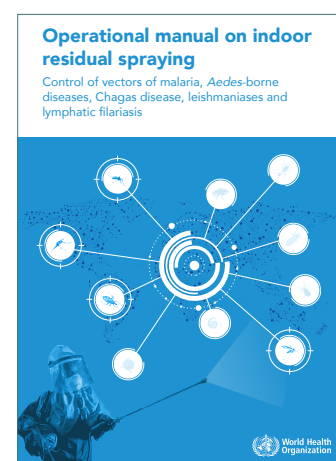
To prevent malaria, WHO recommends 2 vector control interventions for large-scale use: insecticide-treated nets (ITNs) and indoor residual spraying (IRS). For IRS, insecticides are sprayed inside homes and other buildings where disease-transmitting insects are likely to rest. IRS has been widely used to kill malaria-carrying *Anopheles* mosquitoes, but it can also be applied to kill insects that transmit other diseases, such as dengue, Chikungunya, yellow fever, Zika virus disease, leishmaniasis and Chagas disease.

Many factors influence the effectiveness of IRS such as mosquito resistance to insecticides, the timing of insecticide spraying, and the level of training of spray operators, which can impact the quality of spraying.

WHO guidance

The repurposing of insecticides for use in IRS and the development of new insecticides has increased the number of resistance management options available to national malaria control programmes. WHO expanded its [recommendation for IRS](#) to include neonicotinoid insecticides in 2017 and broflanimide in 2023. WHO has also [prequalified a number of IRS products](#) using these new insecticides, ensuring they meet global standards of quality, safety and efficacy.

Recognizing that IRS can be used to control multiple diseases, and with a view to supporting disease control integration, WHO recently published an updated [Operational manual on indoor residual spraying](#) with an expanded scope that includes both malaria and other vector-borne diseases. This updated manual is in line with the [Global vector control response 2017–2030](#), a WHO strategy aimed at strengthening vector control worldwide through integrated action across sectors and diseases, among other measures.



Challenges and opportunities


New IRS products, like new types of nets, may be more expensive than the ones in current use. The introduction of these products requires prioritization of available resources, with the aim of achieving optimal coverage and impact with the most appropriate intervention. To support this complex process, mathematical models may be used to explore the

trade-offs between applying vector control interventions compared to other malaria prevention interventions.

To provide user-friendly prioritization support within vector control, a web-based tool has been created for one of the available models (<https://mint.dide.ic.ac.uk/>). On request, WHO and partners are available to support national malaria programmes in prioritization analyses.

WHO's new operational manual notes that successful IRS campaigns require a high level of political commitment with dedicated human, logistical and financial resources. Adequate health system capacity is essential to ensure that the spray application is well timed, of good quality and of sufficiently high coverage. The engagement of community leadership and the acceptance of spray operations by local residents are also key to success.

Video: new WHO operational manual on IRS



The cover of the WHO Operational manual for indoor residual spraying features four circular icons at the top representing different types of mosquitoes. The title 'Operational manual for indoor residual spraying' is prominently displayed. Below the title is a diagram showing a central circle connected to several smaller circles, with a person in protective gear spraying a wall. The WHO logo is visible in the bottom right corner of the cover.

- ✓ 1. Establish and manage
- ✓ 2. Plan and prepare
- ✓ 3. Implement
- ✓ 4. Monitor, evaluate and review

[View video](#)



Combating insecticide resistance with new types of nets

Background

Since 2005, over 2 billion insecticide-treated nets (ITNs) have been distributed worldwide to prevent malaria. Most of these nets were treated with only one insecticide class: pyrethroids. However, as mosquitoes in many areas are now resistant to pyrethroids, nets treated with other active ingredients are needed to control malaria.

According to the [World malaria report](#), the emergence and wide geographic spread of pyrethroid resistance among malaria-transmitting mosquitoes is the most recognized threat to the effectiveness of ITNs. Other threats to this key prevention tool include insufficient access; challenges related to the physical and chemical durability of nets; and the changing behavior of mosquitoes in which they are adapting to avoid ITNs by, for example, biting early before people go to bed, or spending more time resting outdoors.

WHO guidance

In 2017, WHO recommended the first new type of ITN that combines a pyrethroid with the synergist piperonyl-butoxide (PBO), a chemical that enhances the potency of pyrethroids against resistant mosquitoes. In March 2023, WHO published new recommendations for two types of dual active ingredient nets that, for the first time, use 2 ingredients with different modes of action:

- **Pyrethroid-chlorfenapyr nets** combine a pyrethroid and a pyrrole insecticide to enhance the killing effect of the net.
- **Pyrethroid-pyriproxyfen nets** combine a pyrethroid with an insect growth regulator (IGR); the IGR disrupts mosquito growth and reproduction.

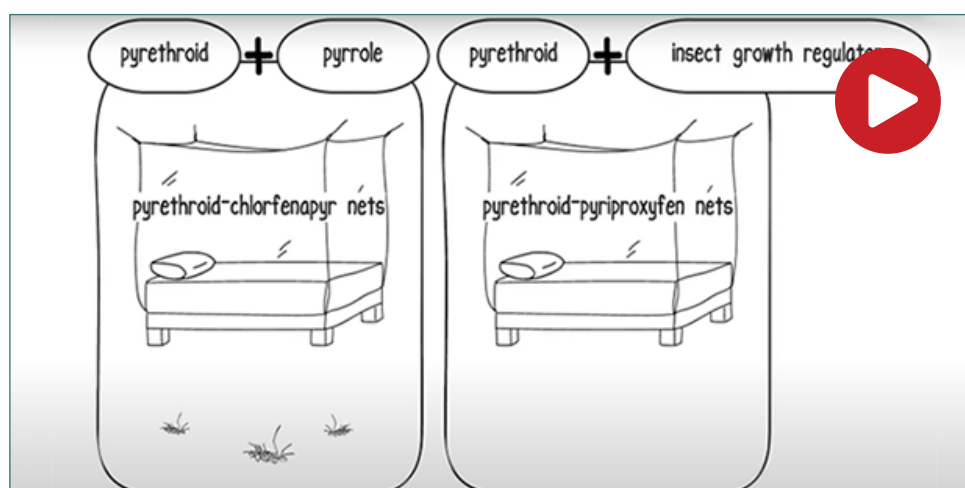
These new types of nets were designed to have a greater impact against pyrethroid-resistant mosquitoes, but they are not equally effective. National malaria programmes are encouraged to refer to the specific [WHO recommendations](#) on newly recommended nets and to use locally adapted cost-effectiveness estimates to guide their decision-making.

Challenges and opportunities

New types of nets are more expensive than pyrethroid-only nets. The transition to these and other new types of vector control interventions requires the prioritization of available resources, with the aim of achieving optimal coverage and impact.

A large volume of data and mathematical models are now available to estimate cost-effectiveness and to support countries in the selection of ITNs and other vector control interventions. A web-based tool has been created for one of these models, with a view to facilitating in-country prioritization discussions on vector control (<https://mint.dide.ic.ac.uk/>). On request, WHO and partners are available to support national programmes in applying these tools.

Video: WHO's 2023 recommendations on new types of ITNs



[View video](#)



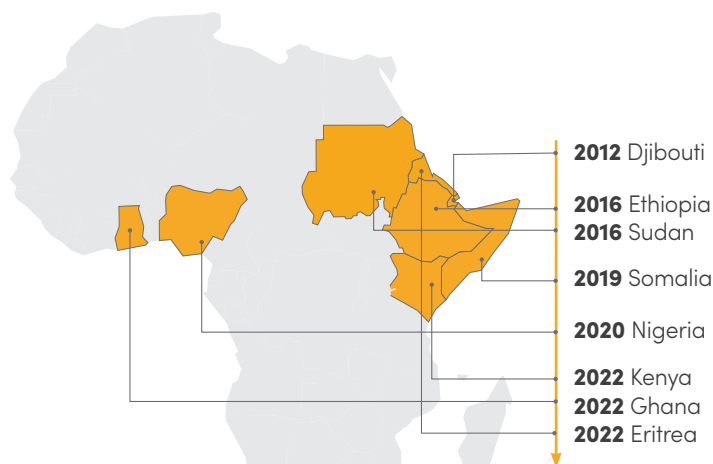
Stopping the spread of *Anopheles stephensi* in Africa

Background

Anopheles stephensi is a mosquito species that is capable of transmitting both *P. falciparum* and *P. vivax* malaria parasites. The vector was originally native to South Asia and parts of the Arabian Peninsula but has been expanding its range over the last decade, with detections reported, to date, in 8 African countries: Djibouti (2012), Ethiopia and Sudan (2016), Somalia (2019), Nigeria (2020) and Eritrea, Ghana and Kenya (2022).

An. stephensi has the capacity to thrive in urban and man-made environments, setting it apart from the other main mosquito vectors of malaria. It has been found to be resistant to many of the insecticides used in public health, posing an added challenge to its control.

The rapid growth of many African cities, coupled with the invasion and spread of this highly efficient and adaptable malaria vector, could undermine gains made in reducing the burden of malaria.



WHO guidance

In a [2019 vector alert](#), WHO identified the spread of *An. stephensi* as a significant threat to malaria control and elimination – particularly in Africa. An [updated vector alert](#), published in 2022, provided new data on the presence of *An. stephensi* and additional guidance for national malaria control programmes.

To support an effective regional response to *An. stephensi* on the African continent, WHO launched [an initiative](#) in September 2022 aimed at:

1. increasing collaboration;
2. strengthening surveillance;
3. improving information exchange;
4. developing guidance;
5. prioritizing research.

Challenges and opportunities

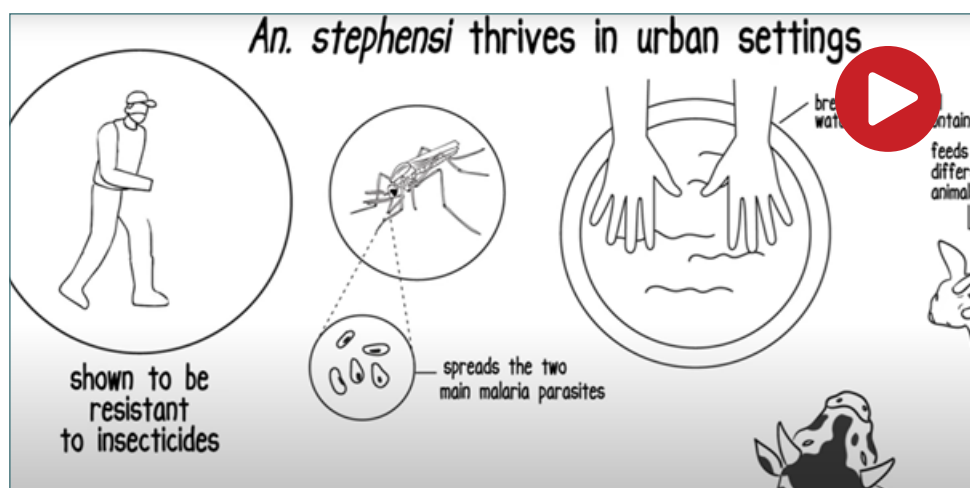
Building and maintaining an integrated response

National responses to *An. stephensi* should be part of a comprehensive response to malaria vectors, guided by the WHO *Global technical strategy for malaria 2016–2030*. The WHO *Global vector control response 2017–2030* provides a framework for investigating and implementing such integration across vector-borne diseases.

Tracking the spread of *Anopheles stephensi*

The WHO Malaria Threats Map features a dedicated section on invasive vectors, including *An. stephensi*. All confirmed reports of the presence of *An. stephensi* should be reported to WHO to enable an open sharing of data and an up-to-date understanding of the vector's distribution and spread.

Video: the spread of the *Anopheles stephensi* in Africa



[View video](#)

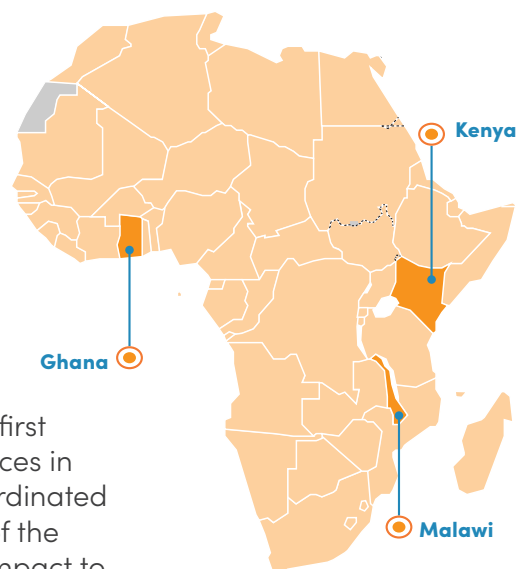


Increasing malaria prevention for young children through malaria vaccines

Background

The WHO African Region shoulders the heaviest burden of malaria globally, comprising 94% of cases and 95% of deaths in 2022. Children under the age of 5 are particularly vulnerable, with nearly half a million African children dying from malaria each year.

In 2021, WHO recommended the first malaria vaccine, RTS,S/AS01, to prevent malaria in children. More than 2 million children were reached with the first malaria vaccine through routine immunization services in Ghana, Kenya and Malawi as part of the WHO-coordinated pilot programme (2019–2023). The pilot evaluation of the public health use of the vaccine shows substantial impact to reduce malaria illness and deaths.



In October 2023 [WHO recommended](#) a second safe and effective malaria vaccine, R21–Matrix–M. Both vaccines act against *P. falciparum*, the deadliest malaria parasite globally and the most prevalent in Africa. The availability of 2 recommended malaria vaccines will resolve supply constraints. Wide implementation of malaria vaccines is expected to save tens of thousands of lives each year.

WHO guidance

WHO recommends both the RTS,S/AS01 and R21/Matrix–M vaccines to prevent malaria in children, prioritizing areas of moderate and high transmission. The 4-dose malaria vaccine should be provided starting from around 5 months of age.

Malaria vaccines should be introduced in the context of national malaria control plans, which include a mix of interventions to achieve highest impact.

Opportunity

Wider deployment of life-saving malaria vaccine is a major step forward for child health and stronger malaria control: pilot introductions resulted in a 13% vaccine-attributable drop in mortality among children age-eligible for vaccination and substantial reduction in severe malaria. Measured impact was on top of benefits due to insecticide-treated net (ITN) use and access to other child health interventions and care. Importantly, malaria vaccine introduction resulted in no reduction in ITN use, uptake of other childhood vaccines, or care-seeking behaviour for fever.

The demand for malaria vaccine is motivating caregivers to bring their children to health clinics in their second year of life. This visit provides an opportunity for the administration of any missed vaccinations or other essential child health interventions, including the distribution of ITNs and growth monitoring.

Next steps

Demand for malaria vaccines is unprecedented. Twenty countries have been approved by Gavi, the Vaccine Alliance, for malaria vaccine introduction support. Cameroon and Burkina Faso launched the RTS,S vaccine into their routine immunization programmes as part of national malaria control plans early this year, with additional countries to start introductions in the coming months. More countries are expected to apply for Gavi support to deploy malaria vaccine.

Addressing challenges to the effectiveness of rapid diagnostic tests

Background

Access to accurate and timely diagnosis is critical to preventing a malaria infection from progressing to severe illness and death. For prompt diagnosis of malaria, WHO recommends quality-assured microscopy or the use of rapid diagnostic tests (RDTs), particularly in areas where microscopy services are not readily available.

In the case of *P. falciparum* – the deadliest malaria parasite globally – RDTs are normally designed to target a protein (or antigen) called histidine rich protein 2 (or HRP2) in a patient's blood. The vast majority of RDTs manufactured and used around the world are based on the detection of HRP2 either alone or in combination with other antigens.

In some areas, however, parasites with genetic mutations do not express the HRP2 protein; as a consequence, these parasites cannot be detected by HRP2-based RDTs, presenting a major threat to accurate and timely diagnosis and treatment.

To date, deletions of the HRP2 gene have been reported in at least 40 countries, mainly in Africa and South America. In some countries across the Horn of Africa, surveys have found the prevalence of these mutated parasites to be as high as 80%, signaling that HRP2-based RDTs may miss the great majority of *P. falciparum* malaria cases.

WHO guidance

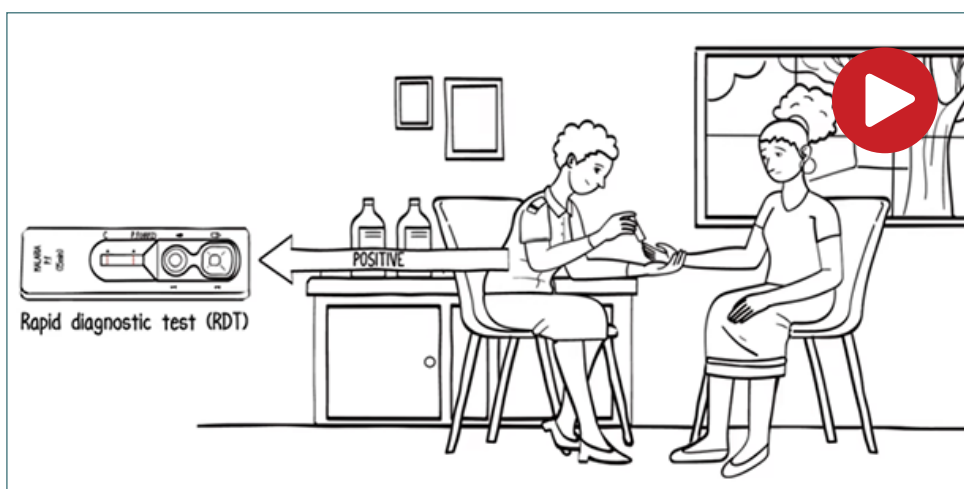
WHO has produced a number of resources to support countries in addressing this issue, including guidance on how and when to investigate suspected HRP2 gene deletions. National responses should be tailored to the local context.

According to WHO guidance, if the percentage of false negative RDT results due to HRP2 gene deletions exceeds 5%, countries should switch to an RDT that is not exclusively based on HRP2 detection. However, alternative options are limited, and procurement requires expertise and advanced planning. More investments and research are needed to develop new diagnostic tests.

Challenges and opportunities

WHO has been tracking published reports of HRP2 deletions and posting them on the [Malaria Threats Map](#) platform to help inform where surveillance activities are being conducted, identify areas that should be prioritized, and provide a global picture of how this threat is evolving over time. In collaboration with multiple stakeholders, WHO is also working with test developers and RDT manufacturers to improve the performance of malaria diagnostic tests that target alternative antigens (such as pLDH-based tests) and to identify new target antigens.

Video: addressing the issue of HRP2 gene deletions



[View video](#)



Preventing malaria in pregnancy

Background

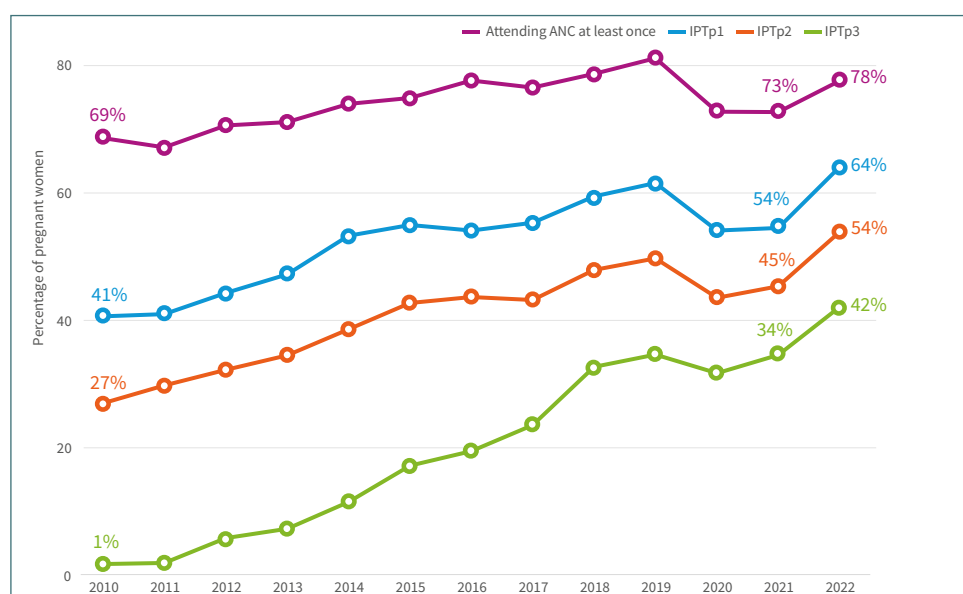
Malaria infection in pregnancy poses substantial risks not only to the mother, but also to her fetus and the newborn. Left untreated, it can lead to death, anemia and low birth weight – a major cause of infant mortality.

To protect pregnant women, WHO recommends a three-pronged approach: sleeping under insecticide-treated mosquito nets; providing intermittent preventive treatment in pregnancy with quality-assured sulfadoxine-pyrimethamine (IPTp-SP) for pregnant women of all gravidities living in malaria-endemic areas; and prompt treatment with effective antimalarial medicines following a confirmed diagnosis.

There is a wide body of evidence underpinning WHO's recommendation of IPTp-SP as a safe and effective strategy for preventing malaria in pregnancy. Studies have shown that SP is generally very well tolerated and that side effects are mild and transient.

While coverage of IPTp-SP has increased steadily in sub-Saharan Africa in recent years, an estimated 58% of pregnant women in the region were still not benefiting from the recommended 3 or more doses of this critical protective intervention in 2022. In countries with a high burden of malaria infection, IPTp-SP lags noticeably behind other malaria control measures.

Percentage of pregnant women attending an ANC clinic at least once and receiving IPTp, by number of doses, in sub-Saharan Africa, 2010–2022



WHO guidance

IPTp-SP is a long-standing WHO recommendation. In updated guidance, published in June 2022, WHO reaffirmed its strong recommendation for the use of IPTp-SP among pregnant women living in malaria-endemic areas. The updated recommendation differs from the original recommendation in 2 important ways:

- **Delivery method:** the recommendation does not limit the delivery of IPTp-SP to antenatal care (ANC) settings; where inequities in ANC services and reach exist, other delivery methods, such as the use of community health workers, may be explored, while ensuring that ANC attendance is maintained and underlying inequities in ANC delivery are addressed.
- **Pregnancy:** while IPTp was previously recommended only during a woman's first and second pregnancies, it is now recommended for all pregnant women regardless of the number of pregnancies.

Challenges and opportunities

Barriers to accessing IPTp-SP include the long distances that many pregnant women must travel to reach antenatal clinics, as well as related transportation costs. Those who reach health facilities may have difficulties in accessing IPTp due to stock-outs of the preventive medicine or insufficient information provided by health workers.

A new [WHO field guide](#), published in January 2024, aims to overcome these challenges through a community-based delivery approach (c-IPTp), complementing the deployment of IPTp-SP at antenatal care clinics. The deployment and scale-up of c-IPTp in multiple high burden countries of Africa has shown an increase in the uptake of 3 doses of IPTp among eligible pregnant women without reducing the number of ANC visits. The field guide draws on best practices and lessons learned from pilot implementation experiences in 8 African countries and targets a range of stakeholders.



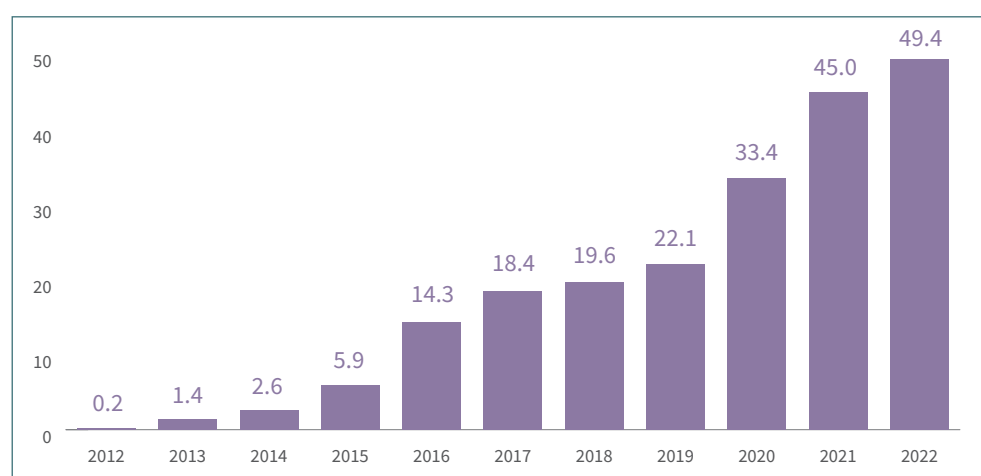
Preventing malaria in children through seasonal malaria chemoprevention

Background

Seasonal malaria chemoprevention (SMC) is a preventive therapy recommended for children at high risk of severe malaria living in areas where malaria is seasonal, and where most cases occur over a short period during the rainy season. It involves the monthly administration of antimalarial medicines, usually sulfadoxine–pyrimethamine plus amodiaquine (SP+AQ), for 3 to 5 months depending on the length of both the rainy season and malaria transmission season.

SMC is known to be a safe, effective and cost-effective strategy for reducing the disease burden and saving lives. It complements other malaria control interventions, such as vector control, prompt diagnosis and treatment of malaria cases. To date, 17 countries in sub-Saharan Africa have implemented SMC, and the average number of children treated per cycle of SMC has steadily increased from about 0.2 million in 2012 to 49 million in 2022.

Average number of children treated with at least one dose of SMC by year in 17 African countries, 2012–2022



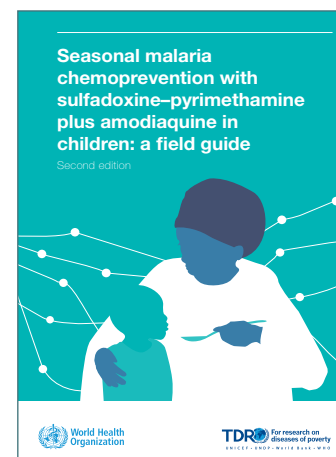
WHO guidance

WHO's [updated recommendations on SMC](#), published in June 2022, are less restrictive than the original 2012 guidance. For example, while the original WHO guidance limited SMC use to the Sahel subregion of Africa, the updated recommendation recognizes that countries in other parts of Africa with highly seasonal malaria could also benefit from this intervention with appropriate medicines during peak transmission season.

In addition, the updated recommendations target children at high risk of severe malaria without specifying age groups, transmission intensity thresholds, numbers of doses or cycles, or specific drugs. As such, they will support the broader use of chemoprevention among young children in areas with seasonal transmission.

In May 2023, WHO published an [updated field guide on seasonal malaria chemoprevention](#), building on the experience of more than 10 years of SMC deployment and reflecting changes introduced in the consolidated [WHO guidelines for malaria](#) in 2022.

The field guide shares best practices to improve SMC implementation, coverage, and monitoring and evaluation. Examples of materials and tools as well as links to resources are included to support managers and health workers in their efforts to conduct successful SMC activities and prevent malaria among vulnerable children.



Challenges and opportunities

While WHO has recommended SMC since 2012, the strategy has yet to reach its full potential in preventing disease and death. Funding remains the main limitation to full deployment and coverage of this highly cost-effective intervention.

Video: WHO recommendations on SMC



[View video](#)



Tackling antimalarial drug resistance in Africa

Background

Artemisinin-based combination therapy (ACT) is the mainstay of malaria care in Africa, where the disease is by far the most prevalent. The treatment, introduced in the early 2000s, has played a major role in lowering the burden of malaria over the last 2 decades.

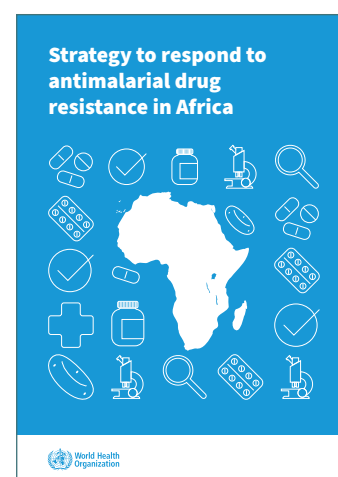
In recent years, however, WHO has been concerned by reports of emerging drug-resistant malaria in Africa. Parasites in some areas have developed partial resistance to artemisinin – the core compound of ACTs – and there are worrying signs that parasites are becoming less sensitive to other drugs that are commonly partnered with artemisinin derivatives.

Given the heavy reliance on ACTs in Africa, high rates of treatment failure could have very serious consequences. Vigorous measures are needed to protect their efficacy.

WHO guidance

In November 2022, [WHO launched a strategy](#) to respond to the urgent problem of antimalarial drug resistance in Africa. The new WHO strategy builds on lessons learned from past global plans and complements existing strategies, including broader efforts to respond to antimicrobial resistance. It aims to minimize the threat and impact of antimalarial drug resistance in Africa through 4 pillars:

- strengthen surveillance of antimalarial drug efficacy and resistance;
- optimize 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 to develop new tools against antimalarial drug resistance.



All of these interventions require strong health systems and investments in primary health care, which are the backbone of any successful response to malaria.

Interventions should be tailored to the local context. Countries should undertake an initial assessment to identify the main factors that drive the emergence and spread of antimalarial drug resistance and to prioritize interventions for an effective response.

Challenges and opportunities

Although antimalarial drug resistance is a serious cause for concern, ACTs remain the best available treatment for uncomplicated *P. falciparum* malaria. Mitigating the risk of resistance to antimalarials will require diversifying the ACT market and including a broader portfolio of ACTs in national policies. Health care providers should continue to prescribe and use ACTs to treat confirmed cases of malaria.

In South-East Asia, the malaria burden has been reduced and elimination of *P. falciparum* is within reach in countries where high levels of both artemisinin partial resistance and ACT partner drug resistance have posed a challenge. This has been achieved through stronger surveillance of antimalarial drug resistance and efficacy, better access to and quality of case management, and investing in all available interventions to lower malaria transmission.

Malaria and climate change

Background

Climate change is recognized as one of the biggest threats and challenges to human health and well-being. As many as 3.6 billion people already live in areas that are highly susceptible to climate change, and vulnerable groups – such as women, children, ethnic minorities, poor communities and migrants – are particularly hard hit.

Rising temperatures and changes in precipitation patterns are altering vector breeding habitats and parasite development, changing the geographical distribution as well as the the risk of transmission of malaria, among other diseases.

In a number of countries, extreme weather events, such as flooding, have led to significant increases in malaria transmission. Such events are predicted to become more frequent as a result of climate change.

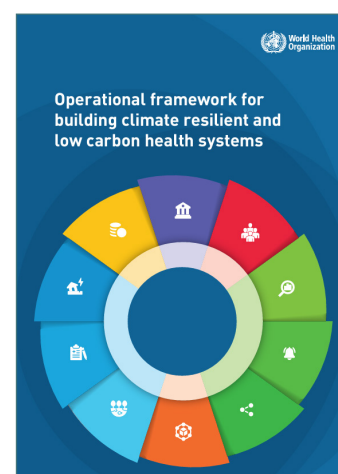
In addition to its direct effects, climate change undermines many of the social determinants of good health, such as livelihoods, security and nutrition, all of which indirectly impact on malaria. Health service disruptions make it more difficult to effectively respond to the disease, particularly for vulnerable and displaced populations.



WHO guidance

Implementing low carbon health practices is expected to contribute to climate change mitigation while also improving health outcomes. In November 2023, WHO published an [operational framework](#) on the design of transformative health systems that can provide safe and quality care in a changing climate.

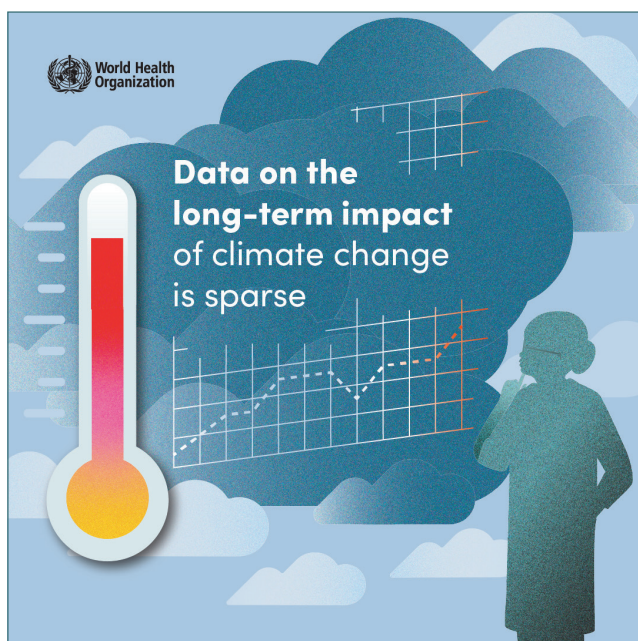
WHO's [World malaria report 2023](#) presented, for the first time, available evidence on the intersection between malaria and climate. It offers a series of proposals to help countries and their development partners detect, prepare for, respond to, and recover from short-term climate-related threats to malaria while also adapting to the longer-term impacts of climate change.



Although it is unequivocal that climate change affects human health, accurately estimating the scale and impact of many climate-sensitive health risks remains a challenge. Later this year, WHO will convene a virtual Technical Expert Group to review available evidence and establish a common position on the effects of climate on malaria. The advisory group will review data on the long-term impact of climate change on malaria transmission to better understand the direction and magnitude of the impacts across social and ecological systems, both within and between countries.

Challenges and opportunities

Sustainable and resilient malaria responses are needed now more than ever, coupled with urgent actions to slow the pace of global warming and reduce its effects. The complex and diverse nature of malaria, coupled with major research gaps, calls for multidisciplinary efforts to predict, prepare and respond to evolving epidemiological patterns under climate change.



World malaria report 2023 briefing kits

