



R&D for Malaria

How new tools can transform the fight

About half of the world's population is at risk of malaria—a life-threatening mosquito-borne disease that devastates communities and countries. In 2017, there were an estimated 219 million cases of malaria in 87 countries that claimed the lives of approximately 435,000 people—61% of whom were young children. Despite gains that have been made over the past two decades in expanding access to malaria prevention tools and treatments, challenges such as drug and insecticide resistance continue to hamper control efforts. Unfortunately, 2017 marked the second consecutive year that malaria cases have increased—indicating progress against the disease has stalled and underscoring the urgent need for new solutions. To eradicate malaria, we need new treatments, vaccines, diagnostics, and vector control technologies.



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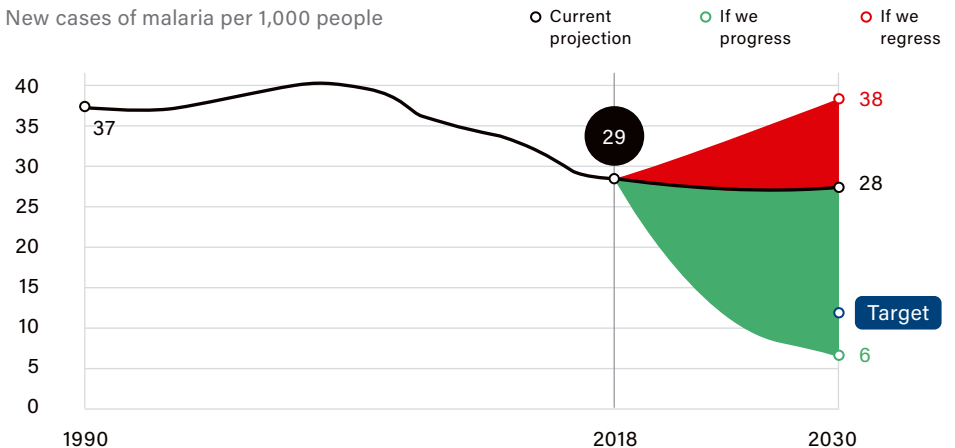
Research successes

Technologies have transformed the fight against malaria:

- **Vector control tools**, including **insecticide-treated bednets and indoor residual spraying**, have driven dramatic declines in malaria. These two tools are responsible for an estimated 78% of malaria cases averted between 2000 and 2015.
- **Artemisinin-based combination therapies (ACTs)**, first developed in the 1990s, have become the gold standard treatment and have helped contribute to a 62% decline in malaria mortality between 2000 and 2015.
- The world's **first malaria vaccine**, RTS,S, which provides partial protection in young children, began pilot implementation in parts of three sub-Saharan African countries in 2019. Several US agencies supported its development.
- Tafenoquine, a **single-dose medicine** to prevent the relapse of *Plasmodium vivax* malaria, which was developed with support from USAID and DoD, was approved in 2018—becoming the first new treatment for this indication in more than 60 years. A companion point-of-care **diagnostic test** to guide its use was approved in 2019.
- A **child-friendly malaria medicine**, Coartem® *Dispersible*, developed with support from USAID, has saved an estimated 825,000 child lives since its launch in 2009.

Continued progress is possible, not inevitable

New cases of malaria per 1,000 people



Key missing tools

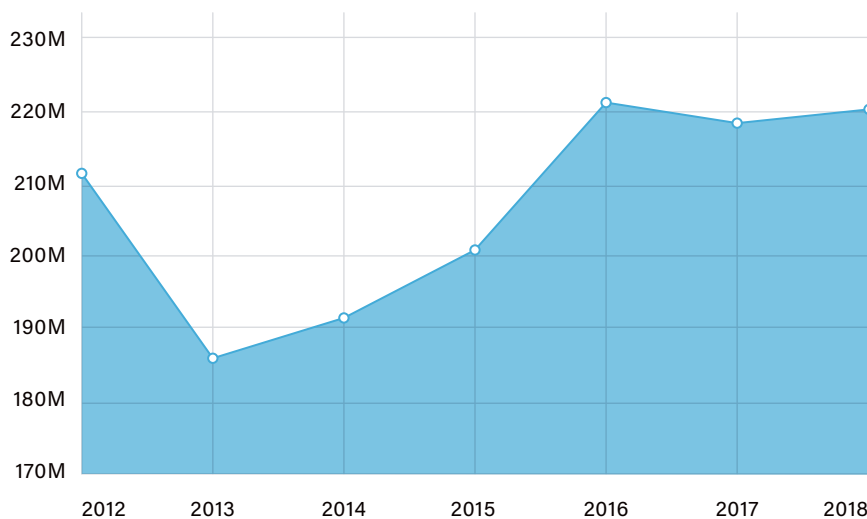
To end malaria, we need new prevention and treatment tools including:

- **New vector control tools**, including new insecticides for use in interventions like bednets and indoor residual spraying to address growing insecticide resistance, and biological control methods, like gene drives, to reduce mosquito populations and block parasite transmission.
- **New treatments** for infections that have become resistant to currently available drugs including ACTs, as well as treatments to block transmission and to protect vulnerable populations like children and pregnant women.
- A **single-dose cure** for *Plasmodium falciparum* infection, the most severe form of malaria, that will be easier and faster to administer and prevent the emergence of drug resistance.
- Improved, more sensitive **rapid diagnostic tests** that are suitable for use in low-resource settings and that can detect all species of malaria equally well, for early, accurate diagnosis and effective surveillance.
- **Next generation malaria vaccines** with longer duration and/or increased efficacy, including vaccines that prevent infection or block human to mosquito transmission of the malaria parasite.

Breakthroughs on the brink

- Several **long-acting injectable malaria prevention drugs** are under development, including one supported by NIH, which uses nanotechnology to intravenously deliver existing antimalarials that confer protection against the disease for weeks or months. This technology could simplify and improve malaria prevention by eliminating the need for daily pills.
- An experimental **single-dose cure** for *Plasmodium falciparum* malaria, DSM265, developed with support from USAID, has shown promise in an early-stage field trial, curing patients with just one dose.
- More than a dozen **malaria vaccine candidates** are in late-stage clinical development, including candidates supported by NIH, DoD, and USAID.
- A promising vector control tool called **Attractive Targeted Sugar Bait** is undergoing trials in three countries. The brand-new product class, which uses plant sugars to attract mosquitoes combined with an ingestible toxin that kills them but is safe to humans, is being developed to address the growing threat of outdoor biting by mosquitoes.
- A first-of-its-kind **test that diagnoses malaria using a patient's saliva**, rather than blood, is now undergoing field trials. Developed with support from NIH, the test is less invasive than other methods, delivers results in 5 to 20 minutes at point of care, and can detect the disease before patients even show symptoms.

US government investment in malaria R&D (in 2018) US\$ millions



US Government R&D efforts

The US government is leading efforts to advance research and development (R&D) to combat malaria through a whole-of-government approach:

- **National Institutes of Health** conducts basic and clinical research for new treatments, vaccines, diagnostics, and vector control products.
- **Department of Defense** undertakes research to protect US service members against malaria—the leading infectious disease threat to US service members abroad—including drug, vaccine, and vector control research.
- **US Agency for International Development** leads the interagency President's Malaria Initiative (PMI) and supports the development of new vaccines, antimalarials, insecticides, and novel vector control tools for low-resource settings.
- **Centers for Disease Control and Prevention**, which jointly implements PMI, conducts surveillance and monitoring research, as well as develops and evaluates malaria control interventions such as bednets and other tools to improve public health efforts.
- **Food and Drug Administration** administers the Tropical Disease Priority Review Voucher Program to incentivize investment in products for neglected diseases, including malaria.

