

CDC's Malaria Research



The Intermittent Mass Screening and Treatment (iMSaT) team attends barazas (community meetings organized by the village chief) to explain iMSaT, test the people who attend, and treat those who are infected.

For more than 60 years, the Centers for Disease Control and Prevention (CDC) has been a leader in the fight against malaria since successfully eliminating it in the United States. Building on that success, CDC experts continue to develop and evaluate malaria control interventions to reduce malaria illness and death and ultimately to eliminate malaria globally. CDC's strategic research helped develop and evaluate each of the effective tools now used throughout the world to prevent and control malaria:

- Insecticide-treated bed nets (ITNs)
- Intermittent preventive treatment for pregnant women (IPTp)
- Improved management of malaria illness with rapid diagnostic tests (RDTs) and artemisinin-containing combination therapies (ACTs)
- Indoor residual spraying (IRS)

Massive scale-up of these proven interventions in the last decade has led to unprecedented gains in the fight against malaria. From 2000 to 2012, 3.3 million lives were saved globally, and malaria deaths in Africa were cut nearly in half.

The Changing Malaria Landscape Calls for New Tools and Approaches

Now, in countries with high malaria transmission where interventions have reached high levels of coverage, the number of people ill or dying from malaria has decreased. Even so, the numbers remain unacceptably high. In many places, success in controlling malaria has changed malaria transmission patterns so that some areas have almost no malaria. In addition, in much of Africa, the mosquito that transmits malaria is not killed or repelled by the insecticides being used, and in Asia, the malaria parasite is becoming resistant to artemisinin, the principal component of the combination treatments that are used to treat malaria worldwide. If the past is an indicator, resistance to these life-saving antimalarials will spread to Africa. Success and resistance are creating a malaria landscape that requires new tools and approaches.



A health worker visits a home to test residents for malaria and treat those infected.

CDC Tests New Interventions

In the last decade, currently available malaria interventions have dramatically decreased the number of deaths and cases of malaria. In some challenging areas, progress has stagnated, and malaria transmission remains high. Our current tools are threatened by the development of insecticide and drug resistance. New interventions and tools are needed to maintain the progress made and to take the next step toward eliminating malaria.

CDC helped to evaluate the RTS,S/AS01 malaria vaccine along with Kenyan scientists in Siaya, Kenya, 1 of 11 Phase III trial sites. CDC continues to collaborate on additional malaria vaccine studies in western Kenya, including developmental studies with the whole *Plasmodium falciparum* sporozoite (PfSPZ) vaccine. In addition to their impact on reducing morbidity, vaccines may represent an important tool to add to the mix of current interventions to further reduce malaria transmission.

CDC is evaluating variations of other interventions, such as mass drug administration, to stay ahead of the parasite.

CDC conducts research to develop and evaluate cutting edge tools to further malaria control efforts, saving lives and accelerating elimination where possible. In addition to the vaccine trials recent examples include:

- **Tracking and mitigating resistance:** Since 2014, CDC has been using advanced molecular detection (AMD) tools to track the spread of malaria drug resistance in blood samples from patients diagnosed and treated for malaria in the United States. This innovative approach is being shared with public health laboratories in the US, and complements on-the-ground support for drug resistance studies that CDC provides to over 30 endemic countries. Together, these approaches aid in global efforts to mitigate spread of malaria drug resistance, and helps CDC provide the most effective advice to protect Americans living, working and traveling abroad.



Surveillance, Monitoring, and Evaluation

CDC is working to determine the most efficient ways to track the progress of malaria control and elimination, identify setbacks, and respond rapidly when needed, as well as to determine how such tools can be used to measure public health impact. For example, in Zanzibar, in collaboration with the Ministry of Health and Social Welfare, CDC, as part of the President's Malaria Initiative, embarked on a public-private partnership with a telecommunications provider to develop a next-generation surveillance system that communicates in real time weekly confirmed malaria cases. If an unusual increase is detected, a rapid response is begun.

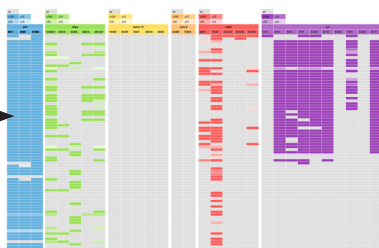
Investment in monitoring and evaluation systems not only provides the data needed to measure the impact of the U.S. Government's malaria control investments, but also builds local capacity—necessary for the long-term success of malaria control efforts. CDC has supported many public health workers to obtain advanced degrees and certificates, including PhDs and masters' degrees. Their ability to conduct research and interpret results helps provide the evidence base for programmatic decisions.

A Congressional Mandate

Recognizing CDC's strengths, Congress under the Lantos-Hyde Act directed CDC to "advise the U.S. Global Malaria Coordinator on priorities for operations and implementation research" and "on monitoring, surveillance, and evaluation activities" and "to be a key implementer of such activities." CDC fulfills this role by implementing the U.S. President's Malaria Initiative with USAID and by focusing our expertise to produce critical evidence on new tools and strategies to impact malaria globally.



Next generation sequencing



Drug resistance profile per patient

- **Malaria in pregnancy:** CDC scientists helped assess the safety of antimalarials in early pregnancy and alternative drugs and strategies for the prevention of malaria in pregnancy. These data, which were presented to the World Health Organization, have helped to shape international policy around the prevention and treatment of malaria in pregnancy, contributing to improved maternal and child outcomes.



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