CDC's Malaria Research

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 2015, 6.2 million lives were saved globally, and malaria deaths in Africa were cut by more than 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. In many places, success in controlling malaria has changed malaria transmission patterns so that some areas have almost no malaria. Even so, the numbers remain unacceptably high. However, 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. Resistance is also increasing to the only drug available for use at IPTp.

(Top) The 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. (Below) 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, but to take the next step toward eliminating malaria, new interventions are needed.

In many areas, progress has stagnated, and in some malaria transmission remains high. Our current tools are threatened by the development of insecticide and drug resistance. New interventions are needed to maintain the progress made and to take the next step towards eliminating malaria. CDC recently collaborated with scientists across Africa to test the RTS,S/AS01 malaria vaccine, which is now the first malaria vaccine proven to be efficacious in preventing malaria in African children. Currently CDC is collaborating with partners to test a different malaria vaccine in the hope of finding a highly efficacious vaccine that can prevent disease and contribute to malaria elimination.

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

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CDC is actively conducting research to develop and evaluate innovative cutting-edge tools so that malaria efforts can continue to save lives and reach the goal of elimination. Examples include iMSaT (box), as well as:

- LAMP: Development of a field-ready, point-of-care molecular diagnostic assay device based on CDC's recent work to improve detection of malaria parasite DNA. This device will be able to detect infections in healthy people who may infect mosquitoes and sustain transmission of malaria in endemic areas.

- Durable wall liners (DLs): These thin sheets treated with insecticides mimic the effect of IRS. CDC has evaluated the added benefit of DLs, when used together with ITNS, in Kenya, and will soon begin a study in Malawi. Preliminary analysis from Kenya indicated that the added benefit of DLs to ITNs was a reduction in the incidence of new malaria infections by 38% among all household members.
- Vaccine: CDC helped to evaluate a malaria candidate vaccine, RTS,S/AS01, in Siaya, Kenya, one of 11 Phase III trial sites. Over 18 months, the vaccine prevented 941 cases per 1,000 children vaccinated and 444 cases per 1,000 infants vaccinated. Vaccine effectiveness was even higher at the KEMRI/CDC site in Siaya, where transmission was more intense.
- 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 in mid-2015, have helped to shape international policy around the prevention and treatment of malaria in pregnancy, contributing to improved maternal and child outcomes.

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.

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