

## Malaria

Malaria is a life-threatening disease transmitted by mosquitoes infected with parasites of the genus *Plasmodium*. The most serious forms of the disease are caused by *Plasmodium falciparum*, which can be fatal, and *Plasmodium vivax*. Every year, malaria infects an estimated 216 million people, causing 655,000 deaths—most of them young children in sub-Saharan Africa. Malaria also poses potentially long-term health risks to pregnant women, developing fetuses, and newborn babies. With proper surveillance and care, malaria can be prevented and treated. Key tools for fighting malaria include: prompt and effective case management, treatment with artemisinin-based combination therapies (ACTs), use of insecticide-treated nets; and indoor residual insecticide spraying.

### Malaria symptoms

The malaria parasite feeds on and destroys red blood cells, which causes some of the disease's hallmark symptoms: fever, chills, sweating, shaking, body aches, and exhaustion. As more and more red blood cells are destroyed, a lack of hemoglobin in the blood can cause anemia. If not promptly treated, infected red blood cells can latch on to blood vessels, restricting blood flow to the brain, damaging other vital organs, and can be fatal. This type of severe malaria is characterized by vomiting, inability to eat or drink, and unconsciousness, and is most often caused by the *P. Falciparum parasite*.

### Geographic distribution and prevalence

Malaria disproportionately affects the poor, with 58 percent of the disease occurring in the poorest 20 percent of the world's population. It is endemic in over 100 countries worldwide, notably in sub-Saharan Africa, where 90 percent of deaths occur, mostly among young children. Malaria kills an African child every 30 seconds. In other areas of the world, malaria is less fatal, but can cause substantial morbidity and incapacitation, especially in rural areas of some countries in South America and Southeast Asia.

### OneWorld Health responds

Artemisinin-based combination therapy (ACT) is the gold standard of malaria treatment. However, the supply of plant-derived artemisinin (ART) can be unstable, resulting in shortages and high costs of ACTs. To meet this challenge, OWH formed a partnership with synthetic biology innovator, Amyris Inc., and a leading pharmaceutical company, Sanofi, to develop a semi-synthetic form of artemisinin. The synthetic biology technology is based on pioneering inventions licensed from the University of California at Berkeley and the National Research Council Plant Biotechnology Institute (Canada). The collaboration, known as the Artemisinin Project, supported by the Bill & Melinda Gates Foundation, aims to create a complementary source of non-seasonal, high-quality, and affordable ART to supplement the current botanical supply, making ACTs more accessible to the hundreds of millions of people who contract malaria each year. In 2011, after successful completion of the scientific work necessary to enable production of semi-synthetic ART, OWH announced that the Artemisinin Project has entered the production and distribution phase. Integration of semisynthetic ART into the supply chain and ACTs is expected in 2012.

#### Additional Resources:

WHO Malaria page. Available at: [www.who.int/topics/malaria/en/](http://www.who.int/topics/malaria/en/). Accessed April 5, 2012.

Centers for Disease Control and Prevention Malaria page. Available at: [www.cdc.gov/malaria/](http://www.cdc.gov/malaria/). Accessed April 5, 2012.

WHO. *World Malaria Report 2005* [Section 1]. Geneva: WHO: 2005. Available at: <http://rbm.who.int/wmr2005/html/1-1.htm>. Accessed April 5, 2012.

Barat LM, Palmer N, Basu S, Worrall E, Hanson K, Mills A. Do Malaria Control Interventions Reach the Poor? A View Through the Equity Lens. *American Journal of Tropical Medicine and Hygiene*. 2004;71(2 Suppl):174–178.



The World Health Organization (WHO) recommends using Artemisinin-based combination therapy (ACT) as a first-line treatment for uncomplicated malaria in areas experiencing resistance. Drug compounds derived from artemisinin which is extracted from the wormwood plant, *Artemisia annua*, has over a 90 percent efficacy rate.

While many countries have adopted the WHO recommendations, the supply of plant-derived artemisinin often does not meet the demands, and high cost of ACTs can create a barrier. An alternative source is needed to stabilize price volatility and alleviate shortages.

