

Malaria

Malaria is the most important of the tropical diseases, remaining widespread throughout the tropics but also occurring in many temperate regions. It exacts a heavy toll of illness and death - especially amongst children and pregnant women. It also poses a risk to travellers and immigrants, with imported cases increasing in non-endemic areas. Treatment and control have become more difficult with the spread of drug-resistant strains of parasites and insecticide-resistant strains of mosquito vectors. Health education, better case management, better control tools and concerted action are needed to limit the burden of the disease.

Distribution

Malaria exists in 100 countries but is mainly confined to poorer tropical areas of Africa, Asia and Latin America. More than 90% of malaria cases and the great majority of malaria deaths occur in tropical Africa. *Plasmodium falciparum* is the main cause of severe clinical malaria and death.



Causative agent

Single-celled protozoan parasites of the genus *Plasmodium*. Four species infect humans by entering the bloodstream.

- *P. falciparum* – found throughout tropical Africa, Asia and Latin America.
- *P. vivax* – worldwide in tropical and some temperate zones.
- *P. ovale* – mainly in tropical west Africa.
- *P. malariae* – worldwide but very patchy distribution.

Transmission



Inoculation via the bite of infected bloodfeeding female mosquitoes of the genus *Anopheles*, which transfer parasites from human to human. Male mosquitoes do not bite. In humans, parasites multiply exponentially in the liver and then in infected red blood cells. Mosquitoes ingest parasites with a bloodmeal, the parasites undergoing another reproductive phase inside the mosquito before being passed on to another human.



Symptoms

Malaria begins as a flu-like illness 8-30 days after infection. Symptoms include fever (with or without other indications such as headache, muscular aches and weakness, vomiting, diarrhoea, cough). Typical cycles of fever, shaking chills and drenching sweats may then develop. The periodicity of these cycles depends on the species of parasite, coinciding with parasite multiplication and destruction of red blood cells (RBC), which also leads to anaemia. *Falciparum* malaria may not show this cyclic pattern and can be fatal if untreated or treated with insufficiently effective drugs. Death may be due to infected RBC blocking blood vessels supplying the brain (cerebral malaria), or damage to other vital organs. In areas where the disease is highly endemic, people are infected so frequently that they develop a degree of acquired immunity and may become asymptomatic carriers of infection. Epidemics are often associated with non-immune people moving to highly-endemic areas, where they quickly succumb to infection. Epidemics and atypical increases in malaria incidence have been increasing.

GLOBAL STATUS

- **Deaths:** 1.09 million annually (due to malaria alone or in combination with other diseases - most deaths occur in children under the age of 5)

- **Cases:** 273 million clinical cases annually
- **Disease burden:** 44.99 million Disability Adjusted Life Years (DALY)
- **At risk:** Over 40% of the global population (>2.1 billion people)

Prevention & Control

Avoidance of mosquito bites and use of vector control measures to reduce mosquito transmission, such as insecticide-impregnated bednets, spraying houses with residual insecticides or environmental management to minimise potential mosquito breeding sites or to make aquatic sites unsuitable for the development of mosquito larvae. When exposure is likely, use appropriate prophylactic drugs such as chloroquine, chloroquine + proguanil, or mefloquine, doxycycline, or sulphadoxine-pyrimethamine in areas where chloroquine-resistant parasites are found. No prophylactic drug can guarantee full protection. In endemic areas, malaria control relies on diagnosis and prompt treatment of infected individuals based on clinical symptoms and microscopic diagnosis, if possible. Suspected or confirmed infections should be swiftly treated as life-threatening disease can develop within hours of infection. Drugs effective against local parasite populations must be used; the drug of choice will be determined by the resistance pattern in the area where the infection was contracted. Severe or cerebral malaria is fatal if untreated and requires immediate hospital treatment, usually with injectable quinine. Regular assessment of a country's malaria situation is necessary, allowing early detection, containment or prevention of epidemics.



Progress

- Some control programmes have achieved considerable success in reducing the burden of malaria.
- Over 90% of endemic countries are implementing appropriate control programmes in line with the global strategy for malaria control.
- **Roll Back Malaria** is a global response tailored to local needs and situations, aimed at reinforcing the health sector, with an emphasis on partnerships which lead to effective action and avoid missed opportunities – with the objective of halving the malaria burden by 2010.

Research Challenges

- Development of new drugs or drug combinations to counter resistance and that are effective among a wide variety of disease settings and patient groups.
- Assessment of antimalarial drugs for intermittent preventive treatment in pregnancy.
- How best to promote and sustain the use of insecticide-treated bednets, especially by children and pregnant women, and assess the benefit of intermittent antimalarial treatment in these two groups.



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