



Malaria: The “unwanted souvenir”

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Introduction

Malaria is considered to be “one of the most severe public health problems worldwide”. According to the World Health Organization (WHO) there were approximately 219 million

cases of malaria in 2017 and the estimated number of malaria deaths was 435 000. In 2017, approximately 61% of all malaria deaths worldwide occurred in children under five years of age, making them the most vulnerable group.

People travelling to areas where there is a risk for malaria should be advised to follow the ‘ABC’ of malaria prevention which involves the use of malaria chemoprophylaxis as well as measures to avoid mosquito bites.

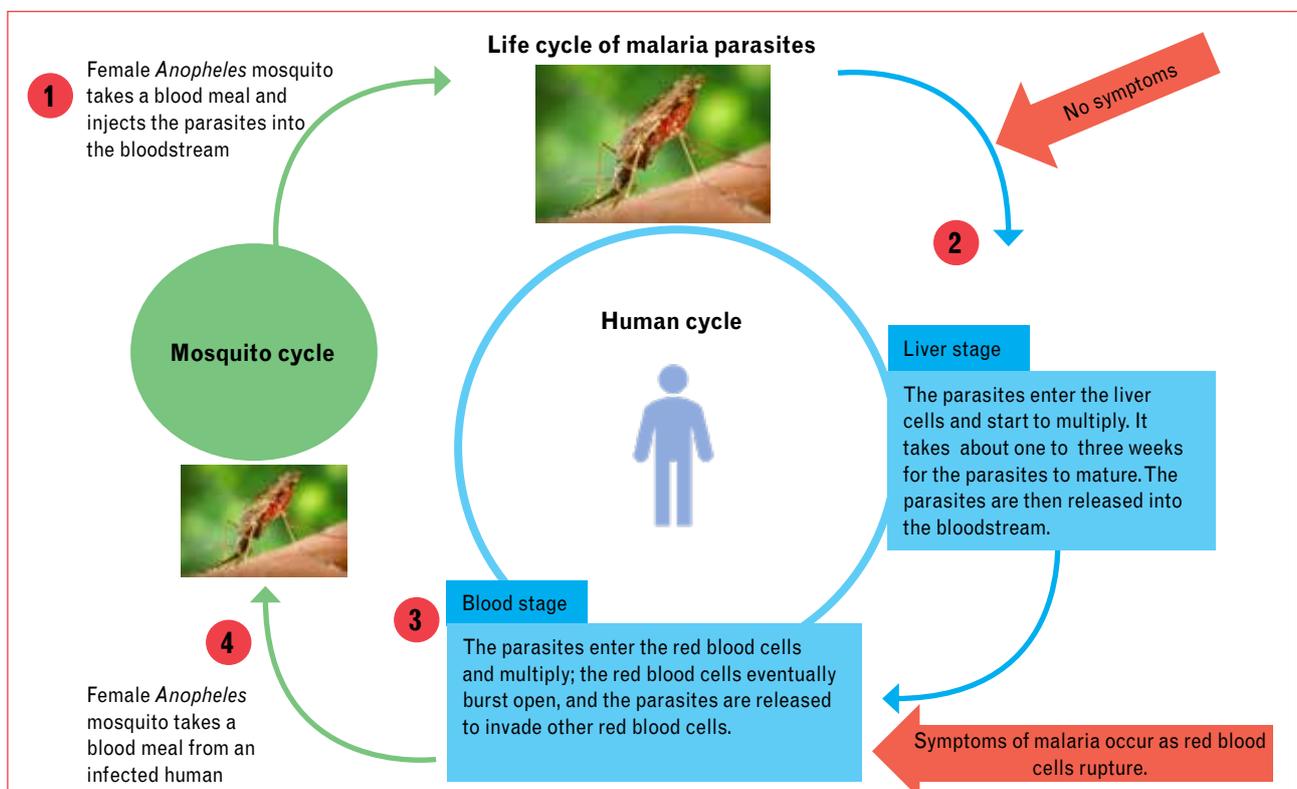


Figure 1. Life cycle of malaria parasites

Adapted from Centers for Disease Control and Prevention (CDC). Available from: <https://www.cdc.gov/malaria/about/biology/index.html>. An *Anopheles* mosquito drawing a blood meal from a human host. Available from the CDC's Public Health Image Library (PHIL), with identification number #7861 (<https://phil.cdc.gov/details.aspx?pid=7861>)

Malaria

Malaria is a potentially life-threatening disease caused by *Plasmodium* parasites. Although there are different species of *Plasmodium* parasites that can infect humans, this article will focus on *P. falciparum* which accounts for the majority of cases in sub-Saharan Africa. It is also the most dangerous type of malaria and it can be fatal, if left untreated.

The parasite has a life cycle in two hosts, in the female *Anopheles* mosquito and in the human. The female mosquito needs to get a blood meal to nurture her eggs. At the same time, the parasites are "injected" into a person via the bite of an infected mosquito. In the infected person, the parasites initially multiply and develop in the liver. During this stage the person is asymptomatic (does not have any symptoms). The parasites then invade and multiply in red blood cells. Malaria symptoms occur once infected red blood cells rupture, and parasites are released (Figure 1).

Malaria symptoms

The initial symptoms of malaria are non-specific and may resemble flu-like symptoms. Symptoms include:

- Fever
- Shaking chills/cold shivers
- Headache
- Sweating
- Fatigue
- Myalgia (body aches)
- Loss of appetite
- Abdominal discomfort
- Nausea and vomiting
- Sore throat and/or cough

Young children often do not present with the typical symptoms of malaria. Symptoms in children may include fever, poor feeding, vomiting and/or lethargy.

People at risk of severe malaria

People at high risk of developing severe illness/complications should, if possible, avoid high-risk malaria areas. These include:

- Infants and children under five years of age
- Pregnant women
- Persons with a weakened immune system, for example persons living with human immunodeficiency viruses (HIV) infections or acquired immune deficiency syndrome (AIDS), those on chemotherapy or immunosuppressive therapy and persons without a spleen
- Elderly persons

The ABC of malaria prevention

Malaria poses a major health risk for those travelling to malaria endemic areas. Anyone travelling to a malaria risk area should know the 'ABC' of malaria prevention.

A. AWARENESS and ASSESSMENT of malaria risk

The first step in malaria prevention is to determine whether there is a risk for malaria. Malaria is prevalent in many developing tropical and subtropical countries of the world. According to the WHO, there are 91 countries and territories around the world where there is a risk of malaria transmission.

People travelling to, and those who are staying in malaria endemic areas (see Figure 2), are at risk of acquiring malaria.

Due to favourable local weather conditions, transmission occurs all year round in warmer areas closer to the equator.

In other areas transmission is more seasonal, with the highest transmission occurring during and just after the rainy season. For example, in South Africa, malaria transmission occurs seasonally, from September to May; and mainly in the low (below 1 000 m) altitude areas, in the north-eastern part of South Africa (Figure 3).

Map showing an estimation of the parts of the world where malaria transmission occurs

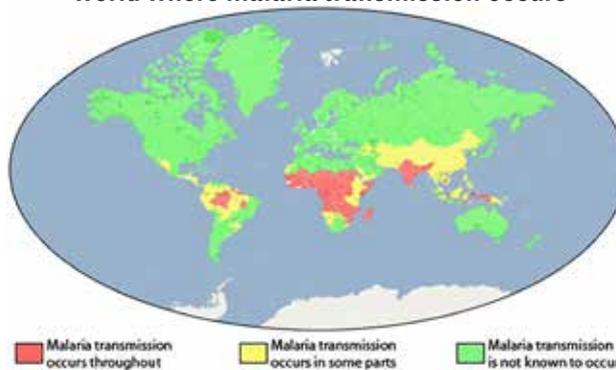


Figure 2. Malaria map showing an estimation of the areas where malaria transmission occurs. Adapted from Centers for Disease Control and Prevention (CDC). Available from: https://www.cdc.gov/malaria/malaria_worldwide/impact.html

Other factors that need to be considered in evaluating the malaria risk include:

- *Location and type of accommodation*
 - The risk of acquiring malaria may be higher for those camping near a river, compared to those staying in urban cities. In addition, people staying/sleeping in air-conditioned hotels have a lower risk of malaria than those who are staying in tents or huts.
- *Time of year*
 - The risk for malaria is increased during wet summer months. Travellers should preferably visit malaria areas in South Africa during dry or cold months (winter) when the risk for malaria transmission is lowest.
- *Time of day*
 - Malaria-carrying mosquitoes bite between dusk and dawn (in the evening). A person's malaria risk would therefore depend on any activities between dusk and dawn as well as overnight stay.

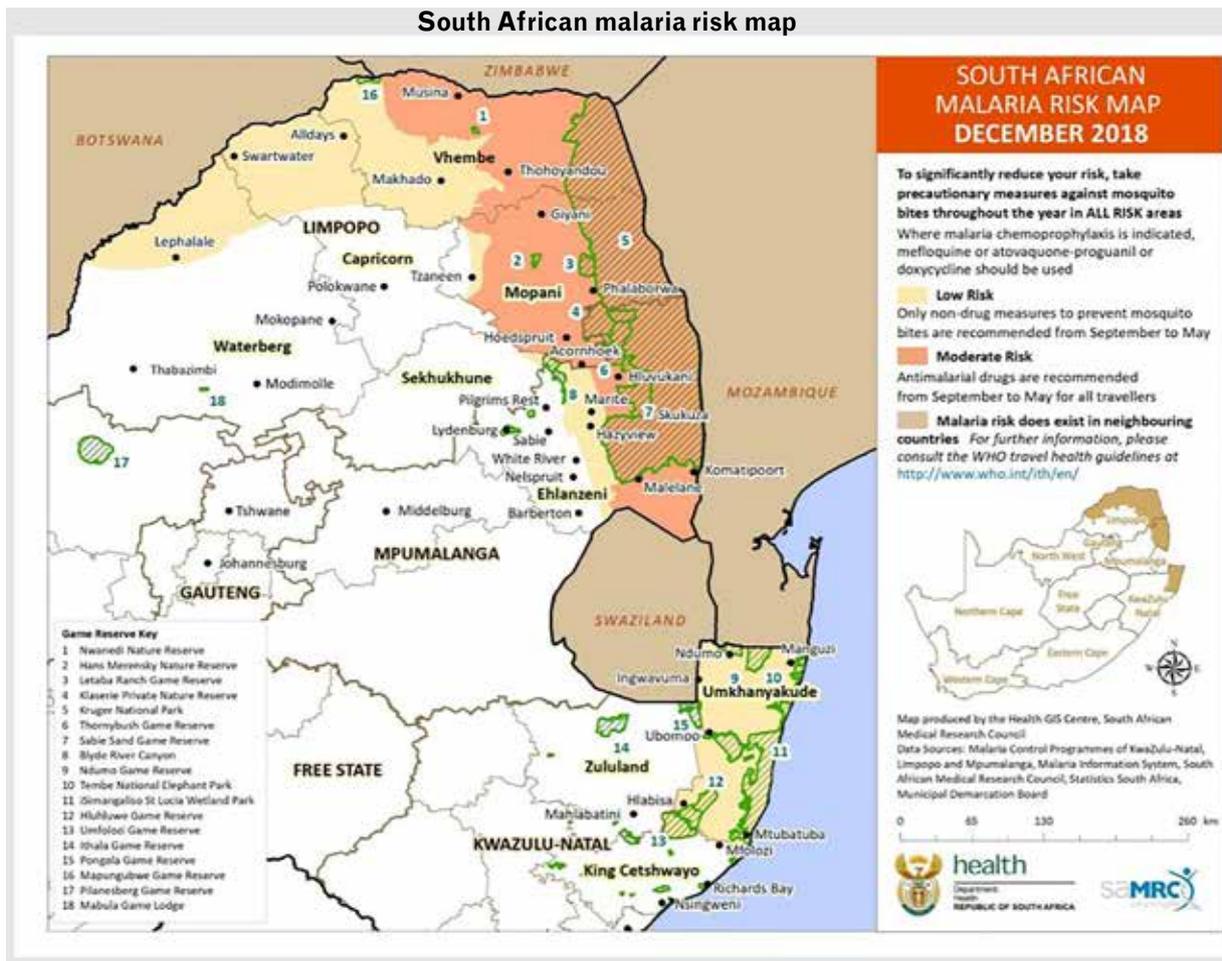


Figure 3. South African malaria risk map (December 2018). Adapted from the National Institute for Communicable Diseases (NICD). Available from: http://www.nicd.ac.za/wp-content/uploads/2018/12/south_africa_malaria_risk_dec2018_final.pdf

- *Duration of stay*
 - The longer a person stays in a malaria area, the higher the risk of being bitten by malaria-carrying mosquitoes.

B. Avoid mosquito BITES: No bites = no malaria

The first line of defence is to take appropriate measures to prevent being bitten, bearing in mind that malaria-carrying mosquitoes bite between dusk and dawn.

In order to minimise the risk of being bitten, travellers should be advised to:

-  Wear long-sleeved tops or shirts, long trousers and socks (preferably light-coloured clothing) to limit the amount of exposed skin.
- Treat clothes with an approved insecticide such as pyrethroid.
- Apply an insect repellent that contains between 20 and 50% DEET (N,N-diethyl-meta-toluamide) for example Tabard® or Peaceful sleep® to exposed skin. These products should:
 - Only be used in persons over two months of age and the directions for application must be followed exactly, especially in children.
 - Not be sprayed on the face and contact with the eyelids, lips, damaged or sunburned skin should be avoided.



- Be re-applied at intervals as per the manufacturer's recommendations and after bathing or showering.
- Avoid outdoor activities and remain indoors during dusk and dawn, if possible.
- Close doors and windows that do not have screens at night.
- Switch on air-conditioners or overhead fans (if available) as these prevent/hinder mosquitoes from landing.
- After closing the doors and windows, spray inside the house, especially the bedroom, with an insecticide for flying insects.
- Burn mosquito coils or use insecticide-impregnated mosquito mats in living and sleeping areas during the night.
- Sleep under an insecticide-treated mosquito bed-net which will act as a physical barrier (help to reduce contact between mosquitoes and humans). Bed nets should not have any holes and edges should be tucked in.



C. COMPLIANCE with malaria CHEMOPROPHYLAXIS

Travellers to malaria areas should be referred to the pharmacist, who will be able to recommend the most suitable chemoprophylaxis.

There are three different regimens recommended for malaria chemoprophylaxis: atovaquone-proguanil and doxycycline may be obtained without a prescription while mefloquine is only available with a prescription.

- Atovaquone-proguanil should be taken daily; the first dose should be taken one to two days before entering the malaria area, treatment should continue while there and for seven days after leaving the malaria area.
- Doxycycline should be taken daily; the first dose should be taken one day before entering a malaria area, treatment should continue while there and for four weeks after leaving the malaria area.

Malaria chemoprophylaxis, if taken correctly, is around 90% effective and the protective efficacy of the different regimens is comparable.

D. Early DETECTION of malaria symptoms

Initial symptoms of malaria (fever, headache and chills) are non-specific and may be difficult to recognise as malaria. Anyone (including those who have been taking malaria chemoprophylaxis) experiencing any flu-like symptoms after being in a malaria area should immediately seek medical care.

Malaria symptoms usually develop from 10 to 14 days after being bitten by an infected mosquito but can occur as early as seven days after being bitten or may develop two months or longer after being exposed. The period may be prolonged in those who have taken chemoprophylaxis.

E. EFFECTIVE treatment

Since *P. falciparum* malaria can progress to severe illness or death if not treated within 24–48 hours, it is extremely important that malaria is diagnosed early and treated effectively.

Summary

- Malaria is a potentially life-threatening disease that is preventable.
- Malaria prophylaxis involves both **chemoprophylaxis** and **mosquito bite avoidance**.
- There remains a small risk of contracting malaria, despite taking chemoprophylaxis. Anyone who develops flu-like symptoms after returning from a malaria area should consult his/or her doctor immediately.
- People at high risk of developing severe complications or dying of malaria should, if possible, avoid high-risk malaria areas.

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