

## TROPICAL DISEASES

### Introduction

Tropical diseases are infectious illnesses and nutritional deficiency disorders found in countries between 25° North and 25° South. They include malaria, bilharzia, leprosy, yellow fever, cholera, typhoid and kwashiorkor (Figure 1). They are often difficult to control because:

- many are the result of bacteria, parasites, insects etc. which thrive and multiply rapidly in hot, wet tropical climates
- most tropical countries are LEDCs whose governments cannot afford widespread vaccination programmes and the facilities for diagnosis and treatment are usually inadequate
- many people suffer from malnutrition which causes deficiency diseases, e.g. kwashiorkor, and also weakens their resistance and makes them readily susceptible to the bacteria and parasites which transmit other diseases
- there is a lack of clean water supplies and sanitation, especially in rural areas and urban slums. Contaminated water harbours some diseases, e.g. bilharzia, which is transmitted through snails living in irrigation ditches
- poor housing conditions encourage rats, flies and other insects to multiply, all of which are carriers of disease
- there is limited general knowledge as to how and why diseases are spread and a lack of information and public health campaigns.

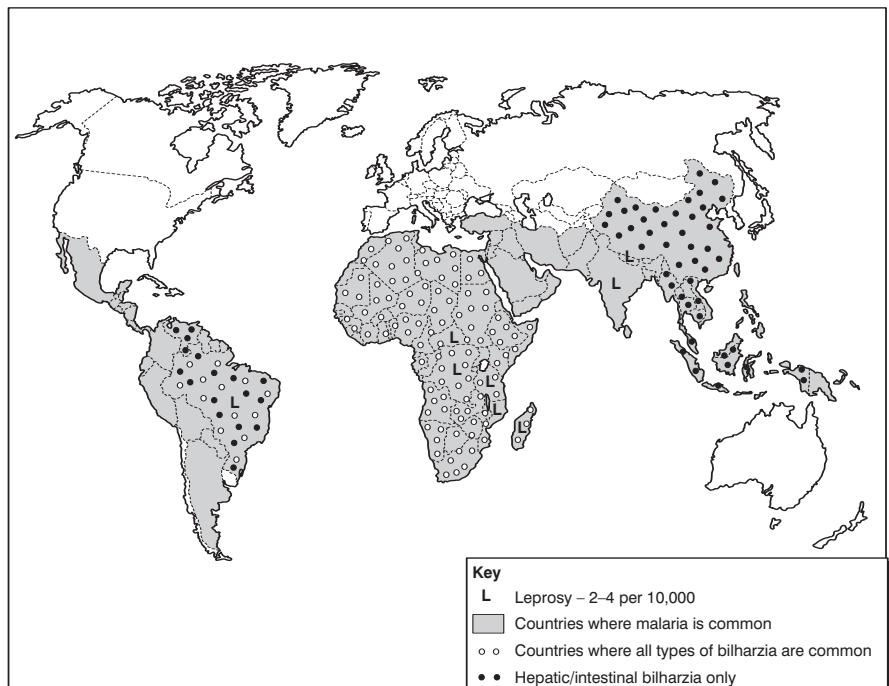
Three of the most prevalent tropical diseases are discussed in this Geofile unit.

### Malaria

Approximately 40% of the world's population is at risk of catching malaria. It kills over 1 million people annually and affects up to 500 million people. The main area of incidence is Sub-Saharan Africa (80% of all cases), where it affects 50% of the population (Figure 2).

Malaria is a parasitic, mosquito-borne disease which is common in tropical areas where the anopheles mosquitoes

Figure 1: World distributions of malaria, bilharzia and leprosy



can survive and multiply (Figure 3). The malarial parasite needs a temperature of above 20°C in order to complete its life cycle and the mosquitoes themselves prefer humid conditions such as valleys, deltas, irrigation channels so, unfortunately, they tend to inhabit densely-populated, fertile farming lands.

The way in which the disease is transmitted can be seen in Figure 3. The disease has fever and flu-like symptoms and if untreated can cause convulsions, coma, and death. Children who survive can suffer from learning impairment and brain damage. Repeated episodes lead to anaemia and general lethargy, which weakens the adult workforce.

#### The costs of malaria:

Malaria is a heavy financial burden on the economy of many LEDCs. Studies have shown that countries with malaria:

- have incomes 33% below those without it
- have an economic growth 1.3% per person per year less than those without it.

Direct costs include:

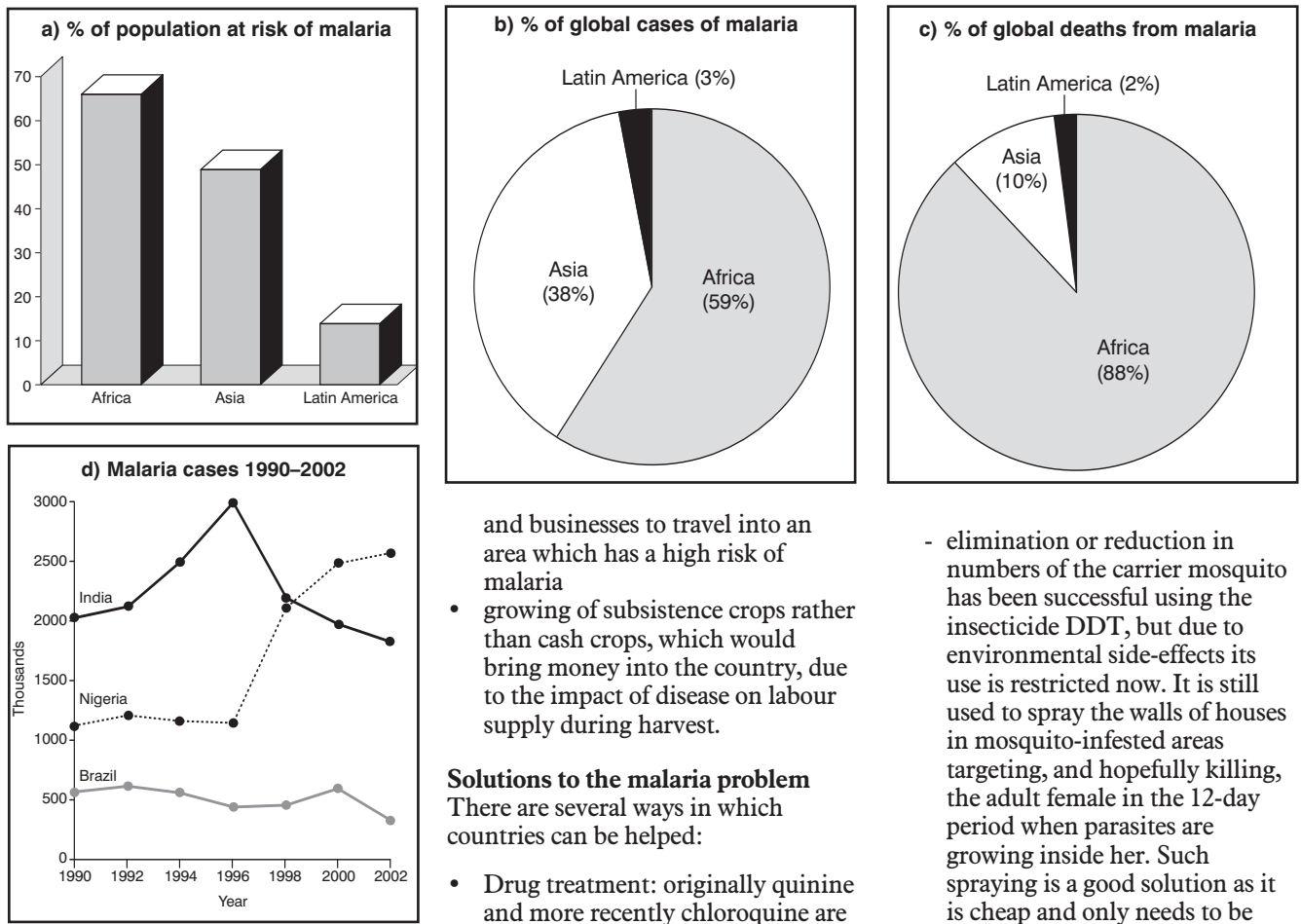
- individual medical costs, e.g. medicines, doctors' fees etc. Many African families spend a quarter of

- their annual income on these
- the cost of preventative measures such as mosquito bed-nets – a useful method of reducing transmission
- loss of earnings – adult sufferers cannot work during their attacks
- public health spending – health care can account for up to 40% of the annual expenditure of some LEDCs. There is little money available in most LEDCs and this expenditure on combating tropical diseases reduces the amounts available for improving standards of living and the overall economy.

Indirect costs can include:

- lost productivity for employers; a recent WHO report stated that malaria has cost Africa around £160 billion in productivity over the past 35 years
- lack of continuity in education – vital in helping the population to improve its lifestyle and job prospects
- reduced investment in an area – e.g. tourism, which is a good source of income for many tropical countries. However, tourists are reluctant to visit some high-risk areas
- undeveloped markets/economy due to unwillingness by large firms

Figure 2: Global incidence of malaria



and businesses to travel into an area which has a high risk of malaria

- growing of subsistence crops rather than cash crops, which would bring money into the country, due to the impact of disease on labour supply during harvest.

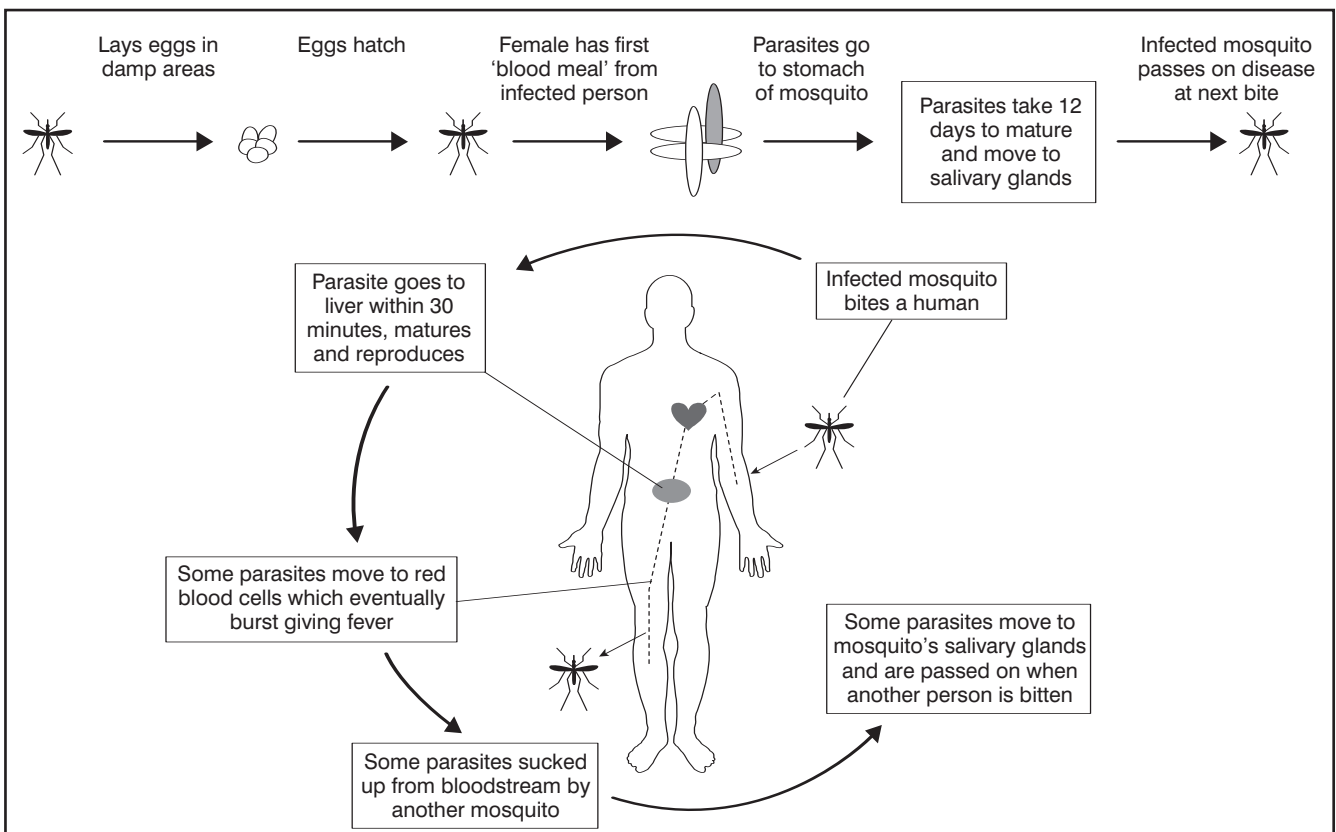
**Solutions to the malaria problem**

There are several ways in which countries can be helped:

- Drug treatment: originally quinine and more recently chloroquine are both effective.
- Controlling the vector (anopheles mosquito) by insecticides:

- elimination or reduction in numbers of the carrier mosquito has been successful using the insecticide DDT, but due to environmental side-effects its use is restricted now. It is still used to spray the walls of houses in mosquito-infested areas targeting, and hopefully killing, the adult female in the 12-day period when parasites are growing inside her. Such spraying is a good solution as it is cheap and only needs to be carried out every 6 months. Recently a new alternative chemical has been introduced –

Figure 3: Life cycle of a mosquito



pyrethrine – which is more expensive but needs a shorter contact time with the mosquitoes. It also kills another major pest, cockroaches, and causes less damage to the walls

- insecticide-treated bed nets are also very effective, easy to use and target the main area of attack. They can reduce child deaths by over 20% and cases of illness by 50%. However, by the end of 2004 only 5% of potential sufferers were using nets, the cost of around three dollars per net being too expensive for many countries to implement on a wide scale.

- Killing mosquitoes at the larval stage by:
  - draining and filling in suitable breeding sites
  - screening or covering water tanks
  - drying out irrigation channels weekly to interrupt the life-cycle of the mosquito
  - stocking water sites with fish which will eat the larvae; these fish can also be used to provide a food source, e.g. grass carp in parts of Asia.

All the major world organisations are very aware of the seriousness of the problems that malaria creates. In

1998 a multi-agency programme (involving input from WHO, UNICEF, the UN and the World Bank) was set up for the research and control of the disease. ‘Roll Back Malaria’ aims to halve deaths from malaria by 2010. It remains to be seen how successful the programme will be, but early results are very encouraging.

### Schistosomiasis (bilharzia, or snail fever)

Globally, this is the second most socio-economically devastating disease after malaria. The disease affects 200 million people worldwide and around half of these are children of school age. As with malaria, it is particularly common in Africa where there are about 170 million sufferers. Whilst it is only responsible for some 20,000 deaths annually, it is significant to the social and economic life of a country as its effects are long-lasting and tend to lower the overall health status of the population.

The parasites (schistosomes, or river flukes) which spread the disease need:

- fresh-water conditions, e.g. rivers, deltas, lakes, to complete their life cycle, part of which occurs in a water snail. Ironically, develop-

ments such as dams and irrigation channels, intended to improve living standards in rural areas, provide the perfect habitat for the parasite and snails and so help to spread the disease

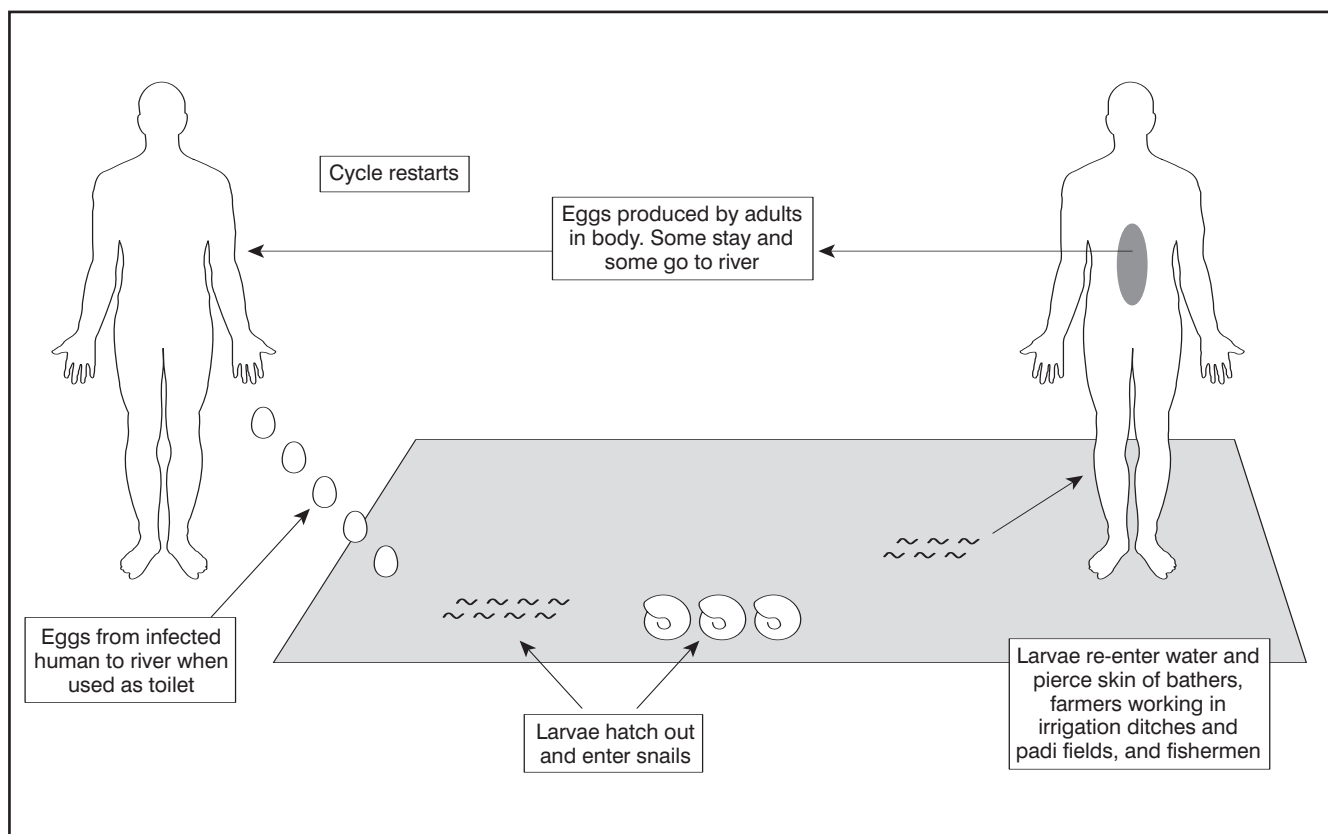
- tropical climatic conditions with high temperatures, rainfall and humidity
- lack of sanitation (rivers are often used as toilets) – in Africa only 24% of the population has piped water and just 13% are linked to a sewage system.

#### How the disease is transmitted

When infected people urinate or defecate in a freshwater source (river, lake, irrigation channel etc.), the eggs of the river fluke are immediately released into the water. The eggs hatch there and the larvae infect the water and then enter watersnails, where they develop into adult males and females. The parasite then emerges and swims in water until it can penetrate the skin of people who are in contact with the infested water. This can be by washing hands, washing food, swimming, fishing and farming, especially growing rice.

Once in the human body, the female parasites release thousands of spiny eggs. Some are passed out of the body and the whole cycle starts again. However, some remain trapped in

Figure 4: Life cycle of bilharzia



body tissues, seriously weakening the victim and causing progressive enlargement of the liver, lungs etc., and impairment of the function of organs e.g. kidneys and bladder, and in advanced cases of the disease causing cancer.

### Solutions

There are three basic approaches to reducing the effects of schistosomiasis:

- preventative measures by governments and/or local authorities, including the provision of proper sanitation facilities and supplying clean drinking water supplies etc. These methods need to be combined with public health programmes so that the population is informed of the dangers of contaminated water and the links with catching diseases
- measures aimed at reducing vector densities or vector lifespan, e.g. chemical, biological and environmental controls
- increased awareness of the disease and, when carrying out large-scale irrigation schemes, building dams etc., the use of special methods to avoid creating favourable conditions for flukes and snails, e.g. preventing or removing aquatic vegetation, lining canals with cement or plastic, regularly fluctuating irrigation water levels, periodic rapid drying of irrigation canals, appropriate siting of housing etc.

Once people have the disease there is a drug called praziquantel which causes paralysis and disintegration of the river flukes when taken for one or two days, and which costs only 18 cents a dose. Studies of those treated show that within six months up to 90% of the damage due to the infection can be reversed. However, more than 423 million tablets would be needed to treat the disease worldwide!

### Leprosy: a success story

Leprosy is a chronic bacterial disease which is transmitted via droplets from the nose and mouth through close contact. Symptoms may take as long as 20 years to appear and it mainly affects the skin and nerves. However, it is now a curable disease and over the last 20–30 years great progress has been made in the control and eradication of the disease. In 1981, the WHO recommended multi-drug therapy (MDT), using a combination of three drugs which can be easily administered in

monthly blister packs of tablets. In the last 20 years more than 14 million patients have been cured. Since 1995, free MDT has been available, financed by various private and charitable foundations. In 1991, the World Health Assembly passed a resolution to eliminate leprosy as a public health problem by 2000, and great strides have been made:

- the disease rate has dropped from 21 per 10,000 to 1 per 10,000.
- the number of cases worldwide has dropped from 5.2 million (1991) to 0.29 million in 2004
- leprosy has been eliminated from 113 out of 122 countries where it was a problem in 1985
- most cases are now limited to a few countries (Figure 1), i.e. Brazil, India, Nepal, Madagascar, Mozambique, Tanzania, DR of Congo, and the Central African Republic, where prevalence rates vary between 2 and 4 per 10,000.

### Solutions

The main ways to control this disease are to ensure that sufferers have the correct medical care and drug therapy. This will depend largely on the development of better health services and facilities in affected LEDCs, which in turn depends on having enough financial support to pay for the drugs, buildings and staff. Information campaigns about leprosy in high-risk areas are crucial so that patients and their families, who were historically ostracised from their communities, are encouraged to come forward and receive treatment. The most effective way of preventing disabilities in leprosy, as well as preventing further transmission of the disease, lies in early diagnosis and treatment with MDT.

### Conclusion

It can thus be seen that tropical regions are affected by a range of diseases which have a serious effect on their populations. Some of these have been eradicated in other parts of the world, but the level of poverty and general environment make it difficult to do this in these tropical areas. In many ways the affected areas are in a 'vicious circle' situation as the diseases weaken the population and workforce and so affect the economic development, and keep the levels of poverty high. If countries are poor the people tend to have poor diets and living conditions and governments cannot afford the health provision to reduce tropical diseases, which then weaken the population and so on. When added to the other problems experienced by these countries such as frequent natural disasters, climatic hazards etc., the incidence and effects of tropical diseases are a major cause for concern in the future development of many countries which suffer from high levels of poverty.

### Web sites

Wikipedia is a very good starting point on all diseases.

WHO (leprosy):

<http://www.who.int/mediacentre/factsheets/fs101/en/index.html>

WHO (malaria):

<http://www.who.int/mediacentre/factsheets/fs094/en/>

Bilharzia:

<http://www.dpd.cdc.gov/dpdx/html/schistosomiasis.htm>

All diseases:

<http://www.cdc.gov/ncidod/dpd/default.htm>

## FOCUS QUESTIONS

The following are all extended writing/essay questions.

1. 'Malaria is a disease of poverty and also causes poverty.' Discuss this statement.
2. Compare bilharzia and malaria in terms of their methods of transmission, world distribution and mortality rates.
3. Imagine that you are going into an area in which either bilharzia or malaria is a serious concern for the region's overall future development. Suggest a list of ways in which you would try to alleviate the effects of the disease on a limited budget.
4. Study the graphs in Figure 2 about Malaria. Comment on the patterns or trends that you can see in the different regions of the world.