

Malaria issue report

[Health & Medicine](#), [Disease](#)



The issue I am going to be talking about in my report is about how to prevent the transmission of malaria around the world.

Malaria is a mosquito-borne, climate sensitive disease caused by the parasite Plasmodium.[1] Malaria is caused by one of four species of the protoctist Plasmodium[2]. The Plasmodium parasites multiply in red blood cells; this can cause symptoms such as fever and headache, but in severe cases the disease can lead to death.

Transmission

Malaria is transmitted through the bite of an infected female (Anopheles) mosquito; although it can be transmitted through contact of infected blood but this is very uncommon.[3] The cycle of malaria is an Anopheles mosquito bites an infected person; a small amount of infected blood is taken. The plasmodium parasite grows and matures in the mosquito's gut for approximately a week before it then travels to the mosquito's salivary glands. When the mosquito next bites someone, these parasites mix with the saliva, are then injected with the bite, and the transmission of malaria is complete.[4]

Cycle in the Body

Once in the blood, the parasites travel to the liver and enter liver cells, to grow and multiply. After some time, the parasites leave the liver cells and enter red blood cells. In the red blood cells the malaria parasites continues to grow and multiply. After they mature, the infected red blood cells rupture, freeing the parasites to attack and enter other red blood cells.[5]

Symptoms

Toxins released when the red cells burst, these are what cause the common symptoms of malaria, these are:

1. Fever
2. Chills
3. Flu like symptoms

Statistics

According to the WorldHealthOrganisation (WHO) malaria report 2011, there were 216 million cases of malaria and an estimated 655, 000 deaths in 2010. Malaria mortality rates have fallen by more than 25% globally since 2000. Most deaths occur amongst children living in Africa where a child dies every minute of malaria and the disease accounts for approximately 22% of allchildhooddeaths.[6]

Malaria is a disease that only occurs in certain climates, due to the fact that malaria is passed on through mosquito bites so only certain countries and regions have the conditions that mosquitos can survive in are affected by the disease; this includes sub-Saharan Africa, Asia and Latin America as shown in the picture below:

[7]

This picture shows that malaria affects countries mainly in the Southern Hemisphere, especially South America (but north of Argentina) Sub-Saharan Africa and Southern Asia.

Malaria has been on the rise since the 1970s and constitutes a serious risk to health in many tropical countries.[8]

The Problem with malaria is that it mainly affects people who live in LEDCs (Less Economically Developed Countries) the problem with this is that they cannot afford to get the healthcare to treat the disease unlike with MEDCs (More Economically Developed Countries) where they don't get diseases of this kind commonly but are able to afford the healthcare.

Malaria also causes a number of deaths and illnesses every year, especially in countries which suffer from a lot of poverty. This means that if parents catch the diseases then their children will be orphaned and left to fend for themselves.

Solutions to the Problem

There are several methods of treating malaria and these are some of the best methods to protect us from the disease:

Nets

A mosquito net protects against mosquitos, flies, and other airborne insects. Mosquito nets are the first line of defence against the deadly bite of mosquitos. The fine, see-through mesh stops insects from biting or affecting the person using the net. The mesh is fine enough to stop these insects

entering the sleeping area of the person. Research has found that the latest Long Lasting Insecticidal Nets (LLINs) save lives; they have been proven to cut malaria cases in children by half as well as reducing child deaths by 20%[9]. The use of these nets can also help protect other people sleeping nearby who are not sleeping under a net. It's estimated that when 80% of people sleep under a net, the entire community is protected.[10]

Although it is vital that the people using the mosquito nets regularly check the nets for any holes big enough for insects to get through. Scientists in Senegal have been researching the success rate of mosquito nets after six million nets were distributed over five years. Within three weeks of the nets being introduced, the scientists found that the number of malaria attacks had started to fall – it had fell by 13 times since before the nets had come in. The researchers also collected specimens of *Anopheles gambiae*, which is the type of mosquito species responsible for transmitting malaria to humans in Africa. Between 2007 and 2010 the proportion of the insects with a genetic resistance rose from 8% to 48%.

By 2010 the proportion of mosquitoes resistant to Deltamethrin was 37%.

[11]

Testing

Malaria parasites in the blood can best be detected under a microscope, but, when this is not available malaria cases can also be quickly and accurately identified using a RapidDiagnosticTest (RDT). RDTs are disposable blood testing kits which can be used anywhere and provide a quick result, they

measure the amount of plasmodium in the blood; therefore showing if you have malaria or not. RDTs mean that a potentially life-saving diagnosis of malaria, which usually could only be possible in hospitals, can now be made available anywhere.[12] The reliability of RDTs is a successful diagnostic reading of 80% or in other words; 4 out of 5 people tested for malaria get a correct result back.[13]

Implications of the solutions to the problem

There are a number of solutions to malaria, although they do have economic and environmental implications. The solutions include:

Nets

The economic problem with nets is that malaria is mainly affecting LEDCs; therefore people are unable to afford the cost of buying drugs nets as they can be expensive.

Environmental issues with mosquito nets are that mosquitos are possibly starting to get immune to the chemical Deltamethrin which is used in the bed nets; this means that they are no longer being useful by stopping the female mosquito from biting and killing harmless insects instead. The social implications of using nets are that nets prevent people being bitten by malaria carrying mosquitos, this means that less access to health services are needed; therefore less time is lost from work because of malaria.

Medicines

Artemisinin-based Combination Therapies (ACTs) are therapies made by combining an extract of the Artemisia plant and another medicine. They are the most effective and advance treatments for malaria, and are strongly recommended for the treatment of malaria in Africa.[14] The implication to this method is that they are highly expensive to produce and take around 15 years to research and develop. And seeing as malaria mainly affects LEDCs it wouldn't be much use to them, as they will not be able to afford to buy them. Also the problem with using drugs is that a lot of testing takes place on animals which have ethical implications along with it.

Benefits/Risks of solutions to the Problem

Medicines

In the table below there is a list of advantages and disadvantages for using different medicines for treating malaria:

Chemoprophylaxis drug

Presentation

Advantages

Disadvantages

Proguanil

Paludrine tablets

1. Low cost

2. Well tolerated

3. Suitable for pregnant or breastfeeding women

1. Increasing resistance of *P. falciparum* to chloroquine

2. Large number of tablets required if taken in combination

Chloroquine

Nivaquine syrup

Avloclor tablets

1.

Mefloquine

Lariam tablets

1. Weekly dose

2. Effective for most areas of the world

3. Can be used in the last 2 trimesters of pregnancy

1. Needs to be commenced 2 to 3 weeks prior to departure

2. May cause neuro-psychiatric adverse events

Doxycycline

Capsule

1. Low cost
2. Generally well tolerated
3. Can be commenced close to departure date

1. May cause photosensitivity
2. May cause vaginal yeast infections in women
3. Unsuitable for children under 12 years

Atovaquone/proguanil

Malarone tablets

1. Well tolerated
2. Can be commenced close to departure date
3. Short course

1. Expensive

[15]

According to the table above the advantages outweigh the disadvantages in the five different medicines, although with Doxycycline the advantages and disadvantages are in the same proportion. This would suggest that Doxycycline may not as effective anti-malarial medicine as some of the others.

Testing

Another solution to the problem could be to use malaria testing kits such as the Rapid Diagnostic Tests (RDT). The benefit of this is that it can create a diagnosis in fraction of the time that a standard test takes. This means that people who have malaria can be treated a lot quicker than they usually could be by the standard method, which involves looking at a blood sample under a microscope to detect plasmodium. An issue with RDTs is that they can be expensive for people living in LEDCs as they can range from \$1. 20 - \$13. 50 per test.[16]

The risks of RDT is that, although it is a quick test, it is not always effective at identify the plasmodium in the blood. The danger is that you may get inaccurate result, leading to you being quite unaware of having the disease, therefore getting the treatment early enough to take effect.

Alternative Solutions to the Problem

Quinine

Another solution to the problem which was used up until the 1930s as the only cure for malaria is quinine. It is found in the Andes Mountain range of Peru and Ecuador[17]. The medicinal properties to quinine has been around since the 17th century, but back then people used to chew the bark off of the cinchona tree as it was believed to be a useful treatment for malaria.

Although people didn't have medicinal knowledge, due to the positive result, they thought it was an effective method of malaria treatment. The active ingredient is quinine which is found in the cinchona tree. Quinine works by

lowering the body's core temperature, thereby killing the plasmodium parasites that cause malaria in the red blood cells. Quinine can also be found in tonic water; some doctors/ GPs may recommend drinking tonic water when going to a high risk country.

Vaccine

A vaccination involves injecting a small harmless amount of infection into you. Finding a vaccine to protect people from malaria would be the best possible defence[18]. Around the world scientists are working on this important research.[19] However, malaria parasite, plasmodium has proven to be adapting to the different cures and vaccines that scientists have been creating. This means that they change their characteristics as antibodies are developed. This adaptability has made finding a vaccine especially challenging.[20]

Currently there is no vaccine, but there are several being developed. Several potential malaria vaccines are already being tested in clinical trials; although no vaccine has been licensed for use.[21] It will be a long wait before a vaccine is available to prevent the spread of malaria.[22] Dr Sandy Douglas (Welcome Trust Clinical Research Training) at the University of Oxford said " We have found a way of making antibodies that kill all different strains of malaria parasites. This is still in an early research phase; the next step is to do clinical trials in people." [23]