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Malaria Control

A second major sanitation-related disease is malaria. A serious resurgence of malaria is taking place in many countries. Between 300 and 400 million people suffer from malaria, and five million die from it annually. The disease is caused

by the malaria parasite, *Plasmodium falciparum* (and three other *Plasmodium* species), which are transmitted by anopheline mosquitoes from an infected person to a healthy person. Tropical and subtropical regions of the world suffer the most from malaria.

COMMUNITY PREVENTIVE MEASURES

Mosquitoes generally stay within about one mile (1.6 km) of where they hatch. The cycle from egg laying to hatching as mosquitoes usually takes about eight days. These facts make it easier for local mosquito eradication or control programs to be effective. But over time, persons infected with malaria can visit the local area or mosquitoes carrying the malaria parasite can be brought in with vegetable baskets, water containers, etc. Therefore, to be effective, anti-

mosquito

programs must be ongoing, and any spraying should be done on a regular basis. Other community based anti-malaria activities include:

- o Eliminate or reduce the amount of stagnant water near the community by digging drainage ditches. The malaria mosquitoes must have water for their egg, larval, and pupal stages of development. Even small accumulations of water, as in wheel ruts or hoofprints of cattle may increase mosquito breeding if the water remains a week or more.
- o Plan for the elimination of standing water in new water and flood control projects.
- o "Supercharge" unlined irrigation ditches about every 6 days. To do this, raise the water level of the irrigation ditch three inches (8 cm) or more for a period of about an hour. This will cause mosquito larvae to float upward on the vegetation that lines the ditch. Do this in the morning on a sunny day. Then quickly drop the water level about five inches (13 cm.) or more and leave it at this level for several hours. The mosquito larva will be hung up on the dry vegetation and will die.
- o Develop a voluntary reporting system for persons in the community who develop fevers, so that health care can be provided to them, and so that trends in the occurrence of malaria will be evident.

Mosquito-eating fish can reduce the number of mosquitoes in rice fields. This is not practical where rice cultivation includes alternate flooding and drying.

Regular use of mosquito-proof bed nets by all or most community inhabitants has

been shown to reduce malaria rates. Programs with community participation in local production and repair of bed nets deserve field trials.

PERSONAL PREVENTIVE MEASURES

To reduce the probability of malaria:

1. Inspect your living and sleeping quarters and install or repair screens in doors and windows.
2. Spray the walls, floors, and ceilings of your residence with insecticides.
3. Sleep under a mosquito-proof bed net.
4. Use mosquito repellents when you walk in the woods or other likely mosquito areas.

To reduce the risk of malaria, you should begin taking chloroquine two weeks prior to departing for regions of the world where malaria is found. Up to date information on the status of malaria and drug resistance can be obtained from references (1) and (2) below.

TREATMENT

No vaccine is currently available against malaria. Breakthroughs have been made, but pharmaceutical availability is still many years away. The most effective drug against malaria is chloroquine, but in some areas of the world, the parasite is beginning to show some resistance to the drug. An alternative drug that is much

more expensive is sold under the label "Fansidar." This drug is effective, but can cause serious allergic reactions in some people. Local health care providers should be consulted as to what drug to use.

The search for a vaccine against malaria is complicated by the fact that while Plasmodium falciparum is responsible for most malaria deaths, there are other plasmodium species, and each species may react differently to the drugs used to treat it.

In addition, the parasite goes through a series of stages of growth as it passes from the mosquito into the human bloodstream, back to the mosquito, and then back into a human host. Each stage requires its own separate defense.

For example, at one stage of the parasite's life it is called a gametocyte, a tiny body that will produce gametes or mature sexual reproduction cells. The gametocytes must pass into an anopheles mosquito to develop.

The mosquito bites a person whose blood contains the gametocytes. The gametocytes develop in the body of the mosquito and eventually produce sporozoites, tiny bodies that will grow into adult plasmodia. The infected mosquito then passes the sporozoites to another human host and the cycle begins again.

A vaccine against the sporozoite would keep the second person from getting the

disease from the mosquito. It would not, however, defend against, say, contaminated blood used in a transfusion, nor one of the other infectious stages of the parasite's life.

The challenge to scientists is to develop vaccines that would be effective in three different ways. One would work against the sporozoite, preventing it from developing in its human host. Another would work against the gametocyte to prevent its growth in the body of the mosquito. Both of these vaccines could effectively block the transmission of the disease.

They would not, however, protect the person who was infected as a result of a blood transfusion. Such a person could become ill with malaria and would then be a source of infection to mosquitoes and ultimately to other people. Thus scientists are also working on a third type of vaccine, which would protect against this type of transmission.

In the meantime, the best protection for people living in malaria areas is to interrupt the cycle by getting rid of the mosquitoes or by trying to keep from being bitten. Malaria control is a community problem, not just a challenge to science. Use the measures described above to eliminate mosquito breeding areas around your home, farm, and community. Remember to protect yourself and your family from the mosquitoes by using window screens and mosquito-proof bed nets. Use mosquito repellents, and spray with appropriate insecticides where needed.

Sources:

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