World Water Day 2001

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Overview of disease fact sheets

Diseases Fact Sheets: Ascariasis, Dengue and Dengue Haemorrhagic Fever, Guinea-Worm Disease (Dracunculiasis), Leptospirosis, Methaemoglobinemia, Ringworm (Tinea), Schistosomiasis, Trachoma, Typhoid and Paratyphoid Enteric Fevers (WHO, 2001, 11 p.)

Disease fact sheet: Ascariasis

The disease and its effect on people

Ascariasis is an infection of the small intestine caused by *Ascaris lumbricoides*, a large roundworm. The eggs of the worm are found in soil contaminated by human faeces or in uncooked food contaminated by soil containing eggs of the worm. A person becomes infected after accidentally swallowing the eggs. The eggs hatch into larvae within the person's intestine. The larvae penetrate the intestine wall and reach the lungs through the blood stream. They eventually get back to the throat and are swallowed. In the intestines, the larvae develop into adult worms. The female adult worm which can grow to over 30cm in length, lays eggs that are then passed into the faeces. If soil is polluted with human or animal faeces containing eggs the cycle begins again. Eggs develop in the soil and become infective after 2-3 weeks, but can remain infective for several months or years.

Children are infected more often than adults, the most common age group being 3-8 years. The infection is likely to be more serious if nutrition is poor. They often become
infected after putting their hands to their mouths after playing in contaminated soil. Eating uncooked food grown in contaminated soil or irrigated with inadequately treated wastewater is another frequent avenue of infection.

The first sign may be the passage of a live worm, usually in the faeces. In a severe infection, intestinal blockage may cause abdominal pain, particularly in children. People may also experience cough, wheezing and difficulty in breathing, or fever.

**Distribution of the disease**

Ascariasis is found worldwide. Infection occurs with greatest frequency in tropical and subtropical regions, and in any areas with inadequate sanitation.

**Scale of the problem**

Ascariasis is one of the most common human parasitic infections. Up to 10% of the population of the developing world is infected with intestinal worms - a large percentage of which is caused by Ascaris. Worldwide, severe Ascaris infections cause approximately 60,000 deaths per year, mainly in children.

**Interventions**

Health education providing the following messages reduces the number of infected people:

1. avoid contact with soil that may be contaminated with human faeces;
2. wash hands with soap and water before handling food;
3. wash, peel or cook all raw vegetables and fruits;
4. protect food from soil and wash or reheat any food that falls on the floor.

The availability of water for use in personal hygiene as well as proper disposal of human faeces will also reduce the number of cases. Where wastewater is used for irrigation waste stabilization ponds and some other technologies are effective in decreasing transmission due to food grown in contaminated soil.

Infected individuals (and domestic animals) should be treated with medicine to reduce disease transmission. Ascariasis can be effectively treated with mebendazole or pyrantel pamoate.

**Disease fact sheet: Guinea-Worm Disease (Dracunculiasis)**

**The disease and its effect on people**

Guinea worm disease is a debilitating and painful infection caused by a large nematode (roundworm), *Dracunculus medinensis*. It begins with a blister, usually on the leg. Around the time of its eruption, the person may experience itching, fever, swelling and burning sensations. Infected persons try to relieve the pain by immersing the infected
part in water, usually open water sources such as ponds and shallow wells. This stimulates the worm to emerge and release thousands of larvae into the water. The larva is ingested by a water flea (cycllops), where it develops and becomes infective in two weeks. When a person drinks the water, the cyclops is dissolved by the acidity of the stomach, and the larva is activated and penetrates the gut wall. It develops and migrates through the subcutaneous tissue. After about one year, a blister forms and the mature worm, 1m long, tries to emerge, thus repeating the life cycle.

For persons living in remote areas with no access to medical care, healing of the ulcers can take several weeks. This can be further complicated by bacterial infection, stiff joints, arthritis and even permanent debilitating contractures of the limbs. People in endemic villages are incapacitated during peak agricultural activities. This can seriously affect their agricultural production and the availability of food in the household, and consequently the nutritional status of their family members, particularly young children.

**Distribution of the disease**

At the beginning of the 20th century, guinea-worm disease, was widespread in many countries in Africa and Asia. It is estimated that there were about 50 million cases in the 1950s. Due to concentrated efforts by the international community and the endemic countries, the number of cases of guinea-worm disease was reduced to about 96 000 by 1999. Guinea-worm disease is prevalent in only 13 countries in Africa including Sudan, Nigeria, Ghana, Burkina Faso, Niger, Togo and Côte d'Ivoire. A small number of cases have also been reported in Uganda, Benin, Mali, Mauritania, Ethiopia and Chad.

**Scale of the problem**

Humans are the only known reservoirs for guinea-worm disease, and infection is through the use of contaminated water in remote rural areas of African countries. About two-thirds of the cases (66 000) reported in 1999 were from Sudan, where the continuing civil war is hampering efforts to eradicate the disease.

**Interventions**

Provision of safe drinking-water in rural and isolated areas is the pillar intervention to eliminate the disease. The disease disappeared from many countries such as from the Islamic Republic of Iran and Saudi Arabia due to improvement in water supply. In 1991, the World Health Assembly adopted a resolution to eradicate the disease.

**Dracunculiasis Eradication Programme**

WHO has promoted the eradication campaign, which focuses on: interruption of transmission of the disease; surveillance of new cases; and certification of eradication. Specific interventions include: health education, case containment, community-based surveillance systems, provision of safe water, including use of filtering devices and chemical treatment of water sources.
Disease fact sheet: Leptospirosis

The disease and its effect on people

Leptospirosis is a bacterial disease that affects both humans and animals. The early stages of the disease may include high fever, severe headache, muscle pain, chills, redness in the eyes, abdominal pain, jaundice, haemorrhages in skin and mucous membranes (including pulmonary bleeding), vomiting, diarrhoea and a rash.

The cause

Pathogenic *Leptospira* spp. cause leptospirosis. Human infection occurs through direct contact with the urine of infected animals or by contact with a urine-contaminated environment, such as surface water, soil and plants. The causative organisms have been found in a variety of both wild and domestic animals, including rodents, insectivores, dogs, cattle, pigs and horses. Leptospires can gain entry through cuts and abrasions in the skin and through mucous membranes of the eyes, nose and mouth. Human-to-human transmission occurs only rarely.

Distribution of the disease

Leptospirosis occurs worldwide, in both rural and urban areas and in temperate and tropical climates. It is an occupational hazard for people who work outdoors or with animals, such as rice and sugar-cane field workers, farmers, sewer workers, veterinarians, dairy workers and military personnel. It is also a recreational hazard to those who swim or wade in contaminated waters. In endemic areas the number of leptospirosis cases may peak during the rainy season and even may reach epidemic proportions in case of flooding.

Scale of the problem

The number of human cases worldwide is not well-documented. It probably ranges from 0.1 to 1 per 100 000 per year in temperate climates to 10 or more per 100 000 per year in the humid tropics. During outbreaks and in high-risk groups, 100 or more per 100 000 may be infected. For several reasons leptospirosis is overlooked and consequently underreported in many areas of the world. In the wake of hurricane Mitch in 1995, an outbreak of leptospirosis with pulmonary haemorrhages was reported in Nicaragua. In 1998, there was an outbreak in the continental United States. 1998 also saw an outbreak in Peru and Ecuador following heavy flooding. A post-cyclone outbreak was reported in Orissa, India in 1999.

Interventions

The disease is often difficult to diagnose clinically; laboratory support is indispensable. Treatment with appropriate antibiotics should be initiated as early as possible. Untreated cases can progress to a more severe and potentially fatal stage. Preventive
measures must be based on a knowledge of the groups at particular risk of infection and the relevant local epidemiological factors. For intervention one may: (a) aim at control at the level of the infection source (e.g. rodent control, animal vaccination); (b) interrupt the transmission route (e.g. wearing protective clothing, refrain from contact with infected animals and from swimming in contaminated water, provide clean drinking-water); or (c) prevent infection or disease in the human host (e.g. vaccination, antibiotic prophylaxis, information to doctors, veterinarians, risk groups and the general population).

**Disease fact sheet: Methaemoglobinemia**

Methaemoglobinemia caused by the decreased ability of blood to carry vital oxygen around the body. One of the most common causes is nitrate in drinking water. It is most important in bottle fed infants and water from wells in rural areas is of special concern. Controlling nitrate levels in drinking water sources to below around 50mg/litre is an effective preventive measure.

**The disease and how it affects people**

Methaemoglobinemia is characterized by reduced ability of the blood to carry oxygen because of reduced levels of normal haemoglobin. It is uncommon. Infants are most often affected, and may seem healthy, but show signs of blueness around the mouth, hands, and feet, hence the common name "blue baby syndrome". These children may also have trouble breathing as well as vomiting and diarrhoea. In extreme cases, there is marked lethargy, an increase in the production of saliva, loss of consciousness and seizures. Some cases may be fatal.

In the body nitrates are converted to nitrites. The nitrites react with haemoglobin in the red blood cells to form methaemoglobin, affecting the blood's ability to carry enough oxygen to the cells of the body. Bottle-fed infants less than three months of age are particularly at risk. The haemoglobin of infants is more susceptible and the condition is made worse by gastrointestinal infection. Older people may also be at risk because of decreased gastric acid secretion.

Malnutrition and infection seem to increase the risk of methaemoglobinemia (McDonald and Kay, 1988). The general health of the infant as well as Vitamin C intake may determine whether or not the condition develops (Super et al, 1981).

Others at risk for developing methaemoglobinemia include: adults with a hereditary predisposition, people with peptic ulcers or chronic gastritis, as well as dialysis patients.

**The cause**

The most common cause of methaemoglobinemia is high levels of nitrates in drinking-water. High nitrate levels may be present in drinking-water due to the use of manure and fertilizers on agricultural land. The natural level of nitrites and nitrates from the environment is normally a few milligrams per litre, although high levels may occur naturally in some areas. Intense farming practice may increase this to more than 50 mg/litre (WHO 1998). Levels greater than 50mg/litre are known to have been
associated with methaemoglobinemia in bottle fed infants. Nitrate is also found in vegetables. Methaemoglobinemia can also be a side effect of some drugs (phenacetin and sulphonamides), although this is very rare with modern drugs.

**Scope of the problem**

Methaemoglobinemia is now rare in most of the industrialised countries due to control of nitrate contamination in water supplies, although occasional cases continue to be reported from rural areas. It is a risk in developing countries, for example where the drinking water is from shallow wells in farming areas.

There is no reliable estimate of the extent of the problem worldwide. WHO is presently collecting information in order to make such an estimate.

**Intervention**

Control of nitrate in drinking water is an effective preventive measure. WHO's Guideline Value for nitrate in drinking water is 50 mg/litre and for nitrite is 3 mg/litre. This is relatively readily achieved in centralised, piped, supplies, but is difficult in rural and small supplies.

The group at greatest risk is bottle fed infants. Breastfeeding protects babies from methaemoglobinemia. Boiling water does not remove nitrate.

For severely affected individuals, medical treatment is possible.

**References**

McDonald A T, Kay D. 


Super M, Heese HV, Mackenie D et al. 


World Health Organization. 


**Disease fact sheet: Ringworm (Tinea)**
Ringworm or Tinea is a typically mild disease of the skin, scalp or nails caused by a fungus. Personal hygiene, supported by availability of adequate quantities of water are important preventive measures.

The disease and its effect on people

Ringworm is a contagious skin disease, in which the scalp (tinea capitis), nails (tinea unguium), feet (tinea pedis or "athlete's foot"), or body (tinea corporis) can be affected. Despite its name, ringworm is caused by a fungus.

On the scalp, ringworm begins in the form of a pimple or sore, which then spreads into a ring shape. Hair becomes brittle, breaking easily and falling out, leaving bald spots on the scalp. On the body, ringworm may first appear as red or pink, flat or slightly raised, patches on the skin. The circular sores may be dry or scaly crusted or moist. As the sores become larger, the central area clears, leaving a ring of infected tissue around the clear area. Infection in the nails usually begins at the site of an injured nail and may spread to the other nails. Infected nails become thick, pitted, grooved and abnormal in shape and colour.

Ringworm of the feet and body are more frequent in men than women. Adults are more likely than children to get ringworm of the feet, which occurs more frequently in hot weather.

Cause

Ringworm is caused by various types of fungi known as the dermatophytes. It is spread by direct contact with an infected person or animal (dogs, cats, guinea-pigs, cattle), contact with soil or by indirect contact with items contaminated by the fungus, for example clothing, towels, bedclothes, chairs, and toilet articles handled by people with the infection. The link with water is via poor personal domestic hygiene and shortage of water for cleaning and washing.

Distribution of the disease

The various types of ringworm are found worldwide.

Scale of the problem

Although specific figures are not available, ringworm is a frequent problem in most countries, particularly where personal and domestic hygiene are poor.

Interventions

Key components of prevention are:

• An adequate supply of water for personal washing and hygiene.
• Regular and thorough bathing with soap and water, with special attention to drying moist areas.

• Health education about how its spreading can be prevented.

• Where ringworm occurs:

• The clothing and linen of infected persons should be frequently laundered in hot water to rid them of the fungus.

• Rashes can be treated with topical anti-fungal lotions or creams. In severe or persistent cases oral anti-fungal medication may be required.

**Disease fact sheet: Schistosomiasis**

**The disease and its effect on people**

Schistosomiasis is a water-based disease which is considered the second most important parasitic infection after malaria in terms of public health and economic impact. The signs following infection are rashes or itchy skin. Two months after infection, fever, chills, cough and muscle aches may occur, as the parasites mature. Untreated infections can result in blood in urine and stools, and enlarged liver and spleen. In children there is a negative impact in terms of growth, nutritional status and cognitive development. Chronic infection leads to diseases of the liver, kidneys and bladder. Occasionally, the nervous system is affected causing seizures, paralysis or spinal cord inflammation.

**Cause**

Schistosomiasis infection in humans, the definitive hosts, is caused by three main species of flatworm, namely *Schistosoma haematobium*, *S. japonicum*, and *S. mansoni*. In Asia, cattle and water buffalo can be important reservoir hosts. Infection occurs when free-swimming larvae penetrate human skin. The larvae develop in fresh-water snails. Humans are infected when they enter larvae-infested water for domestic, occupational and recreational purposes. After skin penetration, the larvae transform and are carried by the blood to the veins draining the intestines or the bladder where they mature, mate and produce eggs. Eggs cause damage to various tissues, particularly the bladder and liver. The reaction to the eggs in tissues causes inflammation and disease. When infected humans excrete parasite eggs with feces or urine into water, the eggs hatch releasing larvae that in turn infect aquatic snails. In the snail the parasite transforms and divides into second-generation larvae which are released into fresh water ready to infect humans. Those who work in irrigation or fishing are at increased risk for schistosomiasis. With the increase in wilderness or “off-track” tourism, more tourists are becoming infected.

**Distribution of the disease**
Schistosomiasis is endemic in 76 countries, most of which are in Africa. Other regions affected are: the Americas (Brazil, Suriname and Venezuela, as well as several Caribbean islands); the Eastern Mediterranean (Islamic Republic of Iran, Iraq, Saudi Arabia, Syrian Arab Republic and Yemen; and eastern Asia (Cambodia, China, Indonesia, Japan, Lao People's Democratic Republic and the Philippines.

**Scale of the problem**

At least 600 million people are at risk of infection and 200 million are infected with schistosomiasis. Of these 20 million have severe disease and 120 million have symptoms. An estimated 80% of transmission takes place in sub-Saharan Africa. Water resource schemes for power generation and irrigation have resulted in a tremendous increase in the transmission and outbreaks of schistosomiasis in several African countries. In northern Senegal, an area without intestinal schistosomiasis before the building of the Diama dam in 1986, virtually the whole population had become infected by 1994.

**Intervention**

Improved sanitation and potable water minimizes contamination of and reduces contact with fresh water, thus limiting transmission. Environmental modification preventing snail vectors and limiting human water contact offers long-term control of schistosomiasis. Health education is a fundamental component that ensures community participation in control interventions. In areas of high prevalence and intensity of infection, chemotherapy with praziquantel, targeted at school-age children and high-risk groups, offers the most efficient way to achieve the recommended strategy for morbidity control. Proper health impact assessment of new irrigation schemes and other water resources projects will provide a solid basis for the incorporation of health safeguards at design and construction plans.

**Disease fact sheet: Typhoid and Paratyphoid Enteric Fevers**

Typhoid and paratyphoid fevers are infections caused by bacteria which are transmitted from faeces to ingestion. Clean water, hygiene and good sanitation prevent the spread of typhoid and paratyphoid. Contaminated water is one of the pathways of transmission of the disease.

**The disease and its effect on people**

Typhoid fever is a bacterial infection of the intestinal tract and bloodstream. Symptoms can be mild or severe and include sustained fever as high as 39°-40° C, malaise, anorexia, headache, constipation or diarrhoea, rose-coloured spots on the chest area and enlarged spleen and liver. Most people show symptoms 1-3 weeks after exposure. Paratyphoid fever has similar symptoms to typhoid fever but is generally a milder disease.

**Cause**
Typhoid and paratyphoid fevers are caused by the bacteria *Salmonella typhi* and *Salmonella paratyphi* respectively. Typhoid and paratyphoid germs are passed in the faeces and urine of infected people. People become infected after eating food or drinking beverages that have been handled by a person who is infected or by drinking water that has been contaminated by sewage containing the bacteria. Once the bacteria enter the person's body they multiply and spread from the intestines, into the bloodstream.

Even after recovery from typhoid or paratyphoid, a small number of individuals (called carriers) continue to carry the bacteria. These people can be a source of infection for others. The transmission of typhoid and paratyphoid in less-industrialized countries may be due to contaminated food or water. In some countries, shellfish taken from sewage-contaminated beds is an important route of infection. Where water quality is high, and chlorinated water piped into the house is widely available, transmission is more likely to occur via food contaminated by carriers handling food.

**Distribution of Disease**

Typhoid and paratyphoid fevers are common in less-industrialized countries, principally owing to the problem of unsafe drinking-water, inadequate sewage disposal and flooding.

**Scale of the problem**

The annual incidence of typhoid is estimated to be about 17 million cases worldwide.

**Intervention**

Public health interventions to prevent typhoid and paratyphoid include: health education about personal hygiene, especially regarding hand-washing after toilet use and before food preparation; provision of a safe water supply; proper sanitation systems; excluding disease carriers from food handling.

Control measures to combat typhoid include health education and antibiotic treatment. A vaccine is available, although it is not routinely recommended except for those who will have prolonged exposure to potentially contaminated food and water in high-risk areas. The vaccine does not provide full protection from infection.

**Disease fact sheet: Trachoma**

**The disease and its effect on people**

Trachoma is an infection of the eyes that may result in blindness after repeated re-infections. It is the world's leading cause of preventable blindness and occurs where people live in overcrowded conditions with limited access to water and health care. Trachoma spreads easily from person to person and is frequently passed from child to child and from child to mother within the family. Infection usually first occurs in
childhood but people do not became blind until adulthood. The disease progresses over years as repeated infections cause scarring on the inside of the eyelid, earning it the name of the "quiet disease". The eyelashes eventually turn in. This causes rubbing on the cornea at the front of the eye. The cornea becomes scarred leading to severe vision loss and eventually blindness.

**Cause**

Trachoma is caused by an organism called *Chlamydia trachomatis*. Through the discharge from an infected child's eyes, trachoma is passed on by hands, on clothing, or by flies that land on the face of the infected child.

**Distribution**

Trachoma occurs worldwide and most often in poor rural communities in developing countries. Blinding trachoma is widespread in the Middle East, North and Sub-Saharan Africa, parts of the Indian subcontinent, Southern Asia and China. Pockets of blinding trachoma occur in Latin America, Australia (among native Australians) and the Pacific Islands.

**Scale of the Problem**

The World Health Organization (WHO) estimates that six million worldwide are blind due to trachoma and more than 150 million people are in need of treatment.

**Intervention**

Primary interventions advocated for preventing trachoma infection include improved sanitation, reduction of fly breeding sites and increased facial cleanliness (with clean water) among children at risk of disease. The scaring and visual change for trachoma can be reversed by a simple surgical procedure performed at village level which reverses the inturned eyelashes.

Good personal and environmental hygiene has been proven to be successful in combating trachoma. Encouraging the washing of children's faces, improved access to water, and proper disposal of human and animal waste has been shown to decrease the number of trachoma infections in communities.

**Global Alliance for the Elimination of Trachoma by the year 2020 (GET 2020)**

The WHO along with an alliance of interested parties has adopted the "SAFE" strategy to combat trachoma. The four components of the strategy include:

- Surgery
• Antibiotic treatment (Tetracycline eye ointment new antibiotic, azithromycin has been tested in a number of countries and initial results are very promising.

• Facial cleanliness

• Environmental changes.

Prepared for World Water Day. Reviewed by staff and experts from the cluster on Communicable Diseases (CDS) and the Water, Sanitation and Health unit (WSH), World Health Organization (WHO).

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