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Ministry of Health

Vector-Borne Diseases

What are the vectors?

Vectors are organisms that transmit pathogens and parasites from an infected person (or animal) to another.

What are vector-borne diseases?

They are diseases caused by vectors, and are often found in tropical areas where insects are abundant and places where it is difficult to access safe drinking water and sanitation systems.

How serious is vector-borne disease?

Vector-borne diseases are among the most serious and unpredictable, and protection and control are extremely difficult since infection can return even after treatment because the organisms are inherent in the environment where they are spreading.

The seriousness of vectors lies in their ability to transmit the disease on a larger scale and faster than other diseases that require human-to-human contact to be transmitted. They also transmit the disease from different organisms (mice, rats, monkeys, birds, dogs, etc.) to the humans, and facilitate the spreading of the micro-organisms which cause serious diseases. The treatment of such diseases is difficult and protection requires the elimination of the vector.

Types of vector:

- Mosquitoes
- Flies (sand fly and black flies)
- Tick
- Bugs
- Snail carrying parasites

Possible places of presence of diseases vectors:

- Pots and ponds with stagnant water and swimming pools
- Rainwater gathering places such as parks' toys

- Abandoned places and equipment
- Open water tanks in the bathroom or kitchen
- Flower pots with stagnant water
- Rodent burrows and dark places
- Stagnant water due to air conditioning and ventilation holes
- Stagnant water on the roofs of buildings
- Swimming pools, ponds and swamps, especially in agricultural areas
- Animal husbandry sheds
- Beds and unclean sleeping areas may be a bunk.

Preventive measures to protect against vectors?

- Control insect vectors and the locations of their larvae by spraying with appropriate pesticides.
- Backfilling of ponds and marshes and disposal of waste and prevent accumulation.
- wearing long-sleeved clothes, covering the legs in places infested with insects, and applying insect repellents to the skin and clothing.
- Make sure to place mesh nets with tiny holes on all windows and doors to prevent insects from coming in.
- Use a mosquito net if you are planning to sleep outside.
- Cover water tanks tightly.
- Remove potential water-gathering areas such as old tires, planting basins and generally unused equipment.
- When you spend a long time out of the house, close the toilet cover, siphon cover, drainage holes and drains.
- Change the water in the flower pots every two days with cleaning the pots from the inside.
- Remove stagnant water in the drainage channels above the roof and in the garden.

- Change the water in the animal pots every two days.
- Avoid traveling to places where insect-borne diseases are as common as possible, and be sure to receive vaccines or medicines to prevent them in case of travel such as yellow fever or malaria.
- Sleeping places such as beds, bed linen and mattresses should be checked, especially in hotels, to avoid bugs.
- Pay attention to the cleanliness of the barns and the cattle where the breeding takes place.
- Dry the skin thoroughly after exposure to water in endemic areas.
- Do not swim in ponds or stagnant water, and do not defecate there at all.
- Control of snails carrying the infectious phase of schistosomiasis
- Always maintain personal hygiene and use pure water to drink or shower.
- Dispose of human waste away from water sources.

Vector-borne disease groups:

Mosquito-borne diseases

What is mosquito?

It is one of the most important insect vectors in humans, where it infects diseases due to transmission of viruses and parasites.

How does a mosquito transmit diseases?

When a mosquito carrying viruses, parasites or worms (microorganisms) which causes diseases bites a person, it transmits them into the body by injecting the microorganisms' saliva into the skin of a person.

It is possible to prevent the transmission of disease to another person by controlling mosquitoes, isolating people infected with the disease from healthy people or giving vaccines to healthy people when there is a risk of infection.

Main mosquito-borne diseases:

- Malaria

- Dengue Fever
- Yellow fever
- Chikungunya disease
- Elephantiasis

The mosquito transmits various types of microorganisms, causing a number of diseases, including:

Type	Disease caused by its transmission to humans
Parasites	The mosquito transmits various types of microorganisms, causing a number of diseases, including:
Viruses	• The mosquito transmits various types of microorganisms, causing a number of diseases, including: Aedesaegypti mosquitoes transmit the virus that causes a number of diseases: dengue, yellow fever and chikungunya • Other mosquitoes transmit viruses that cause cerebral fever, Rift valley fever, and West Nile virus
Nematodes	Some mosquitoes transmit these nematodes that cause elephantiasis, which is characterized by swelling of parts of the human body

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Identification and characteristic symptoms of mosquito-borne diseases:

Disease	Definition	Symptoms
Malaria	Malaria is a mosquito-borne disease caused by a parasitic organism called plasmodium. This parasite invades red blood cells in the human body and destroys them.	Frequent attacks of: • Fever and chills. • Sweating • Headache • Nausea and vomiting • Diarrhea
Dengue Fever	It is a viral disease transmitted by a type of mosquito known as the Egyptian Aedes aegypti	• Fever. • Severe headache • Severe pain behind the eye • Joint and muscle pain • Skin rash • Symptoms of bleeding from the nose or gums or spots under the skin

Disease	Definition	Symptoms
Yellow fever	A viral disease transmitted by a particular type of mosquito that spreads in the tropics of Africa and South America	• Fever • Headache • Muscle pain especially in the back and knees • Nausea and vomiting • Redness of the eyes, face or tongue • Jaundice . • Bleeding from the nose, mouth and eyes • Irregular heartbeats • Liver and kidney failure • Brain dysfunction, symptoms of delirium, convulsions, coma

Disease	Definition	Symptoms
Chikungunya disease	Chikungunya is a viral disease that is spread by mosquitoes and spreads in Africa, Asia and the Indian subcontinent.	• Sudden fever with severe joint pain that often leads to a significant disability of the human • Muscle pain and headaches • Skin rash
Elephantiasis	A syndrome caused by nematodes attacking the lymphatic system leading to swelling and accumulation of tissues in different areas of the body, especially in the legs and limbs. Elephantiasis often does not cause death but can cause disability	• **Asymptomatic:** The majority of infections are of this type so that they do not show any external signs of infection, but cause damage to the lymphatic system and kidneys and changes in the body's immune system. • **Acute symptoms:** These symptoms are in the form of infections of the skin, lymph nodes and lymph vessels. • **Chronic symptoms:** include obvious inflation in the extremities, thickening of the skin and fluid accumulation.

Diagnosis:

The type of mosquito-borne disease can only be determined by blood tests to determine the type of microorganism and therefore its treatment

Treatment:

Disease	Treatment
Malaria	Worldwide, malaria is treated with a range of medications depending on the type of malaria parasite you have and the location where the disease was contracted; as some of these parasites have developed resistance to certain medications and they can no longer be used. **Malaria Medications:** • Chloroquine • Quinine sulfate • Hydroxychloroquine • Mefloquine • Atovaquone+Proguanil

Disease	Treatment
Dengue Fever	There is no specific treatment for dengue virus but the doctor uses the following methods: • Administering painkillers and antipyretics (avoid giving painkillers that cause increased blood thinners such as aspirin, ibuprofen or naproxen). • The need to drink enough fluids to compensate for dehydration that may occur due to repeated vomiting or high body temperature. In severe cases, the patient needs to remain under hospital care for appropriate treatment: • Intravenous solutions to compensate for drought and lack of salts • Monitor vital signs, especially blood pressure Blood transfusion when needed
Yellow fever	There is no specific treatment for yellow fever, and the patient needs to remain under health care within the hospital to give treatment to help alleviate the associated symptoms. • Full rest • Intravenous solutions to compensate for dehydration • Administering painkillers and antipyretics (avoid giving painkillers that cause increased blood thinners such as aspirin, ibuprofen or naproxen). • Monitoring biological signs • Blood transfusion when needed
Chikungunya disease	There are no specific medications to treat chikungunya, but the goal of treating the incidence is to relieve the accompanying symptoms, including joint pain

Elephantiasis	There is still no definitive cure for elephantiasis but antideworms can be used: • Diethylcarbamazine • Ivermectin • Albendazole Doxycycline antibiotic can be added To relieve allergy symptoms, antihistamines and painkillers can be used.

Prevention of Mosquito-borne diseases Infection with such diseases can be prevented by:

- Mosquito control.
- Take all possible measures to protect yourself from mosquito bites, such as wearing long-sleeved clothes, covering the legs in places infested with insects, and applying insect repellents to the skin and clothing.
- Make sure to place mesh nets with tiny holes on all windows and doors to prevent insects from coming in.
- Use a mosquito net if you are planning to sleep outside.
- Avoid traveling to places where insect-borne diseases are as common as possible, and be sure to receive vaccines or medicines to prevent them in case of travel such as yellow fever or malaria.

Fly-borne diseases

Types of flies carrying infectious diseases:

Type of fly	The disease it causes	Description and whereabouts
Sand fly	**Leishmania**	They feed on the blood and their ability to fly is weak and move by jumping from one victim to another. Their size is very small (3 mm) so it is difficult to find them before they start feeding on the victim, their bites cause severe pain that may last for several days.
Black flies	**River blindness**	It is characterized by proliferation in running water such as small streams and rivers whose salivary fluids can cause a disease called black fly fever. It also transmits a nematode that lives within the human body for up to fifteen years, destroying the way the tissues of the internal organs, most notably the eyes; causing blindness
Tsetse fly	**African trypanosomiasis**	A two-wing African fly, carrying the parasite that causes African sleep sickness and transmitting it to humans through stings. It lives on the shores of lakes or river banks

- **Leishmania:**

  Leishmaniasis is an infectious disease transmitted to humans by more than 20 species of parasites that affect mammals, including humans. These parasites infect human leishmaniasis to varying degrees, where symptoms range from ulcers and skin infections to injuries and destruction of different organs and parts in humans.

Clinical symptoms:

Symptoms vary depending on the type of infection. Leishmania is divided into three types:

1. **Dermal Leishmaniasis:**
   Infection in this case occurs only in the skin and does not affect the internal organs, and is in the form of superficial or deep ulcers. The symptoms begin in the form of redness and itching at the site of the bite of the fly, and after a few weeks it grows in size and may turn into a sore that produces pus or the ulcer remains dry and shows scales. The infection appears in exposed parts of the body such as the face, arms, legs, and feet.
   Ulcers can occur in the case of a bacterial infection or a problem with a person's immunity (such as immunodeficiency disease), as healing of such cases is delayed and may leave scars that do not disappear.
2. **Visceral Leishmania**
   Symptoms begin after the bite of the sandfly where a person develops high body temperature, sweating, general weakness, diarrhea, cough, weight loss, and symptoms similar to anemia.
   It is also noted that the person has enlarged liver and spleen. As the disease develops, the color of the skin changes to the brown, especially in the area of the forehead, hands, feet and abdomen.
   Many of the symptoms are similar to those of malaria, tuberculosis, and brucellosis; laboratory tests are needed to verify the diagnosis.
3. Leishmania mucous membranes:
   The infection occurs after the bite of the sand fly, and the symptoms are concentrated in the respiratory area and begin in the mucous membranes of the nose, where cases of epistaxis and nasal sinus congestion, and then develop into ulcers in the nasal membranes, and extends to the throat and pharynx, and in advanced cases, the person develops pneumonia.

How is Leishmaniasis treated?

- In cases of infection with cutaneous leishmaniasis, it heals mostly spontaneously without treatment, but it may take a long time to heal ulcers for up to two years, and may leave undesirable and distorted scars on the skin;
- Dermal leishmaniasis can be treated with injections called intravenous antimony compounds (intramuscularly or intravenously) or topically within the ulceration.
- Exposure to ulceration of heat, radiation or cooling may be used to treat certain conditions.
- In cases of visceral leishmaniasis, it is recommended to treat the condition to prevent the development of the disease and reduce scars and reduce cases of disease resistance. These cases are treated with pentathlonal antimony compounds by intramuscular, intravenous, or topical intra-ulceration, or by other medications such as painkiller and lupirinol.

How to protect yourself from leishmaniasis?

- Exercise caution when in the gardens and farms early in the morning and evening and cover your body parts.
- Spray pesticides in gardens, farms and water gathering places
- Maintain cleanliness of pets such as dogs and cats
- Spray body and clothing with insect repellents
- Use mosquito nets for children

River blindness:

The disease is caused by nematode infection, called onchocerciasis, which is transmitted to humans by bites of black flies that live and multiply around running water and rivers. Worms live in the human

body for a long period that may extend for fifteen years, and when they die the immune system activates to resist dead tissues, thus appearing Symptoms, including:

- Severe itching
- Changes in skin color
- The appearance of nodes and clumps under the skin
- Damage to tissues and cells such as the eye, causing blindness

How to treat cases of river blindness?

Make sure to treat infections to prevent their development and complications on the skin and eyes.

Every six months, ivermectin should used to kill worm larvae and stop reproduction. Doxycycline can also be used to kill adult worms.

How to prevent river blindness?

1. There are no vaccines or medicines to prevent the disease.
2. Avoiding bites of flies is the best form of prevention using:

- Mosquito nets.
- Cover the body by wearing long sleeves.
- Use insect repellent creams on the skin.

- African trypanosomiasis:

Sleep disease, also called “African trypanosomiasis", is a parasitic disease transmitted by tsetse bites, which are found mainly in mixed savannah and forest environments in Africa only.

Human African trypanosomiasis takes two forms according to the causative parasite:

- (Trypanosoma bruce gambi) This form of the disease is spread in West and Central Africa.
- (Prussian Rhododian Trypanosoma) is spread in East and South Africa.

What are the symptoms of the disease?

The first stage:

Called lymphatic stage, trypanosomiasis proliferates in subcutaneous tissue, blood and lymph nodes. This stage of the disease is characterized by episodes of fever, headache, joint pain and itching.

The second phase:

Called the neurological phase, the parasites penetrate the blood-brain barrier and infect the central nervous system with the appearance of signs and symptoms, including:

- Changes in behavior and disorders
- Poor concentration
- sleep disorders
- If untreated, sleeping disease can lead to death.

What is the treatment of sleeping disease?

Treatment is determined by the stage at which the disease is diagnosed

Stage	Drugs used
• First stage	• Pentamidine • Suramin
• Second stage	• Melarsoprol • Eflornithine

How can sleep disease be prevented?

- There are no vaccines or medicines to prevent the disease.
- Avoiding bites of flies is the best form of prevention using:
    - Mosquito nets
    - Cover the body by wearing long sleeves
    - Use insect repellent creams on the skin

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Tick-borne diseases

What is tick?

An insect that sucks the blood of animals and transmits diseases by transferring the blood it carries in its mouth from one creature to another. This insect may also absorb human blood if it is present in its environment. It is found in animal husbandry and forest barns.

Main tick-borne diseases:

- Lyme disease
- Crimean fever

Disease	Definition	Symptoms:	Prevention	Treatment
Lyme disease	• A disease transmitted by a tick bite and the transfer of a type of bacteria to humans	• Flu-like symptoms • Skin rash • Joint pain • Disorders in the nervous system	• Avoid areas where lyme-borne ticks breed and multiply • Use insecticide-treated clothing in areas where common ticks are common • After going to a safe place, take off your clothes and do a self-check for ticks.If you find an insect that has inserted parts of its mouth into the skin, get rid of it properly.It is important to remove the insect completely, because leaving parts of it on the skin may transmit infection. Wash the	some types of antibiotics can be used to control inflammation due to bacterial infection

			affected area with soap and water • Wear a long-sleeved, light-colored shirt, long trousers and locked shoes to the front Use repellents on clothing and skin	
Crimean fever	A disease transmitted by a tick bite and transmits a type of virus to humans	• Fever • Headache • Back and joint pain • Stomach pain and vomiting • Eye infections. Red spots in the throat		Health care in hospital for adjuvant therapy: • Full rest • Intravenous solutions to compensate for dehydration • Monitoring biological signs • Blood transfusion when needed • Antiviral ribavirin may be used

Bug-borne diseases

What are bugs?

They are large nocturnal insects, which can be found in buildings with thatched roofs where they can hide in the daytime. Although they are large, their bites are painless, but they leave their contaminated stools near the opening of the wound.

Main Bug-borne diseases

Chagas disease

What is Chagas disease?

This disease occurs as a result of the transmission of trypanosomiasis Crozi (Trypanosomacruzi) to humans through the bug insect, known by several names, including "kissing bugs" and bug insects bite lips or face and usually leave behind feces contaminated with this parasite.

Where is Chagas disease spread?

- The disease spreads in rural areas, especially in houses with thatched roofs, and bugs hide during the day in the cracks of walls and ceilings, mud and brick milk, and feed on human blood.
- Predominantly in Mexico, Central America or South America.

What are the symptoms of the disease?

There are two phases of Chagas disease:

Acute phase:

The acute phase lasts several weeks or months after infection, is rarely fatal, and symptoms are mild and may not be noticed, including:

- Fever and body aches
- swelling of the eyelid
- Swelling at the bite site

- Swelling of the of the acute phase often go away without treatment, but the infection does not go away, and the infection continues if untreated and can develop into the chronic phase.

Chronic phase:

Chronic phase may be more serious, and symptoms may appear up to 10-20 years after infection, including:

- Irregular heartbeats.
- Cardiac hypertrophy
- Problems with digestion and bowel movement.
- Increased chance of stroke.

What is the treatment of Chagas disease?

Treatment of Chagas disease depends on the elimination of the parasite and the treatment of symptoms associated with the infection.

In the acute phase, treatment with antiparasitic drugs can be used. In the chronic phase, treatment is limited to symptomatic treatment.

How can Chagas disease be prevented?

- Avoid sleeping in mud and straw houses, as these types of housing are more likely to house triatomine bugs.
- Use insecticides to remove insects from the place of residence.
- Insect repellent products can be sprayed on beds to eliminate bedbugs

Diseases transmitted by helminths

The most important diseases transmitted by snails:

Bilharzia

What is bilharzia?

It is a disease caused by parasitic worms.

How can you get the disease?

Infection occurs when the skin is exposed to fresh water containing snails

that transmit worms.
Fresh water becomes contaminated with schistosomiasis eggs when infected people urinate or defecate in those waters, where eggs hatch and worms and infect appear certain types of snail snails found in fresh water to grow and multiply within the shell. T he parasite then leaves the snails and moves to the surrounding water where it can survive for 48 hours.
Within several weeks, helminths mature and become adult, remaining in the blood vessels where females produce eggs. Some eggs move into the bladder or intestines and then come out with urine or stool.

What are the symptoms of Bilharzia?

- Within days of infection, you may develop a rash or itching.
- Fever, chills, cough, muscle pain can appear within one to two months of infection.
- • In adult worms, eggs move to the intestines, liver, or bladder causing inflammations or scars.
- Children who develop frequent schistosomiasis may experience anemia and learning difficulties.
- Liver, intestinal, lungs and bladder damage may occur years after infection.

How can cases of schistosomiasis be diagnosed?

Blood, urine or stool samples are taken to detect the presence of parasites, and the results usually appear 6-8 weeks after exposure to contaminated water.

What is the treatment for schistosomiasis?

There are safe and effective medications in the treatment of schistosomiasis, including praziquantel, a drug that is usually recommended to use, and should consult a doctor for diagnosis and treatment.

What are the risk factors?

People present or traveling to areas where schistosomiasis has spread and their skin has been exposed to fresh water in rivers, lakes, streams and lakes are at risk.

Prevention:

- Dry the skin thoroughly after exposure to water in endemic areas.
- Do not swim in ponds or stagnant water, and do not defecate there at all.
- Control of snails carrying the infectious phase of schistosomiasis
- Always maintain personal hygiene and use pure water to drink or shower.
- Dispose of human waste away from water sources.
- Bath water should be heated to a boiling point for at least 1 minute. Water stored in reservoirs for at least two days is usually safe.