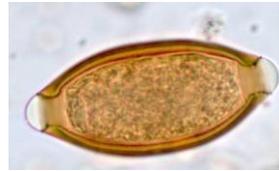
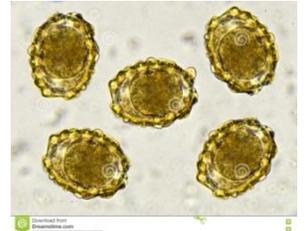




Hook eggs



Trichuris egg



Ascaris egg



Soil-transmitted helminths (NTDs)

Soil-transmitted helminth infections are among the most common infections worldwide and affect the poorest and most

deprived communities. They are one of Neglected tropical diseases.

Transmitted by eggs present in human faeces which in turn contaminate soil in areas where sanitation is poor. The main species that infect people are the roundworm (*Ascaris lumbricoides*), the whipworm (*Trichuris*

trichiura) and the hookworms (*Necator americanus* and *Ancylostoma duodenale*).

Soil-transmitted helminth infections are widely distributed in all WHO Regions. For the control of these infections, WHO recommends the periodic administration of anthelmintic medicines (albendazole or mebendazole) as a

public health intervention, for children (from 1 to 15 years of age) living in areas where the prevalence of STH is estimated to be over 20%.

According to WHO estimates about 1 billion children worldwide require preventive chemotherapy for soil-transmitted helminthiases.

In 2018 more than 576 million children in need of treatment received preventive chemotherapy for STH, corresponding to 54% global coverage. In 2018, 30 countries have reached the World Health Assembly's target of treating at least 75% of school-aged children requiring preventive chemotherapy for the disease. Soil-transmitted helminths (STHs) refer to the intestinal worms infecting humans that are transmitted through contaminated soil ("helminth" means parasitic worm): *Ascaris lumbricoides* (sometimes called just "Ascaris"), whipworm (*Trichuris trichiura*), and hookworm (*Ancylostoma duodenale* and *Necator americanus*). A large part of the world's population is infected with one or more of these soil-transmitted helminths:

approximately 807-1,121 million with Ascaris

approximately 604-795 million with whipworm

approximately 576-740 million with hookworm

Soil-transmitted helminth infection is found mainly in areas with warm and moist climates where sanitation and hygiene are poor, including in temperate zones during warmer months. These STHs are considered Neglected Tropical Diseases (NTDs) because they inflict tremendous disability and suffering yet can be controlled or eliminated.

Morbidity and symptoms

Morbidity is directly related to worm burden: the greater the number of worms in the infected person, the greater will be the severity of disease. Soil-transmitted helminths impair the nutritional status of those infected in many ways, sometimes causing death by:

- negatively affecting nutritional status (causing intestinal bleeding, loss of appetite, diarrhoea or dysentery, and reducing absorption of micronutrients);
- worsening school performance;
- causing complications that require surgical intervention (i.e. intestinal obstruction and rectal prolapse).

Concomitant infections with other parasite species are frequent and may have additional effects on nutritional status and organ pathology.

Transmission

Soil-transmitted helminths live in the intestine of infected individuals where they produce thousands of eggs each day that are passed in the faeces. Where the environmental conditions are favourable, the eggs develop into infective stages.

Humans become infected when ingesting infected eggs (*Ascaris lumbricoides* and *Trichuris trichiura*) or larvae (*Ancylostoma duodenale*) in contaminated food (e.g. vegetables that are not carefully cooked, washed or peeled), hands or utensils or through penetration of the skin by infective hookworm larvae in contaminated soil (*Necator americanus* and *Ancylostoma duodenale*).

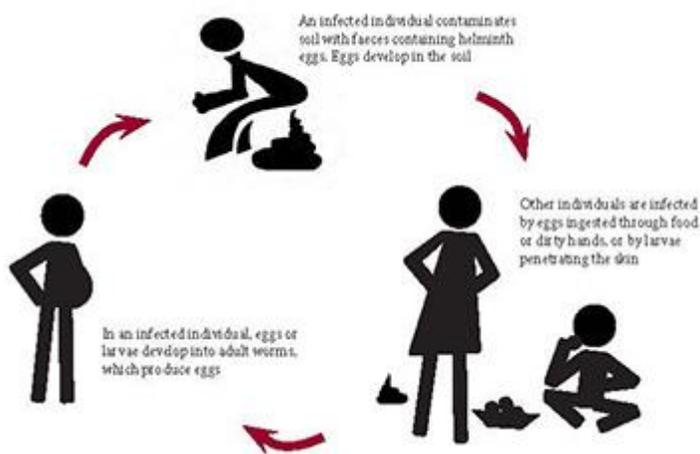


Figure schematic life-cycle (source: helminth control in school age children)

There is no direct person-to-person transmission or infection from fresh faeces because eggs passed in faeces need about 3 weeks in the soil before they become infective.

Treatment: albendazole and mebendazole

Soil-transmitted helminths live in the intestine and their eggs are passed in the feces of infected persons. If an infected person defecates outside (near bushes, in a garden, or field) or if the feces of an infected person are used as fertilizer, eggs are deposited on soil.

Hookworm eggs are not infective. They hatch in soil, releasing larvae (immature worms) that mature into a form that can penetrate the skin of humans. Hookworm infection is transmitted primarily by walking barefoot on contaminated soil. One kind of hookworm (*Anclostoma duodenale*) can also be transmitted through the ingestion of larvae.

People with light soil-transmitted helminth infections usually have no symptoms. Heavy infections can cause a range of health problems, including abdominal pain, diarrhea, blood and protein loss, rectal prolapse, and physical

and cognitive growth retardation. Soil-transmitted helminth infections are treatable with medication prescribed by your health care provider.

Hookworm

An estimated 576-740 million people in the world are infected with hookworm. Hookworm was widespread in the southeastern United States until the early 20th century but is now nearly eliminated.

Hookworm, *Ascaris*, and whipworm are known as soil-transmitted helminths (parasitic worms). Together, they account for a major burden of disease worldwide.

High-intensity hookworm infections occur among both school-age children and adults, unlike the soil-transmitted helminths *Ascaris* and whipworm. High-intensity infections with these worms are less common among adults. The most serious effects of hookworm infection are the development of anemia and protein deficiency caused by blood loss at the site of the intestinal attachment of the adult worms. When children are continuously infected by many worms, the loss of iron and protein can retard growth and mental development.

Prevention:

The best way to avoid hookworm infection is not to walk barefoot in areas where hookworm is common and where there may be human fecal contamination of the soil. Also, avoid other skin contact with such soil and avoid ingesting it.

Infection can also be prevented by not defecating outdoors and by effective sewage disposal systems.

Ascaris

An estimated 807-1,221 million people in the world are infected with *Ascaris lumbricoides* (sometimes called just "Ascaris"). *Ascaris*, hookworm, and whipworm are known as soil-transmitted helminths (parasitic worms). Together, they account for a major burden of disease worldwide. Ascariasis is now uncommon in the United States. People infected with *Ascaris* often show no symptoms, regardless of the species of worm. If symptoms do occur they can be light and include abdominal discomfort. Heavy infections can cause intestinal blockage and impair growth in children. Other symptoms such as cough are due to migration of the worms through the body.

Prevention:

- avoid ingesting soil that may be contaminated with human or pig feces, including where human fecal matter
- Wash your hands with soap and water before handling food.
- Wash your hands with soap and water after touching or handling pigs, cleaning pig pens, or handling pig manure.

- Teach children the importance of washing hands to prevent infection.
- Supervise children around pigs, ensuring that they do not put unwashed hands in their mouths.
- Wash, peel, or cook all raw vegetables and fruits before eating, particularly those that have been grown in soil that has been fertilized with manure.

Whipworm (Trichuris Trichuira)

An estimated 604-795 million people in the world are infected with whipworm. Whipworm, hookworm, and Ascaris are known as soil-transmitted helminths (parasitic worms). Together, they account for a major burden of disease worldwide.

infected with whipworm can cause light or heavy infections. People with light infections usually have no symptoms. People with heavy symptoms can experience frequent, painful passage of stool that contains a mixture of mucus, water, and blood. Rectal prolapse can also occur.

Prevention same as Ascaris