

Soil-Transmitted Helminth Infection Fact Sheet

Geographic Distribution and Prevalence

Soil-Transmitted Helminth (STH) infection is highly endemic in tropical and subtropical areas of sub-Saharan Africa, Asia and Latin America, where up to 2 billion people have active infections. STH infection has remained largely neglected by the global health community because the people most affected are among the most impoverished and because the infection causes chronic ill health with insidious clinical presentations, rather than severe acute illness or high mortality. However, it is now recognized that STH infection causes significant morbidity worldwide with 39 million disability adjusted life years (DALYs) lost each year - more than those lost to malaria (36 million yearly) and approaching those lost to tuberculosis (47 million yearly). Hookworm infection alone causes the loss of 22 million DALYs.

Worldwide estimates of number of STH infections by region (millions of cases).

Region \ Disease	Latin America & Caribbean	Sub-Saharan Africa	Middle East & North Africa	South Asia	India	East Asia & Pacific Islands	China	Total
Ascariasis	84	173	23	97	140	204	86	807
Trichuriasis	100	162	7	74	73	159	29	604
Hookworm	50	198	10	59	71	149	39	576

Transmission and Disease Characteristics

STH infection is caused by four major nematode species: *Ancylostoma duodenale* and *Necator americanus* (hookworms), *Ascaris lumbricoides* (roundworm) and *Trichuris trichiura* (whipworm). Infection is prevalent in areas with over-population and inadequate sanitation in tropical and subtropical countries, where the climate supports the survival of the parasite eggs or larvae in the warm and moist soil. After infective larvae enter the human body they develop into adult worms and parasitize the gastrointestinal tract, sometimes for years. Some species of worms can produce up to 200,000 eggs per day. Eggs are excreted in the feces and remain viable in the soil for several weeks or years depending on the species. It is common for a single individual, especially a child, to be infected with all three types of worms.

Although STH infection rarely causes fatality, chronic infection with high worm burden can lead to serious health consequences. Infection is typically most intense and debilitating in school-age children, resulting in malnutrition, physical and intellectual growth retardation, and cognitive and educational deficits. *A. lumbricoides* may cause intestinal obstructions that require surgery, and *T. trichiura* may cause chronic colitis. Hookworm infection causes iron-deficiency anemia because the worms feed on the intestinal wall causing tissue damage and blood loss. Hookworm infection is a leading cause of morbidity in children and pregnant women, and can have adverse results for the mother, the fetus and the neonate.

Recently, it has been suggested that individuals having STH infection may fail to develop protective immune responses when exposed to unrelated pathogens, such as *Plasmodium* (causing malaria), *Mycobacterium* (causing tuberculosis) and HIV (causing AIDS). These findings highlight that public health implications of STH infection are much greater than previously realized and that STH infection may indirectly contribute to significant mortality worldwide.

Current Control Strategy and Therapeutic Options

A strategy emerged in the early 1990s to focus global deworming efforts on school-aged children. Prevalence in children now serves as a guide to treat an entire community in endemic areas. Currently, a periodic, large-scale deworming by chemotherapy is the main morbidity control strategy. Such chemotherapy prevents the infection from developing into critically debilitating disease and also interrupts the transmission cycle. The World Health Assembly passed a resolution WHA54.19 (2001) to treat STH infections in high-risk groups with a goal of treating over 75% of school-age children at risk by 2010.

During the last 30 years, only four drugs have been recommended by the World Health Organization to treat STH infection: two benzimidazole carbamates (albendazole and mebendazole), levamisole, and pyrantel pamoate. Other than these four drugs, only a few other drugs have undergone clinical testing, and none of them showed desired efficacy in treatment of hookworms. Repeated use of only a few drugs over a long period of time raises a concern that these drugs may soon face resistance problems in the field. Indeed, recent reports have indicated unexpectedly low cure rates of mebendazole against hookworm infection in Mali, Zanzibar and Vietnam.

The lack of recent development activity in the antihelmintic drug pipeline and concerns over emerging drug resistance in the face of imminent large-scale deployment of benzimidazoles brings about an urgent need to rapidly develop a safe and effective new drug to complement the existing treatment options. Furthermore, the fact that protective immunity doesn't develop even after repeated infections with STH and that people treated with a drug soon become re-infected means that there will continue to always be a need for drug treatment in STH control programs.

OneWorld Health's Role

The Institute for OneWorld Health aims to create new therapeutic tools to support and augment the capabilities of the global control of STH infections in developing countries. We have identified promising compounds in partnership with established STH experts. While our main focus is on the development of new, safe and affordable medicines, we intend to collaborate closely with the organizations working on STH control and disease management to enable rapid deployment and integration of new drugs in the on-going global effort.

Sources

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