

The Global State of Helminth Control and Elimination in Children



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KEYWORDS

- Soil-transmitted helminths • Schistosomiasis • Mass drug administration
- Anthelmintics • Vaccine

KEY POINTS

- Soil-transmitted helminths and schistosomiasis are some of the most common infections found in children and adolescents worldwide and cause significant morbidity and chronic disability.
- Current strategies to reduce morbidity associated with soil-transmitted helminths and schistosomiasis include mass drug administration (MDA) and programs of water, sanitation, and hygiene (WASH).
- Although MDA and WASH are reducing the overall prevalence of helminth infections, global elimination remains elusive because of low drug efficacies and reinfection.
- Alternative strategies, including improved diagnostics, improved worm prevalence and resistance monitoring, new anthelmintics diagnostics, therapies, and vaccines, are required.

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INTRODUCTION

Helminth infections, including hookworm (*Necator americanus*, *Ancylostoma duodenale*), roundworm (*Ascaris lumbricoides*), and whipworm (*Trichuris trichiura*), collectively known as intestinal (or soil) transmitted helminths, as well as schistosomiasis, are among the most common infections found in children worldwide, infecting almost 2 billion people (Table 1).^{1,2} Although intestinal helminth infections and schistosomiasis are not the only major parasites affecting children, their overwhelming numbers in terms of pediatric cases globally requires special attention. New estimates from the Global Burden of Disease Study 2015 indicate that together these helminth infections resulted in more than 6 million disability-adjusted life-years (DALYs), a number roughly equivalent to the DALYs caused by measles, *Haemophilus influenzae* type B meningitis, or other better-known pediatric conditions.² However, even these DALY estimates may represent “low-ball” figures based on revised estimates of more than 4 million DALYs from hookworm alone.³ Thus, although intestinal helminth infections are not leading causes of death,⁴ they are profoundly important causes of childhood disability and even future economic disrupters, with calculated adverse effects on future wage earning. Overwhelmingly, these worms affect children living in extreme poverty, particularly those living in rural communities or urban communities that lack adequate water, sanitation, and hygiene (WASH).⁵ Contrary to previous assumptions, helminths and other neglected tropical diseases are not restricted exclusively to resource-limited countries. For some worm infections, there is a significant burden of disease found in poor communities living in countries with robust economies, including areas of the United States.⁶

The most common and most profound disabilities resulting from each of the major intestinal helminth infections and schistosomiasis are shown in Table 2. Children acquire their primary infection as they begin interacting with the environment during their pre-school years and reach maximum worm burden for roundworm and whipworm (transmission via oral ingestion of embryonated eggs) by school age, whereas for hookworm and schistosomiasis (transmission via direct percutaneous invasion of larvae) in adolescence or young adulthood.^{8,9} Overall, children infected with intestinal helminths and/or schistosomiasis often suffer from restrictions in cognitive development, impairment in memory, and reduced education attendance and performance.^{5,9,10} These deficits lead to impaired school achievement.^{9,11} Preschool- and school-aged children are at

Table 1
Prevalence and impact of major helminth infections, soil-transmitted helminths, and schistosomiasis, globally

	Major Human Species	Estimated Prevalence (Cases)	DALYs (Millions)	Deaths	References
Roundworm (Ascariasis)	<i>Ascaris lumbricoides</i>	761.9 million	1.075	2700	2,4,7
Whipworm (Trichuriasis)	<i>T trichiura</i>	463.7 million	0.653	None specified	2,4,7
Hookworm	<i>N americanus</i> and <i>Ancylostoma</i> sp	428.2 million	1.758	None specified	2,4,7
Blood Fluke (Schistosomiasis)	<i>S haematobium</i> , <i>S mansoni</i>	252.3 million	2.613	4400	2,4,7
Total		>1.9 billion	6.096	7100	—

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