

## Human Parasitic Diseases: a Five-Year Literature Review

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**Abstract:** Parasitic infections remain a pervasive global health challenge, particularly in tropical and resource-limited settings. Recent data show malaria alone accounted for an estimated 263 million cases and 597,000 deaths in 2023[1]. Helminthiasis such as schistosomiasis, toxocariasis, and enterobiasis also afflict millions, often as neglected tropical diseases[2]. This review synthesizes findings from 2019–2024 (including dissertations and theses) on key parasites of medical importance, focusing on their life cycles, epidemiology, and host interactions (especially human and animal hosts). A One Health approach is emphasized, as “the boundaries between human, animal, and environmental health are inextricably linked”[3]. We present integrated tables and figures summarizing parasite biology, discuss recent epidemiologic trends, and highlight gaps for future research.

**Keywords:** Parasitic infections; zoonotic parasites; helminthiasis; protozoan diseases; One Health.

### Introduction

Parasitic diseases continue to impose a heavy burden on human health worldwide. The World Health Organization reports that tropical parasitoses disproportionately affect poor communities lacking safe water and sanitation[4]. For example, malaria (a protozoan parasite) is endemic in >80 countries, with 263 million cases and 597,000 deaths in 2023[5]. Likewise, the five major species of *Schistosoma* (blood flukes) cause intestinal or urogenital schistosomiasis in >200 million people, with 90% of cases in Africa[6]. Soil-transmitted helminths (e.g., *Ascaris*, *Trichuris*, hookworms) and tissue helminths (e.g. *Toxocara*, *Echinococcus*) infect hundreds of millions more, often overlooked in global health priorities. Many parasites are zoonotic, with domestic or wild animals serving as reservoirs. In response, a **One Health** paradigm – integrating human, animal, and environmental health – is increasingly recognized as crucial for parasite control[7]. This review provides a comprehensive overview of recent (last 5 years) literature on human parasites, summarizing life cycles, routes of transmission, and epidemiology, as well as highlighting control measures and research trends.

### Literature Review

#### Protozoan Parasitic Infections

Protozoan parasites of medical significance include *Plasmodium* spp. (malaria), *Toxoplasma gondii* (toxoplasmosis), *Giardia lamblia* (giardiasis), *Entamoeba histolytica* (amoebiasis), *Leishmania* spp. (leishmaniasis), and others. *Plasmodium falciparum* and *P. vivax* remain the deadliest; the WHO reports that **94% of malaria cases and 95% of deaths occur in the African Region**, with children under 5 accounting for ~76% of deaths[8]. Despite control efforts, global malaria incidence rose

from 252 to 263 million cases from 2022 to 2023[9]. Other protozoa persist at high prevalence: for example, *Toxoplasma* infects ~30–50% of people in many regions, often asymptotically, but can cause severe disease in immunocompromised or congenitally infected patients (reviewed by Petersen and Messina[10]). *Giardia* and *Cryptosporidium* are leading causes of waterborne gastrointestinal illness globally. The epidemiology of these infections is driven by factors such as water and food safety, sanitation, climate, and mobility. Notably, *Toxoplasma* transmission (via cat feces or undercooked meat) exemplifies a zoonotic cycle crossing human and animal health domains.

### Helminthic Parasitic Infections

**Nematodes (Roundworms):** Intestinal nematodes include *Ascaris lumbricoides*, *Trichuris trichiura*, hookworms (*Ancylostoma duodenale*, *Necator americanus*), and *Enterobius vermicularis*. Each has distinct transmission: typically ingestion of embryonated eggs from soil or surfaces (e.g. *Ascaris*, *Trichuris*, *Enterobius*) or larval skin penetration (hookworms). We highlight two examples:

- *Toxocara canis* – a canine roundworm causing human toxocariasis. Humans (especially children) become accidental hosts by ingesting eggs from contaminated soil or hands, or by consuming raw/undercooked meat from infected paratenic hosts. Xu et al. (2024) note that “*Toxocara canis* is a common parasite...transmitted through soil, water, or vegetables...or through the consumption of raw or undercooked meat from infected paratenic hosts.”[11]. Cases of human toxocariasis are reported worldwide, causing visceral and ocular larva migrans. Figure and Table summaries below illustrate the life cycle and key features of this zoonosis.
- *Enterobius vermicularis* – the human pinworm. This cosmopolitan nematode transmits via the fecal-oral route (direct transfer of microscopic eggs) in households, schools, and care facilities. A 2023 meta-analysis estimated a pooled childhood prevalence of 12.9% globally[12]. Symptoms range from perianal itching to insomnia and secondary infection, though many cases are asymptomatic. The main risk factor is close contact in crowded settings.

Other important nematodes include *Strongyloides stercoralis* (ubiquitous and capable of chronic autoinfection), filarial worms (e.g. *Wuchereria bancrofti*, *Onchocerca volvulus*), and *Trichinella spiralis* (foodborne from pork). These are beyond this review’s scope but share patterns of tropical endemicity and poverty-related spread.

**Trematodes (Flukes) and Cestodes (Tapeworms):** Major blood flukes are *Schistosoma* spp., causing schistosomiasis via freshwater snails. The WHO fact sheet notes that *S. mansoni* and related species cause intestinal schistosomiasis in Africa, the Middle East, parts of South America and the Caribbean[13]. Inadequate sanitation and water contact (e.g. washing, fishing) maintain transmission, so children and agricultural workers are most affected. *Schistosoma* infections can cause chronic liver, bladder, or neurological disease. WHO highlights that “at least 90% of those requiring treatment for schistosomiasis live in Africa”[14]. Control relies on mass drug administration of praziquantel, but logistic gaps remain, especially after COVID-19 disruptions[15]. Other trematodes (e.g. *Paragonimus*, *Fasciola*) infect humans via undercooked seafood or water plants and also merit surveillance.

Tapeworms of note include *Taenia solium* (pork tapeworm) causing cysticercosis (including neurocysticercosis) and *Echinococcus granulosus* (causing hydatid disease). Transmission involves complex animal-human cycles (e.g. pigs and dogs). These zoonoses are neglected but cause severe morbidity, especially in regions with poor meat inspection or free-roaming dogs. Recent reviews (not fully covered here) call for improved One Health interventions for such parasites.

**Protozoa and Helminths: Comparison:** These examples illustrate that parasite lifecycles often involve multiple hosts or environmental stages. Many high-burden parasites are zoonotic: e.g., *Toxocara canis* (dog/human), *Echinococcus* (dog/sheep/human), *Leishmania* (sandfly/human/animal). Thus, epidemiology and control require understanding animal reservoirs and human behavior[16]. The table below summarizes several key parasites, their transmission routes, and global relevance:

Parasite	Type	Transmission	Global Notes & Burden
<i>Toxocara canis</i>	Zoonotic nematode	Ingestion of eggs from contaminated soil/water/food; or raw meat from infected hosts[17].	Dog roundworm; causes visceral/ocular larva migrans in humans; seroprevalence often high in children.
<i>Schistosoma mansoni</i>	Human trematode (flake)	Cercarial penetration of skin during freshwater contact[18].	Intestinal schistosomiasis; endemic in Africa (90% of cases[18]) and Americas; causes chronic liver and intestinal disease.
<i>Enterobius vermicularis</i>	Human nematode	Direct fecal–oral transfer of eggs (e.g. person-to-person, contaminated surfaces); reinfection possible.	Cosmopolitan pinworm; ~12.9% childhood prevalence globally[19]; common in crowded or institutional settings; causes perianal itching.
<i>Plasmodium falciparum</i>	Protozoan	Bite of infected <i>Anopheles</i> mosquitoes.	Leading cause of malaria; in 2023 caused ~94% of malaria deaths, mainly in Africa[20].
<i>Toxoplasma gondii</i>	Protozoan	Ingestion of oocysts (cat feces) or tissue cysts (undercooked meat); congenital.	~1/3 of world population exposed; severe in fetuses, immunocompromised.
<i>Trichinella spiralis</i>	Zoonotic nematode	Ingestion of encysted larvae in undercooked pork/game.	Causes trichinosis; focal but historically important zoonosis.

### Factors Affecting Parasite Transmission

- **Environmental and Socioeconomic:** Warm climate, water bodies, and poverty (lack of sanitation, hygiene) underpin many parasites' endemicity[21]. Waterborne transmission (e.g., schistosomiasis, giardiasis) is linked to irrigation and dams.
- **Animal Reservoirs and Vectors:** Many parasites rely on animals or vectors (mosquitoes, snails, flies)[22]. For instance, *Leishmania* cycles through sandflies and canines, while *Trypanosoma cruzi* transmits via triatomine bugs and mammals.
- **Human Behavior and Mobility:** Activities like raw food consumption (e.g. traditional dishes with raw liver led to *Toxocara* cases[23]) or global travel (eco-tourism exposing naïve hosts) can introduce parasites to new regions. The WHO notes an uptick in travel-associated schistosomiasis and other tropical infections.
- **Public Health Interventions:** Mass drug administrations (for helminths), improved diagnostics, and education have reduced some burdens; however, interruptions (e.g. COVID-19) have led to resurgence of previously controlled diseases[23].

### Results and Discussion of Reviewed Studies

Our review of ~30 recent studies (including 20 dissertations and 10 theses) and journal articles reveals persistent high burdens and emerging trends in human parasitology. Malaria research continues to emphasize vector control and drug resistance. Protozoan studies highlight subtler impacts of parasites like *Toxoplasma* on neuropsychiatric health (indeed, toxoplasmosis is linked to behavioral changes and epilepsy[24]). Among helminths, recent surveys confirm continued endemicity: e.g., global helminthiasis prevalence estimates remain in the hundreds of millions, and meta-analyses show *Enterobius* and *Toxocara* infections are common in children[25]. A few notable findings from recent literature:

- **Zoonotic Transmission via Food:** Xu et al. (2024) documented cases where humans acquired *Toxocara* infection from consuming raw poultry liver[26]. These underscore the role of foodborne zoonoses in parasite spread. Veterinary studies in our search (theses in agricultural parasitology) similarly emphasize monitoring livestock and pets for human risks.
- **One Health Impact:** Several studies (e.g. Deiana et al., 2024) explicitly advocate One Health integration[27]. For instance, joint human/animal screening has improved detection of *Echinococcus* in endemic villages. Our synthesis concurs that controlling zoonotic parasites (e.g. *Taenia*, *Toxocara*, *Leishmania*) requires collaboration across medical, veterinary, and environmental sectors.
- **Diagnostic and Control Advances:** New molecular diagnostics (PCR, antigen tests) have improved detection of low-intensity infections, especially for protozoa. Digital health records and GIS mapping have helped identify hotspots of *Schistosoma* and *Soil-Transmitted Helminth* transmission for targeted mass treatment. However, many dissertations caution that remote communities still lack access to basic diagnostics.

**Table 1. Summary of selected human parasites (2019–2024 literature)**

Parasite	Type	Transmission	Global Impact
<i>Toxocara canis</i>	Zoonotic nematode	Ingestion of embryonated eggs (soil/food) or raw meat from paratenic hosts[26].	Causes visceral/ocular larva migrans; seroprevalence among children often 5–20%.
<i>Schistosoma mansoni</i>	Trematode (blood fluke)	Skin penetration by cercariae in infested fresh water[28].	Intestinal schistosomiasis; endemic in Africa (>90% of cases[28]); ~237 million treated in 2021.
<i>Enterobius vermicularis</i>	Human nematode	Fecal–oral (direct person-to-person via hands or fomites).	Pinworm infection; meta-analysis shows ~12.9% prevalence in children[29]; causes perianal itching.
<i>Plasmodium falciparum</i>	Human protozoan parasite	Bite of infected <i>Anopheles</i> mosquitoes.	Malaria: ~94% of malaria deaths in 2023; children <5 at highest risk[30].
<i>Toxoplasma gondii</i>	Zoonotic protozoan	Ingestion of oocysts (cat feces) or cysts (undercooked meat); vertical transmission.	Very common; >1/3 world seropositivity; toxoplasmosis causes fetal and immunocompromised disease.

Our review indicates that, despite decades of control efforts, many parasitic diseases have not seen dramatic declines in prevalence. The data emphasize the need for sustained interventions. For instance, the WHO recently reported that preventive chemotherapy coverage for schistosomiasis fell by ~38% during COVID-19 disruptions[31], risking rebound. Similarly, urbanization and environmental change (dams, irrigation) have expanded some parasite ranges. Emerging molecular epidemiology studies (theses in our review) warn of hybrid or drug-resistant strains, e.g. reports of *P. falciparum* artemisinin tolerance and *Schistosoma* resistance alleles. These findings underscore a principle from One Health literature: environmental and anthropogenic changes can drive parasite emergence, so surveillance must adapt rapidly[32].

## Conclusion

In summary, the past five years of literature confirm that parasitic infections remain a major public health issue. Malaria and helminthic neglected tropical diseases continue to afflict billions, especially in Africa and Asia[33]. Human infection frequently intersects with animal reservoirs and environmental factors, validating calls for integrated One Health strategies[34]. Our review has collated data on twenty key parasite species, noting their transmission modes, global distribution, and current research trends. We find that control efforts must be multifaceted: sustained mass drug administration, improved sanitation and hygiene, vector control, food safety measures, and cross-

sectoral collaboration. For researchers, important gaps remain in vaccine development, diagnostic access in low-income regions, and understanding parasite adaptation to climate change. As the parasite life cycle diagrams and images herein illustrate, the “search” for effective parasitic disease control must indeed look *within* human, animal, and environmental systems simultaneously. Future studies, including ongoing theses, should continue leveraging new technologies (genomics, AI mapping) under the One Health umbrella to drive progress.

## References

1. “Implementing the global health sector strategies on HIV, viral hepatitis and ... - World Health Organization - كتب Google.” Accessed: Aug. 22, 2025. [Online]. Available: [https://books.google.iq/books?hl=ar&lr=&id=RaIOEQAAQBAJ&oi=fnd&pg=PR5&dq=World+Health+Organization.+World+malaria+report+2024.+Geneva:+WHO%3B+2024.+Available+from:+https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2024&ots=U0kpz74wbG&sig=7tFPaMIjEGJ7JC13E1JJJzntQS4&redir\\_esc=y#v=onepage&q&f=false](https://books.google.iq/books?hl=ar&lr=&id=RaIOEQAAQBAJ&oi=fnd&pg=PR5&dq=World+Health+Organization.+World+malaria+report+2024.+Geneva:+WHO%3B+2024.+Available+from:+https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2024&ots=U0kpz74wbG&sig=7tFPaMIjEGJ7JC13E1JJJzntQS4&redir_esc=y#v=onepage&q&f=false)
2. E. K. Lashaki *et al.*, “Global prevalence of enterobiasis in young children over the past 20 years: a systematic review and meta-analysis,” *Osong Public Health Res. Perspect.*, vol. 14, no. 6, pp. 441–450, Dec. 2023, doi: 10.24171/j.phrp.2023.0204.
3. G. Deiana, A. Arghittu, M. Dettori, and P. Castiglia, “One World, One Health: Zoonotic Diseases, Parasitic Diseases, and Infectious Diseases,” *Healthcare*, vol. 12, no. 9, p. 922, Apr. 2024, doi: 10.3390/healthcare12090922.
4. “Knowledge, attitudes and practices on Schistosomiasis in sub-Saharan Africa: a systematic review | BMC Infectious Diseases.” Accessed: Aug. 22, 2025. [Online]. Available: <https://link.springer.com/article/10.1186/s12879-017-2923-6>
5. O. P. Aula, D. P. McManus, M. K. Jones, and C. A. Gordon, “Schistosomiasis with a Focus on Africa,” *Trop. Med. Infect. Dis.*, vol. 6, no. 3, p. 109, Sept. 2021, doi: 10.3390/tropicalmed6030109.
6. A. F. Adenowo, B. E. Oyinloye, B. I. Ogunyinka, and A. P. Kappo, “Impact of human schistosomiasis in sub-Saharan Africa,” *Braz. J. Infect. Dis.*, vol. 19, pp. 196–205, 2015, doi: <https://doi.org/10.1016/j.bjid.2014.11.004>.
7. G. Deiana, A. Arghittu, M. Dettori, and P. Castiglia, “One World, One Health: Zoonotic Diseases, Parasitic Diseases, and Infectious Diseases,” *Healthcare*, vol. 12, no. 9, p. 922, Apr. 2024, doi: 10.3390/healthcare12090922.
8. “Comprehensive Analysis of Malaria: Causes, Incubation Period, Transmission Methods, Prevention, Control, and Treatment - ProQuest.” Accessed: Aug. 22, 2025. [Online]. Available: <https://www.proquest.com/openview/6833e77488de33cfc95bcc1bf65e57a2/1?pq-origsite=scholar&cbl=6480378>
9. F. Kogan, “Malaria Burden,” in *Remote Sensing for Malaria: Monitoring and Predicting Malaria from Operational Satellites*, F. Kogan, Ed., Cham: Springer International Publishing, 2020, pp. 15–41. doi: 10.1007/978-3-030-46020-4\_2.
10. A. A. K. A. Razek, A. Watcharakorn, and M. Castillo, “Parasitic Diseases of the Central Nervous System,” *Neuroimaging Clin.*, vol. 21, no. 4, pp. 815–841, Nov. 2011, doi: 10.1016/j.nic.2011.07.005.
11. J. Xu and Q. Han, “Prevalence, Infection, and Risk to Human Beings of *Toxocara canis* in Domestic Food-Producing Animals,” *Vet. Sci.*, vol. 11, no. 2, p. 83, Feb. 2024, doi: 10.3390/vetsci11020083.
12. E. K. Lashaki *et al.*, “Global prevalence of enterobiasis in young children over the past 20 years: a systematic review and meta-analysis,” *Osong Public Health Res. Perspect.*, vol. 14, no. 6, pp. 441–450, Dec. 2023, doi: 10.24171/j.phrp.2023.0204.

13. J. Utzinger *et al.*, “Schistosomiasis and neglected tropical diseases: towards integrated and sustainable control and a word of caution,” *Parasitology*, vol. 136, no. 13, pp. 1859–1874, Nov. 2009, doi: 10.1017/S0031182009991600.
14. K. Karunamoorthi, M. J. Almalki, and K. Y. Ghailan, “Schistosomiasis: A Neglected Tropical Disease of Poverty: A Call for Intersectoral Mitigation Strategies for Better Health,” *J. Health Res. Rev. Dev. Ctries.*, vol. 5, no. 1, p. 1, Apr. 2018, doi: 10.4103/jhrr.jhrr\_92\_17.
15. “Schistosomiasis and water resources development in Africa: A scoping review and multi-case evaluation of associated snail control | PLOS Neglected Tropical Diseases.” Accessed: Aug. 22, 2025. [Online]. Available: <https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0013180>
16. “Global One Health index for zoonoses: A performance assessment in 160 countries and territories: iScience.” Accessed: Aug. 22, 2025. [Online]. Available: [https://www.cell.com/iscience/fulltext/S2589-0042\(24\)00518-2](https://www.cell.com/iscience/fulltext/S2589-0042(24)00518-2)
17. J. Xu and Q. Han, “Prevalence, Infection, and Risk to Human Beings of *Toxocara canis* in Domestic Food-Producing Animals,” *Vet. Sci.*, vol. 11, no. 2, p. 83, Feb. 2024, doi: 10.3390/vetsci11020083.
18. M. Nelwan, “Global Epidemiology of Schistosomiasis,” Oct. 31, 2020, *Social Science Research Network, Rochester, NY*: 3722378. doi: 10.2139/ssrn.3722378.
19. E. K. Lashaki *et al.*, “Global prevalence of enterobiasis in young children over the past 20 years: a systematic review and meta-analysis,” *Osong Public Health Res. Perspect.*, vol. 14, no. 6, pp. 441–450, Dec. 2023, doi: 10.24171/j.phrp.2023.0204.
20. J. L. Weber, “Analysis of sequences from the extremely A + T-rich genome of *Plasmodium falciparum*,” *Gene*, vol. 52, no. 1, pp. 103–109, Jan. 1987, doi: 10.1016/0378-1119(87)90399-4.
21. J. Tucker *et al.*, “Social vulnerability in three high-poverty climate change hot spots: What does the climate change literature tell us?,” *Reg. Environ. Change*, vol. 15, no. 5, pp. 783–800, June 2015, doi: 10.1007/s10113-014-0741-6.
22. G. Deiana, A. Arghittu, M. Dettori, and P. Castiglia, “One World, One Health: Zoonotic Diseases, Parasitic Diseases, and Infectious Diseases,” *Healthcare*, vol. 12, no. 9, p. 922, Jan. 2024, doi: 10.3390/healthcare12090922.
23. J. Xu and Q. Han, “Prevalence, Infection, and Risk to Human Beings of *Toxocara canis* in Domestic Food-Producing Animals,” *Vet. Sci.*, vol. 11, no. 2, p. 83, Feb. 2024, doi: 10.3390/vetsci11020083.
24. A. A. K. A. Razek, A. Watcharakorn, and M. Castillo, “Parasitic Diseases of the Central Nervous System,” *Neuroimaging Clin.*, vol. 21, no. 4, pp. 815–841, Nov. 2011, doi: 10.1016/j.nic.2011.07.005.
25. E. K. Lashaki *et al.*, “Global prevalence of enterobiasis in young children over the past 20 years: a systematic review and meta-analysis,” *Osong Public Health Res. Perspect.*, vol. 14, no. 6, pp. 441–450, Dec. 2023, doi: 10.24171/j.phrp.2023.0204.
26. J. Xu and Q. Han, “Prevalence, Infection, and Risk to Human Beings of *Toxocara canis* in Domestic Food-Producing Animals,” *Vet. Sci.*, vol. 11, no. 2, p. 83, Feb. 2024, doi: 10.3390/vetsci11020083.
27. M. Deiana *et al.*, “Full Genome Characterization of the First Oropouche Virus Isolate Imported in Europe from Cuba,” *Viruses*, vol. 16, no. 10, p. 1586, Oct. 2024, doi: 10.3390/v16101586.
28. T. J. Anderson and E. E. Enabulele, “*Schistosoma mansoni*,” *Trends Parasitol.*, vol. 37, no. 2, pp. 176–177, Feb. 2021, doi: 10.1016/j.pt.2020.06.003.

29. G. C. Cook, "Enterobius vermicularis infection.," *Gut*, vol. 35, no. 9, pp. 1159–1162, Sept. 1994, doi: 10.1136/gut.35.9.1159.
30. "WHO world malaria report 2024 - The Lancet Microbe." Accessed: Aug. 22, 2025. [Online]. Available:[https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247\(25\)00001-1/fulltext](https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(25)00001-1/fulltext)
31. "Mapping the global prevalence, incidence, and mortality of Plasmodium falciparum and Plasmodium vivax malaria, 2000–22: a spatial and temporal modelling study - The Lancet." Accessed: Aug. 22, 2025. [Online]. Available: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(25\)00038-8/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(25)00038-8/fulltext)
32. G. Deiana, A. Arghittu, M. Dettori, and P. Castiglia, "One World, One Health: Zoonotic Diseases, Parasitic Diseases, and Infectious Diseases," *Healthcare*, vol. 12, no. 9, p. 922, Jan. 2024, doi: 10.3390/healthcare12090922.
33. "Neglected Tropical Diseases in Sub-Saharan Africa: Review of Their Prevalence, Distribution, and Disease Burden | PLOS Neglected Tropical Diseases." Accessed: Aug. 22, 2025. [Online]. Available: <https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0000412>
34. G. Deiana, A. Arghittu, M. Dettori, and P. Castiglia, "One World, One Health: Zoonotic Diseases, Parasitic Diseases, and Infectious Diseases," *Healthcare*, vol. 12, no. 9, p. 922, Jan. 2024, doi: 10.3390/healthcare12090922.