eISSN: 2229-3213 pISSN: 2229-3205
The Journal of Applied Science and Social Science
Volume 16,Issue 01 January , 2026

PARASITIC INFECTIONS IN UZBEKISTAN: PATTERNS, REGIONAL DIFFERENCES, AND TREATMENT APPROACHES

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Abstract

Background: Parasitic infections remain an important public health problem in Uzbekistan, particularly among children and rural populations. Environmental conditions, agricultural practices, water sanitation challenges, and close human–animal interactions contribute to sustained transmission. Understanding regional patterns of parasitic infections is essential for designing effective, targeted control strategies.

Objective: To review the epidemiological patterns of parasitic infections in Uzbekistan, compare regional variations, and summarize current treatment and prevention approaches.

Methods: A narrative review of published literature, national surveillance reports, and regional epidemiological studies was conducted. Data on intestinal helminths, protozoan infections, and zoonotic parasitic diseases were analyzed with particular emphasis on regional distribution, risk factors, and therapeutic strategies.

Results: Intestinal helminth infections, especially enterobiasis, ascariasis, and trichocephalosis, represent the most prevalent parasitic diseases nationwide, predominantly affecting children. Karakalpakstan and the Fergana Valley report the highest burden of soil-transmitted helminths, largely due to inadequate sanitation and environmental exposure. Protozoan infections, particularly giardiasis, are more common in urban and peri-urban regions such as Samarkand. Cystic echinococcosis remains a significant zoonotic concern, with higher incidence in livestock-intensive regions including Syrdarya and Jizzakh, while urban centers such as Tashkent demonstrate lower prevalence. Treatment strategies primarily rely on benzimidazole anthelmintics for helminth infections, nitroimidazole agents for protozoal diseases, and combined medical–surgical approaches for echinococcosis. Preventive measures include routine screening, mass deworming, hygiene promotion, and veterinary control programs.

Conclusion: Parasitic infections in Uzbekistan display marked regional heterogeneity influenced by ecological, socio-economic, and behavioral factors. Integrated, region-specific control strategies combining pharmacological treatment, sanitation improvement, health education, and zoonotic disease control are essential to reduce disease burden and prevent reinfection.

Keywords: Parasitic infections; Helminthiasis; Giardiasis; Echinococcosis; Regional variation; Uzbekistan.

Introduction

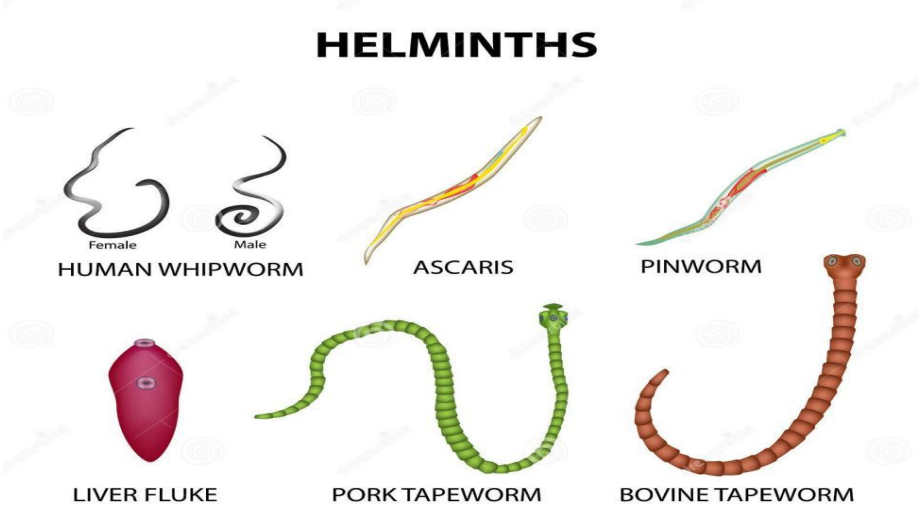
Parasitic infections remain a substantial public health concern in Uzbekistan, particularly among children and rural populations. Uzbekistan's climate, agro-pastoral economy, and water access

challenges contribute to persistent parasitic burdens despite ongoing control efforts. This review synthesizes recent epidemiological findings, highlights regional disparities in parasite prevalence, and outlines current treatment strategies.

Intestinal Helminth Infections

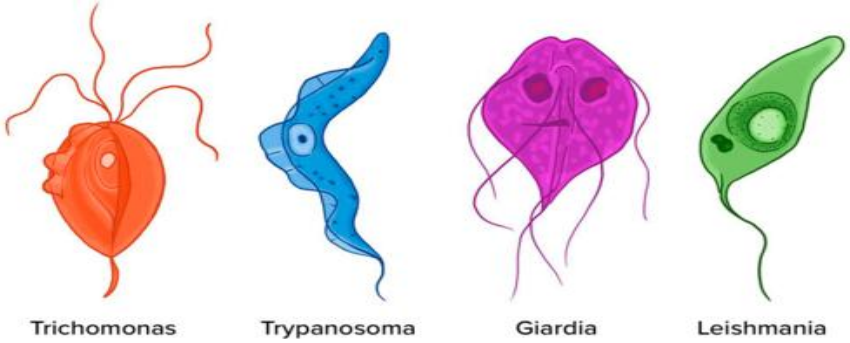
Intestinal helminthiasis represents the most prevalent parasitic disease group in Uzbekistan. Commonly reported helminths include *Enterobius vermicularis*, *Ascaris lumbricoides*, *Trichuris trichiura*, and *Hymenolepis nana*. Studies from Karakalpakstan demonstrate that helminth infections account for nearly 90% of registered parasitic diseases, with enterobiasis predominating among children younger than 14 years (1). Regular screening programs in schools are implemented, particularly when group infestation rates exceed 15% (1).

Similar trends have been observed in other regions. In Samarkand, a retrospective analysis revealed a high burden of intestinal parasites, with enterobiasis ranking among the most common infections in pediatric populations (2).



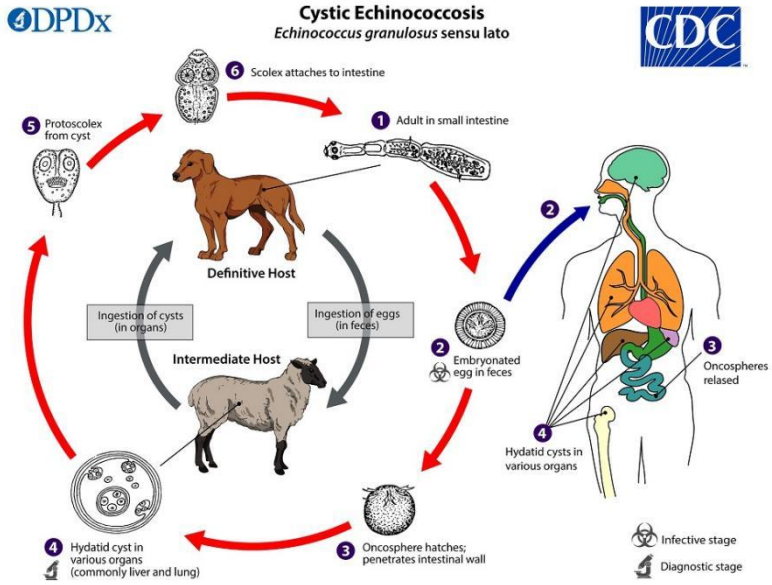
Protozoan Parasitic Infections

Protozoan infections, particularly giardiasis caused by *Giardia lamblia*, remain a significant cause of gastrointestinal morbidity. In Samarkand, giardiasis accounted for approximately one-quarter of all diagnosed parasitic infections, affecting primarily school-aged children and adolescents (2). Inadequate water sanitation and person-to-person transmission contribute to sustained endemicity.



Zoonotic Parasitic Infections

Cystic echinococcosis (CE), caused by *Echinococcus granulosus*, is a major zoonotic parasitic disease in Uzbekistan. National epidemiological data indicate an average incidence of approximately 6.5 cases per 100,000 population annually (5). Liver involvement constitutes nearly 80% of cases, followed by pulmonary localization (5). Transmission is closely linked to livestock rearing practices and uncontrolled dog populations.



Regional Differences in Parasitic Infection Burden

Marked regional variation exists in the distribution of parasitic infections across Uzbekistan. Karakalpakstan reports persistently high rates of helminthiasis, attributed to ecological conditions and water scarcity (1). Mountain-foothill regions such as Fergana, Namangan, and Surkhandarya show increased prevalence of soil-transmitted helminths due to favorable climatic and agricultural conditions (8).

chinococcosis displays distinct geographic clustering. Syrdarya and Jizzakh regions report the highest incidence rates (9.8–10.9 per 100,000), whereas Tashkent city shows significantly lower prevalence, likely reflecting better urban sanitation and veterinary control measures (5).

Risk Factors and Transmission Dynamics

Key risk factors for parasitic infections include poor hygiene practices, unsafe drinking water, overcrowded living conditions, and limited health education. Children are particularly vulnerable due to close contact in schools and inadequate hand hygiene. Intervention studies in rural Uzbekistan have demonstrated that hygiene promotion alone can reduce reinfection rates of intestinal parasites by up to 37% (3).

Zoonotic transmission remains a concern in rural communities. Surveys of domestic dogs in Uzbekistan reveal a high prevalence of zoonotic helminths, highlighting the ongoing risk of transmission to humans, especially in farming households (7).

Modes of Treatment and Control

Anthelmintic Treatment

Benzimidazole derivatives such as albendazole and mebendazole are the mainstay of treatment for intestinal helminth infections. Mass deworming programs targeting school-aged children form a central component of national control strategies (1,4).

Treatment of Protozoan Infections

Giardiasis is typically managed with nitroimidazole agents, including metronidazole or tinidazole. Treatment is often accompanied by hygiene counseling to reduce recurrence and household transmission (2).

Management of Echinococcosis

Management of cystic echinococcosis depends on cyst stage and organ involvement. Medical therapy with albendazole is effective for early or uncomplicated cysts, while surgical intervention remains necessary for advanced or complicated disease (5)

Table: Regional Comparison of Parasitic Infections in Uzbekistan

Region	Predominant Parasitic Infections	Most Affected Population	Key Risk Factors	Common Treatment & Control Measures
Karakalpakstan	Enterobiasis, ascariasis, hymenolepiasis	Children <14 years	Water scarcity, poor sanitation, overcrowded schools	Annual school screening, mass deworming with albendazole/mebendazole, hygiene education (1)
Samarkand	Giardiasis, enterobiasis	School-aged children, adolescents	Unsafe drinking water, person-to-person transmission	Metronidazole for giardiasis, targeted deworming, sanitation awareness (2)
Fergana Valley (Fergana, Namangan, Andijan)	Ascariasis, trichocephalosis, enterobiasis	Rural children, agricultural workers	Warm climate, soil exposure, use of untreated fertilizers	Periodic anthelmintic therapy, hygiene promotion, school-based programs (3,8)
Surkhandarya	Soil-transmitted helminths, giardiasis	Rural communities	Irrigation agriculture, barefoot farming, limited water treatment	Albendazole/mebendazole, water sanitation measures, health education (4,8)
Syrdarya	Cystic	Adults involved in	Close dog–livestock–human	Albendazole therapy, surgical management of

	echinococcosis	livestock farming	contact, poor veterinary control	cysts, dog deworming programs (5,7)
Jizzakh	Cystic echinococcosis, intestinal helminths	Rural adults	Sheep and cattle farming, home slaughtering	Combined medical–surgical management, public health surveillance (5)
Khorezm	Intestinal helminths, echinococcosis	Rural households	Irrigation farming, domestic animal exposure	Mass deworming, ultrasound screening for CE, veterinary control (5)
Tashkent City	Sporadic enterobiasis, giardiasis	Urban children	Day-care and school transmission	Targeted treatment, improved sanitation, health education (2,5)

Preventive and Public Health Measures

Uzbekistan mandates routine parasitological screening of children and high-risk groups. Public health strategies emphasize sanitation improvement, health education, veterinary surveillance, and control of stray dog populations to reduce zoonotic transmission (1,5,7).

Conclusion

Parasitic infections in Uzbekistan demonstrate distinct epidemiological patterns influenced by regional, environmental, and socio-economic factors. Intestinal helminthiasis remains highly prevalent among children, while zoonotic infections such as echinococcosis show pronounced geographic clustering. Integrated approaches combining pharmacological treatment, hygiene promotion, and region-specific public health interventions are essential for sustainable control.

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