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# ASSESSMENT OF HELMINTH CONTAMINATION IN SOIL OF CHILDREN'S PLAYGROUNDS AND KINDERGARTENS

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**Abstract**
At present, soil contamination with geohelminths (soil-transmitted helminths) in children's playgrounds, preschool educational institutions, and kindergartens represents a serious public health concern. Studies conducted worldwide indicate that more than 30–60% of soil samples from children's playgrounds are contaminated with helminth eggs (for example, 63.5% of playgrounds in the city of Hannover were found to be contaminated). Helminth eggs are able to retain their infective potential for long periods and are transmitted through direct contact with children, leading to intestinal parasitoses and other health problems.

**Keywords**: Children's playgrounds, soil contamination, geohelminths, Toxocara spp., Ascaris spp., parasite epidemiology, public health.

## Introduction

Soil-transmitted helminthiases (STH) are parasitic infections of significant importance that remain underestimated within the global healthcare system. These parasites are mainly nematodes, including Toxocara spp., Ascaris lumbricoides, Trichuris trichiura, and other species. Their eggs enter the child's body through contaminated soil or sandpits and may cause serious health problems such as intestinal disorders, digestive complaints, anemia, and immunological reactions.

Children, particularly those of preschool age, frequently come into direct contact with soil in playgrounds and kindergartens. Therefore, contamination of soil in child-oriented environments with geohelminth eggs represents not only an epidemiological issue but also a clear public health risk.

International studies demonstrate that a significant proportion of soil samples collected from playgrounds and sandpits are contaminated with helminth eggs. For instance, a study conducted in the city of Szczecin, Poland, revealed that 41.4% of soil samples were contaminated with geohelminth eggs, with Toxocara spp. being the most frequently detected parasite.

Similarly, in Malaysia, analysis of 300 soil samples collected from 60 playgrounds showed the presence of Toxocara eggs in 95.7% of samples, Ascaris in 93.3%, Ancylostoma in 88.3%, and Trichuris species in 77.0%. This high prevalence was mainly associated with uncontrolled defecation by dogs and cats and inadequate compliance with sanitary and hygienic regulations.

In addition, a study conducted in Vladivostok, Russia, analyzing 671 soil samples, reported an overall contamination rate of 59.8%, with Toxocara spp. eggs being the most commonly detected.

These statistical data indicate that helminth contamination of soil in social environments where children are active is a widespread phenomenon and poses a significant risk to child health. In



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particular, behaviors such as not washing hands after contact with soil and bringing contaminated hands to the mouth increase the likelihood of helminth transmission.

**Study Objective**

To determine the level of helminth contamination in the soil of children's playgrounds and kindergartens; to analyze the main factors contributing to contamination; to summarize the impact of helminth contamination on children's health; and to identify preventive measures.

**Materials and Methods**

This review article is based on an analysis of international scientific studies published in sources such as PubMed, Cambridge University Press, and Folia Veterinaria. Articles on health protection and parasitology obtained through university library resources and internet databases were reviewed. In the analyzed studies, soil samples were examined for helminth eggs using standard parasitological methods, including flotation techniques, sedimentation techniques, and statistical analysis of soil sample data.

**Results**

Level of contamination and helminth species. The level of contamination of soil samples from child-active environments with helminth eggs has been assessed in various countries. The table below summarizes the results of key studies:

| Study location | Number of samples | Contaminated (%) | Identified helminth species |
|---|---|---|---|
| Szczecin, Poland | 88 | 41.4 | Toxocara spp., Toxascaris leonina, Dipylidium caninum, Trichuris spp. |
| Pelotas, Brazil | 22 | 54.5 | Ancylostoma spp., Toxocara spp. |
| Lodz, Poland | 88 | (15.7 sports fields) | Toxocara, Uncinaria/Ancylostoma, Ascaris, Trichuris |
| Wrocław, Poland | 424 | ~17.5* | Toxocara spp., Ancylostomatidae, Trichuris spp. |
| Hannover, Germany | 52 sandpits | 63.5 | Toxocara spp., Toxascaris leonina |
| Lisbon, Portugal | 151 | 53.0 | Toxocara spp. |

*Note: In Wrocław, 74 out of 424 samples were contaminated with geohelminths, yielding an estimated overall prevalence of approximately 17.5% (74/424).

These results indicate that in all studied regions, a substantial proportion of soil samples from children's playgrounds and kindergartens are contaminated with zoonotic helminth eggs, particularly Toxocara spp. This clearly demonstrates that the social and ecological environment represents a significant public health risk.

Trends in the distribution of helminth species.

**a) Poland (Szczecin).**

Analysis of 88 soil samples collected in Szczecin revealed helminth eggs in 41.4% of samples. Toxocara spp. eggs were detected in 22.7%, making them the most frequently identified parasite. Other species were also found, including Toxascaris leonina (28.6%).



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**b) Brazil.**

In Pelotas, analysis of samples collected from 22 school areas showed that 54.5% of locations were contaminated with geohelminths. Among these, 36.4% were contaminated with Ancylostoma spp. and 27.3% with Toxocara spp. These findings indicate a high risk of geohelminth contamination in enclosed schoolyards and playgrounds used by children.

**c) Germany.**

In Hannover, 52 sandpits were examined, of which 63.5% were contaminated with helminth eggs. Toxocara spp. were detected in 55.8% of sandpits, indicating a particularly high prevalence.

Sample analysis and helminth egg density. In the Lodz region of Poland, examination of 88 soil and sand samples revealed a total of 62 helminth eggs. The presence of multiple parasite species was confirmed, and 43.5% of the detected eggs were embryonated (infective). This indicates that a substantial proportion of the identified eggs possessed infective potential.

Environmental determinants of helminth contamination. Based on these studies, several key trends were identified. Geohelminth contamination levels tend to be higher in central urban areas (e.g., Lisbon), which can be explained by increased human and animal traffic. Climatic conditions also play an important role, as helminth eggs survive longer and retain infectivity in moist and cool environments. In addition, higher contamination levels may be observed in sandpits and artificial playgrounds, as sand remains relatively moist, allowing eggs to persist for extended periods.

## Discussion

Soil contamination with helminth eggs in children's playgrounds and kindergartens represents a widespread ecological and sanitary-epidemiological issue at the global level. Although results from studies conducted in different geographic regions vary, a general trend shows the predominance of Toxocara spp., Ancylostoma spp., Ascaris, and Trichuris species. This reflects the ecological resilience of these parasites, the ability of their eggs to survive for long periods in the external environment, and the influence of anthropogenic factors.

According to reported statistics, in some regions (Hannover, Lisbon, Pelotas, Malaysia), more than half of soil samples were contaminated with helminth eggs. These figures are observed even in developed countries, confirming that helminth contamination is not exclusively a problem of areas with poor sanitation. Particularly in urban central playgrounds, high contamination levels are associated with uncontrolled populations of domestic animals (dogs and cats), their unrestricted movement, and insufficient hygiene measures.

An important aspect of the results is that a significant proportion of detected helminth eggs were embryonated, i.e., in an infective state. This indicates that the identified contamination is not merely an ecological indicator but represents a real epidemiological risk. Specifically, the high prevalence of Toxocara spp. eggs increases the risk of toxocariasis in children. This disease is often clinically silent but can cause severe damage to the eyes, liver, lungs, and central nervous system.

Analysis of inter-study differences indicates that climatic conditions significantly affect the level of helminth contamination. In moist and temperate climates, helminth eggs survive longer and remain infective. Therefore, contamination rates are higher in tropical and subtropical regions. However, the



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detection of high percentages in European countries may be linked to insufficient sanitation and environmental control.

Contamination in kindergartens and preschool areas poses a particular risk, as children at this age often lack fully developed hygiene skills. Behaviors such as playing in soil, putting hands in the mouth, or reusing toys that have fallen onto the ground facilitate the transmission of helminth eggs. Thus, the findings are critical from a child health protection perspective.

The results suggest that prevention of soil helminth contamination should not be limited to medical interventions alone. A comprehensive approach is required, including:

Veterinary control: regular deworming of dogs and cats.

Adherence to sanitary-hygienic practices.

Playground management: installing enclosed sandpits, regular replacement and disinfection of soil.

Health education: educating parents and caregivers about preventive measures.

Such integrated strategies are essential to effectively reduce the risk of helminth infections among children.

## Conclusion

This literature review demonstrates that soil contamination with helminth eggs in children's playgrounds and kindergartens is a widespread ecological and sanitary-epidemiological problem. The scientific evidence confirms that such contamination poses a real and long-term risk to children's health, particularly increasing the likelihood of parasitic infections among preschool-aged children.

High level of helminth contamination and predominant species. Analysis of the reviewed studies shows that a significant proportion of soil in children's playgrounds and kindergartens is contaminated with helminth eggs, with some regions exhibiting contamination rates of 40–60% or higher. The most frequently detected helminth species are Toxocara spp., Ancylostoma spp., Ascaris, and Trichuris, most of which are zoonotic and pose a threat to human health.

Epidemiological significance of detected eggs. A substantial proportion of the helminth eggs identified in soil samples were embryonated (infective). This indicates that the contamination is not merely theoretical but provides real conditions for the development of helminth infections in children. Preschool-aged children, who often lack fully developed hygiene practices, are particularly vulnerable.

Factors influencing contamination and the need for prevention. The level of helminth contamination is closely related to climatic conditions, uncontrolled movement of domestic animals (dogs and cats), non-compliance with sanitary-hygienic standards, and the technical condition of playgrounds.

Assessment and monitoring of helminth contamination in the soil of children's playgrounds and kindergartens are essential for protecting public health. Systematic study, continuous monitoring, and strengthened preventive measures can reduce the prevalence of parasitic infections among children and contribute to the formation of a healthy generation.

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