Spinghar University- Kabul

Spinghar Journal of Biomedical Sciences (SJBS)

Vol. 2, No. 1, Apr 2026, pp. 21-31

Parasitic Contamination of Primary School Playground Soils in Jos North and South Local Government Areas, Plateau State, Nigeria

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ARTICLE INFO

Type: Original Article
Received: 11/01/2026
Accepted: 19/04/2026

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ABSTRACT

Background: We aimed to determine the level of parasitic contamination of primary school playground soils in Jos North and Jos South Local Government Areas of Plateau State, Nigeria. We also assessed the hygiene, sanitation, and behavioral factors that might influence exposure to soil-borne parasites among school-aged children.

Methods: This cross-sectional study was conducted between August 2022 and November 2024. A total of 100 (2–3 cm depth) topsoil samples were collected from selected primary school playgrounds using purposive sampling technique. Samples collected were processed by sucrose flotation technique to detect the helminth eggs and larvae. Data were analyzed using descriptive statistics and Pearson's Chi-square test, with statistical significance set at $P<0.05$.

Results: Of the 100 soil samples examined, 19 were positive for at least one Soil Transmitted Helminths (STH) parasite, giving an overall prevalence of 19.0%. Hookworm larvae were the most frequently encountered parasite with a prevalence of 8.0%, followed by *Ascaris lumbricoides* (3.0%), larvae of *Strongyloides stercoralis* (2.0%) and Taeniid eggs (4.0%). There was no statistically significant difference in parasitic contamination of schools' playgrounds between Jos North (20.0%) and Jos South (18.0%) ($\chi^2 = 0.08$, $P=0.78$).

Conclusion: The detection of parasites in school playgrounds, including STHs and other soil-associated organisms in both LGAs is a reflection of environmental contamination by human waste and continued risk of transmission among school-aged children. This underscores the need for improved sanitation, strengthened school-based deworming programs, and enhanced environmental hygiene practices.

Keywords: Helminths; Playground; Soil; Parasitology; Environmental contamination

DOI: https://doi.org/10.64444/sjbs.34

Introduction

Soil plays a significant role in the transmission of many parasites of public health and veterinary importance. It serves as a reservoir for the infective stages of soil-transmitted helminths (STHs) and other parasitic organisms, including protozoa, arthropods, and cestodes. Under favorable environmental conditions such as adequate moisture, temperature, and shade, many parasitic stages can survive for prolonged periods in soil, thereby increasing the risk of transmission to humans [1].

Among soil-borne parasites, STHs remain the most epidemiologically significant and widely studied group [2,3]. They are widely distributed in tropical and subtropical regions, especially in areas with poor sanitation, limited health education and inadequate access to clean water [4]. Persistent intestinal parasite infections can result in malnutrition, anemia, stunted growth, and impaired cognitive development, while also contributing to decreased school attendance and poor academic performance [5,6]. Consequently, school-aged children are recognized as the population most vulnerable, highlighting the urgent need for targeted control interventions.

This vulnerability is largely driven by environmental exposure pathways associated with contaminated soil. Human infection occurs primarily through ingestion of infective eggs from contaminated hands, food, or objects, or through skin penetration by infective larvae, particularly in the case of hookworms and *Strongyloides stercoralis* [7,8]. School playgrounds represent important environments for exposure to soil-borne parasites, as children frequently engage in outdoor play activities that involve direct contact with contaminated soil. This risk is further amplified by behavioral practices such as barefoot play, inadequate hand hygiene, thumb sucking, and failure to wash fruits before consumption.

Environmental contamination of playground soils is largely driven by poor sanitation and hygiene conditions within and around school premises, including open defecation, inadequate toilet facilities, improper waste disposal, and unrestricted access of domestic or stray animals, all of which facilitate the deposition of parasitic eggs and larvae in the soil. While STHs remain the primary focus of most environmental and epidemiological studies due to their high burden and well-established transmission dynamics, the detection of other soil-associated organisms such as cestodes and arthropods further reflects the complexity of environmental contamination and highlights additional pathways of exposure that warrant consideration.

Several studies conducted in different parts of Nigeria have consistently reported considerable levels of soil contamination with intestinal parasites, particularly in school and community environments [1,8,9], underscoring the role of soil as a key reservoir for transmission. However, despite this growing body of evidence, there remains a paucity of location-specific data on parasitic contamination of school playground soils in Plateau State, particularly within Jos North and Jos South Local Government Areas. This disparity in available data limits context-specific understanding of environmental exposure risks in the region and highlights the need for localized investigations.

Addressing this critical gap is essential for guiding context-specific public health interventions aimed at reducing the risk of infection among school-aged children. Such information is essential for strengthening school-based deworming programs, improving sanitation facilities, and promoting hygiene education among pupils.

We aimed to determine the level of parasitic contamination of primary school playground soils in Jos North and Jos South Local Government Areas of Plateau State, Nigeria. We also assessed hygiene, sanitation, and behavioral factors that may influence exposure to soil-borne parasites among school-aged children.

Materials and Methods

Study area

The study was conducted in Jos North and Jos South Local Government Areas of Plateau State, Nigeria. It is located in the North-Central region of Nigeria and approximately covers an area of 26,899 km² with an estimated population of about 3.2 million people. The state lies between latitude 08°24′N and longitude 008°32′E to

010°38′E. Due to its high altitude (approximately 1,200–1,829 m above sea level), the area experiences relatively mild temperatures ranging from 13 °C to 22 °C and receives annual rainfall between 131.75 cm and 146 cm.

Study Design

This was a cross-sectional study in which each selected school playground was sampled once; however, sampling was conducted at different time points between August 2022 and November 2024. A total of 20 primary schools were enrolled using a purposive sampling approach based on the accessibility and willingness to participate. The selected schools comprised both public **(**n = 8**)** and private **(**n = 12**)** institutions, with equal representation from Jos North **(**n = 10**)** and Jos South **(**n = 10**)** Local Government Areas.

Ethical Consideration

Ethical approval for the study was obtained from the Plateau State Ministry of Health (Approval No: MOH/MIS/202/VOL1/148). Permission to conduct the study was also obtained from the relevant Local Education Authorities and the management of the selected primary schools. Written informed consent was obtained from parents or guardians of participating pupils, and assent was obtained from the children prior to questionnaire administration. Participation was voluntary, and confidentiality of responses was strictly maintained.

Assessment of Hygiene and Behavioral Risk Factors

A structured questionnaire was administered to 1,200 pupils selected from the same primary schools included in the soil sampling component, with 600 pupils each from Jos North and Jos South LGAs. An approximately equal number of pupils were recruited per school using a classroom-based approach, involving available pupils across different class levels with the assistance of class teachers. This ensured balanced representation and allowed direct comparison between environmental contamination and behavioral risk factors. Participation was voluntary, and pupils' responses were collected anonymously and treated with strict confidentiality. The questionnaire captured demographic characteristics, sanitation facilities, hygiene practices, and behaviors associated with exposure to soil-borne parasites.

Collection of Soil Samples

Soil samples were collected using purposive sampling from areas within school playgrounds that were frequently used by pupils during play activities. This approach was used to target high-contact areas with greater likelihood of contamination. From the selected schools, a total of 100 soil samples were collected. This comprised five samples per school from different high-contact areas within the playground to improve representativeness. The total number of samples collected from each LGA was equal **(**n = 50 per LGA**)** to allow for comparison between Jos North and Jos South. At each selected site, a quadrat was randomly placed, and 100–200 g of the top 2–3 cm of soil was collected using a clean spoon. Soil sampling was conducted between 8:00 am and 11:00 am. Soil samples were placed in clean labelled polythene bags and transported in a covered plastic container [10,11] to the Parasitology Laboratory of the Federal College of Veterinary and Medical Laboratory Technology, Vom, Plateau State for parasitological examination. Soil samples were collected during both wet and dry seasons to account for potential seasonal variation in parasite survival and recovery. Sampling procedures, including timing, depth, and processing methods, were applied consistently across both Jos North and Jos South Local Government Areas to ensure comparability.

Examination of Soil Samples for Parasites

The sucrose flotation technique was used to examine soil samples for parasite eggs and larvae [12,13]. Approximately 2 g of each air-dried soil sample was weighed and mixed with distilled water before being sieved through a 400 µm mesh to remove large debris. The filtrate was centrifuged at 3000 rpm for 10 min and the supernatant decanted. The sediment was then resuspended in 5 ml of sucrose solution (specific gravity 1.3), and a coverslip was carefully placed on the surface of the tube. After flotation, the coverslip was transferred onto a microscope slide and examined under light microscopy using ×10 and ×40 objectives. Parasite eggs and larvae were identified based on their morphological characteristics using standard identification keys under light microscopy. Identification of taeniid eggs was limited to the family level due to morphological similarity among species [12].

Data analysis

Data were entered and analyzed using the SPSS version 20 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize parasite prevalence and hygiene variables. Associations between categorical variables were assessed using Pearson's Chi-square (χ^2) test. Odds ratios (OR) with 95% confidence intervals (CI) were calculated to determine the strength of associations. A P-value < 0.05 was considered statistically significant.

Results

A total of 100 soil samples were examined from school playgrounds in Jos North (n = 50) and Jos South (n = 50). Overall, 19 samples were positive for at least one parasite, giving an overall prevalence of 19.0%. Each positive sample contained only one parasite type; no co-contamination was observed. Five groups of parasites were detected, with hookworm larvae being the most prevalent (8.0%). The prevalence was slightly higher in Jos North than in Jos South. However, this difference was not statistically significant (χ^2 = 0.08, P=0.78) (Table 1).

Table 1: Distribution of parasites in schools' playgrounds in Jos North and Jos South LGAs, Plateau State

Parasite detected	***Location (%)***		***Total (%)***	***χ²***	***df***	***P-value***
	Jos North (n = 50)	Jos South (n = 50)				
Ascaris lumbricoides	3 (6.0)	0 (0.0)	3 (3.0)	1.38	1	0.241
Hookworm larvae	5 (10.0)	3 (6.0)	8 (8.0)	0.14	1	0.712
Strongyloides stercoralis	1 (2.0)	1 (2.0)	2 (2.0)	0.00	1	1.000
Mites	1 (2.0)	1 (2.0)	2 (2.0)	0.00	1	1.000
Taeniid eggs	0 (0.0)	4 (8.0)	4 (4.0)	2.34	1	0.126
Total	10 (20.0)	9 (18.0)	19 (19.0)			

(Across locations: χ^2 = 0.08, P = 0.78, df = 1)

Public school playgrounds recorded a significantly higher prevalence of parasites (26.2%) compared to private schools (5.7%) (χ^2 = 6.24; P=0.013). Hookworm larvae were the most prevalent in public schools (12.3%) and were not detected in private school samples. Taeniid eggs recorded a higher prevalence in public schools (4.6%) compared to private schools (2.9%). Bivariate analysis indicated that public school playgrounds had over five times the odds of parasitic contamination compared to private school playgrounds (OR = 5.85; 95% CI: 1.27–26.98) (Table 2).

Table 2: Distribution of parasites in private and public schools' playgrounds in Jos North and Jos South LGAs, Plateau State

Parasite Detected	***Type of School (%)***		***Total (N=100)***
	Private(n=35)	Public (n=65)	
Ascaris lumbricoides	1 (2.9)	2 (3.1)	3 (3.0)
Hookworm larvae	0 (0.0)	8 (12.3)	8 (8.0)
Strongyloides stercoralis	0 (0.0)	2 (3.1)	2 (2.0)
Mites	0 (0.0)	2 (3.1)	2 (2.0)
Taeniid eggs	1 (2.9)	3 (4.6)	4 (4.0)
Total Positive Samples	2 (5.7)	17 (26.2)	19 (19.0)

Overall comparison between private and public schools: $\chi^2 = 6.24$, df = 1, p = 0.013. Odds Ratio (OR) = 5.85 (95% CI: 1.27–26.98)

Parasite contamination was higher during the wet season compared to the dry season; however, this difference was not statistically significant. Notably, a significant seasonal variation was observed for taeniid eggs, which were detected exclusively during the dry season (P=0.041) (Table 3).

Table 3: Seasonal distribution of parasites in schools' playgrounds in Jos North and Jos South LGAs, Plateau State

Parasite detected	***SEASON***		***Total (%)***	***χ^2***	***df***	***p-value***
	Wet (n=50)	Dry (n=50)				
Ascaris lumbricoides	1 (2.0)	2 (4.0)	3 (3.0)	0.34	1	0.56
Hookworm larvae	6 (12.0)	2 (4.0)	8 (8.0)	2.17	1	0.14
Strongyloides stercoralis	2 (4.0)	0 (0.0)	2 (2.0)	2.04	1	0.15
Mites	2 (4.0)	0 (0.0)	2 (2.0)	2.04	1	0.15
Taeniid eggs	0 (0.0)	4 (8.0)	4 (4.0)	4.17	1	0.041*
Total	11 (22.0)	8 (16.0)	19 (19.0)	0.56	1	0.45

A total of 1,200 pupils participated in the questionnaire survey, with equal representation from Jos North and Jos South and an equal distribution by sex. The majority of participants were aged 9–12 years (Table 4).

Several hygiene and behavioral factors differed significantly between the two locations. Practices such as open defecation, inconsistent handwashing, and poor fruit hygiene were more frequently reported among pupils in Jos South, while relatively better hygiene practices were observed in Jos North (P<0.05) (Table 5).

Table 4: Demographic Characteristics of Participants across Jos North and Jos South LGAs, Plateau State

Demographic Characteristics	***Variables***	***LOCATION (%)***		***Total (%) N=1200***
		Jos North LGA *n=600*	Jos South LGA *n=600*	
Sex	Male	300(50.0)	300(50.0)	600(50.0)
	Female	300(50.0)	300(50.0)	600(50.0)
Age group (yr)	5-8	179(29.8)	184(30.7)	363(30.3)
	9-12	343(57.2)	322(53.7)	665(55.4)
	13-16	78(13.0)	91(15.2)	169(14.1)
	>16	0(0.0)	3(0.5)	3(0.3)
Tribe	*Berom*	192(32.0)	279(46.5)	471(39.3)
	Angas	60(10.0)	49(8.2)	109(9.1)
	Taroh	35(5.8)	40(6.7)	75(6.3)
	Afizere	10(1.7)	20(3.3)	30(2.5)
	Magavou	48(8.0)	51(8.5)	99(8.3)
	Hausa	123(20.5)	77(12.8)	200(16.7)
	Other	132(22.0)	84(14.0)	216(18.0)
Parent's occupation	Farming	150(25.0)	146(24.3)	296(24.7)
	Artisan	66(11.0)	97(16.2)	163(13.6)
	Civil-Servant	138(23.0)	147(24.5)	285(23.8)
	Trader	148(24.7)	143(23.8)	291(24.3)
	Other	98(16.3)	67(11.2)	165(13.8)
Parent's educational Level	Primary	98(16.3)	106(17.7)	204(17.0)
	Secondary	275(45.8)	267(44.5)	542(45.2)
	Tertiary	203(33.8)	198(33.0)	401(33.4)
	None formal	24(4.0)	29(4.8)	53(4.4)
Parent's Religion	Christian	497(82.8)	551(91.8)	1048(87.3)
	Islam	99(16.5)	46(7.7)	145(12.1)
	Traditional	4(0.7)	3(0.5)	7(0.6)

Table 5: Hygiene and behavioral characteristics of school-aged children by location (Jos North and Jos South LGAs)

Factors	***Variable***	***LOCATION***		***Total n (%)***	***χ^2***	***df***	***P-value***
		Jos North *n* (%)	Jos South *n* (%)				
Toilet at home	Pit	136 (22.7)	170 (28.3)	306 (25.5)	44.98	3	<0.001*
	Water closet	397 (66.2)	317 (52.8)	714 (59.5)			
	Bush	58 (9.7)	111 (18.5)	169 (14.1)			
	Others	9 (1.5)	2 (0.3)	11 (0.9)			
Source of water at home	Tap	157 (26.2)	119 (19.8)	276 (23.0)	19.21	4	0.001*
	Well	301 (50.2)	361 (60.2)	662 (55.2)			
	Borehole	119 (19.8)	105 (17.5)	224 (18.7)			
	Stream	15 (2.5)	11 (1.8)	26 (2.2)			
	Others	8 (1.3)	4 (0.7)	12 (1.0)			
Running water for handwashing	No	228 (38.0)	177 (29.5)	405 (33.8)	9.32	1	0.002*
	Yes	372 (62.0)	423 (70.5)	795 (66.3)			
Open defecation in school	No	187 (31.2)	79 (13.2)	266 (22.2)	55.30	1	<0.001*
	Yes	413 (68.8)	521 (86.8)	934 (77.8)			
Wash fruits before eating	Always	482 (80.3)	366 (61.0)	848 (70.7)	44.71	2	<0.001*
	Sometimes	117 (19.5)	228 (38.0)	345 (28.8)			

	Never	1 (0.2)	6 (1.0)	7 (0.6)			
Habit of wearing footwear	Always	438 (73.0)	391 (65.2)	829 (69.1)	4.33	2	0.115
	Sometimes	158 (26.3)	206 (34.3)	364 (30.3)			
	Never	4 (0.7)	3 (0.5)	7 (0.6)			
Handwashing after toilet/play	Always	458 (76.3)	367 (61.2)	825 (68.8)	35.91	2	<0.001*
	Sometimes	136 (22.7)	219 (36.5)	355 (29.6)			
	Never	6 (1.0)	14 (2.3)	20 (1.7)			
Trimmed finger nails	No	121 (20.2)	203 (33.8)	324 (27.0)	27.74	1	<0.001*
	Yes	479 (79.8)	397 (66.2)	876 (73.0)			
Use teeth to trim finger nails	No	479 (79.8)	392 (65.3)	871 (72.6)	30.97	1	<0.001*
	Yes	121 (20.2)	208 (34.7)	329 (27.4)			
Thumb sucking	No	528 (88.0)	481 (80.2)	1009 (84.1)	13.18	1	<0.001*
	Yes	72 (12.0)	119 (19.8)	191 (15.9)			
Dogs/cats at home	No	315 (52.5)	287 (47.8)	602 (50.2)	2.43	1	0.119
	Yes	285 (47.5)	313 (52.2)	598 (49.8)			
Last deworming	< 6months	164 (27.3)	88 (14.7)	252 (21.0)	41.67	2	<0.001*
	6–12 months	113 (18.8)	163 (27.2)	276 (23.0)			
	> 1 year	323 (53.8)	349 (58.2)	672 (56.0)			
Know of STH	No	289 (48.2)	272 (45.3)	561 (46.8)	0.86	1	0.355
	Yes	311 (51.8)	328 (54.7)	639 (53.3)			

Bivariate analysis further confirmed that pupils in Jos South had significantly higher odds of engaging in multiple high-risk behaviors, including open defecation, inadequate hand hygiene, and unsafe food practices ($P<0.05$) (Table 6).

Table 6: Bivariate analysis of hygiene and behavioral characteristics by location

Factors	*Variables*	***LOCATION***		*p-value*	*OR (95% CI)*
		Jos North *n* (%)	Jos South *n* (%)		
Sanitation Infrastructure	Open defecation in school	413(68.8)	521(86.8)	<0.001*	2.99 (2.23–4.00)
	Lack running water	228(38.0)	177 (29.5)	0.002*	0.68 (0.54–0.87)
Hygiene Behaviors	Not washing fruits	118 (19.7)	234 (39.0)	<0.001*	2.61 (2.01–3.39)
	Use teeth to trim nails	121 (20.2)	208 (34.7)	<0.001*	2.10 (1.62–2.73)
	Inconsistent handwashing	142 (23.7)	233 (38.8)	<0.001*	2.05 (1.60–2.63)
	Untrimmed nails	121 (20.2)	203 (33.8)	<0.001*	2.02 (1.56–2.63)
	Thumb sucking	72 (12.0)	119 (19.8)	<0.001*	1.81 (1.32–2.49)
	Inconsistent footwear use	162 (27.0)	209 (34.8)	<0.001*	1.45 (1.13–1.85)
Knowledge & Pets	Dogs/cats at home	285 (47.5)	313 (52.2)	0.119	1.21 (0.96–1.51)
	No knowledge of STH	289 (48.2)	272 (45.3)	0.355	0.89 (0.71–1.12)

$P<0.05$ considered significant. OR = Odds Ratio, CI = Confidence Interval

Discussion

The contamination of the soil with parasites is common in the developing countries [14]. The overall prevalence of 19.0% recorded in this study indicates a moderate level of environmental contamination and suggests potential exposure risk among school-aged children who frequently come into contact with soil during play activities. Although the prevalence was lower than values reported in some regions of Nigeria, for example 48% in Ondo state [15], 55.2 % in Edo state [16], and 53.6% in Anambra state [17], this study highlights the need for sustained surveillance and preventive measures. The parasites detected included STHs such as *A. lumbricoides*, hookworm, and *S. stercoralis*, as well as other soil-associated organisms such as taeniid eggs and mites. The presence of these parasites might reflect environmental contamination potentially associated with open defecation from pupils and inhabitants of respective host communities living close to the school premises.

Hookworm larvae were the most frequently detected STH, consistent with findings from Ibadan, Nigeria [18]. This study slightly differs from a study in Iran [3] where no hookworm was recovered from soil samples. The observed prevalence of hookworm larvae may be related to the parasite's ability to survive and remain infective in warm, moist soil conditions common in tropical environments. In contrast, *A. lumbricoides* eggs were found at a relatively lower prevalence (3.0%), despite their known environmental resilience. Similar variations in helminth distribution have been reported in other Nigerian studies, reflecting differences in local sanitation practices, soil conditions, and levels of environmental contamination.

The detection of taeniid eggs and mites further suggests contamination from both human and animal sources. The presence of taeniid eggs in school compounds is particularly concerning considering the health implications of the possibility of ingestion by man and animals. The presence of the eggs also points to improper disposal of human or animal feces near school premises.

The absence of statistically significant differences in parasite distribution between Jos North and Jos South suggests that both LGAs share similar environmental and cultural factors that contribute to soil contamination. Factors such as open defecation within and outside school premises, poor sanitation practices, inadequate toilet facilities, improper waste disposal and barefoot walking by pupils may be associated with the presence of STHs and other parasites in the school environment across the two LGAs.

A notable finding in this study was the statistically significant seasonal distribution of taeniid eggs, which were recovered exclusively during the dry season (P=0.041). As a zoonotic parasite, the presence of taeniid eggs in school playgrounds reflect environmental contamination potentially involving animal or human hosts within the school environment. In the Jos region, the dry season might coincide with increased movement of roaming animals in search of dwindling water sources and forage, potentially leading to higher rates of fecal deposition on school grounds that lack secure perimeter fencing.

Furthermore, the structural resilience of taeniid eggs allows them to survive in the dry, dusty topsoil of the Plateau's harmattan season, whereas moisture-sensitive larvae, such as those of Hookworms and *S. stercoralis*, are more likely to perish due to desiccation. This environmental pattern may help explain why taeniid eggs remained detectable and significant during the dry months while other species showed a preference for the wet season but failed to reach statistical significance. The exclusive detection of taeniid eggs in the dry season may indicate a possible seasonal pattern, which requires confirmation for school children, necessitating year-round environmental management regardless of rainfall patterns.

Interestingly, the bivariate analysis revealed that Jos South exhibited significantly higher odds for nearly all investigated risky behaviors, including open defecation, inadequate washing of fruits/vegetables, and inconsistent hand washing after play, despite these schools having significantly better access to running water infrastructure compared to Jos North (OR = 0.68). This finding might suggest a significant 'Knowledge-Practice Gap,' where the mere provision of hardware (taps and toilets) does not automatically translate into behavioral change. This paradox is consistent with a global systematic review where the impact of water, sanitation, and hygiene (WASH) infrastructure on STH prevalence is often mediated more by consistent usage and behavioral compliance than by access alone [19].

In the context of Jos South, the higher prevalence of risk behaviors despite water availability may be partly related to factors such as intermittent supply or poor maintenance of the facilities, a common issue in Nigerian public schools where infrastructure exists but is non-functional or kept under lock and key [18].

Furthermore, in rural and peri-urban Nigerian communities, cultural habits and the lack of sustained health education often override the benefits of improved infrastructure [20]. The significantly higher odds of risky behavior in Jos South may also be linked to the specific socioeconomic demography of the area, which often includes semi-rural settlements where open defecation may remain a culturally entrenched practice. This underscores the recommendation effective STH control programs combines both environmental modifications with intensive Social and Behavior Change Communication (SBCC) to ensure that the provided infrastructure is utilized correctly to interrupt the fecal-oral transmission route [7].

Lack or partial perimeter fencing contributes significantly to free movement of human and animals into and out of the school premises resulting in soil contamination with animal and human feces. Coprophagia of human feces by dogs could increase the possibility of transporting STH eggs into the playground as sticky-coated *Ascaris* eggs might adhere to the dog's coat for relatively longer period [21]. The public health implications of these findings are significant. School-aged children are highly vulnerable to STH infections due to frequent soil contact and hygiene habits of pupils. Even low to moderate levels of environmental contamination may be sufficient to sustain transmission cycles and have been associated with malnutrition, impaired cognitive development, anemia, and reduced school performance. These findings underscore the importance of integrating environmental health measures with regular school-based deworming programs.

Conclusion

This study demonstrates moderate environmental contamination of primary school playground soils in Jos North and Jos South LGAs with parasitic stages, indicating potential exposure risk among school-aged children. The detection of hookworm larvae, *A. lumbricoides* eggs, *S. stercoralis* larvae, taeniid eggs, and mites reflects ongoing environmental contamination, although infection and health outcomes were not assessed. Although contamination levels did not differ significantly between the two LGAs, the findings suggest shared underlying risk factors related to sanitation, hygiene practices, and environmental management. Overall, these results highlight the need for targeted environmental and public health interventions to reduce exposure. We recommend strengthening school-based deworming programs in line with the WHO guidelines, alongside improved sanitation infrastructure, elimination of open defecation, proper waste disposal, and routine maintenance of playground environments to minimize contact with contaminated soil.

Funding

The authors declare that no funds, grants, or other financial support were received for the conduct of this study or the preparation of this manuscript.

Acknowledgments

The authors sincerely appreciate the Plateau State Ministry of Health for granting permission to conduct this study. We are also grateful to the head teachers and parents of the participating schools for their cooperation and support in facilitating the completion of the questionnaires by the pupils. In addition, we acknowledge the technical assistance provided by the staff of the Parasitology Laboratory at the Federal College of Veterinary and Medical Laboratory Technology, Vom, during the laboratory analysis of the samples. Additionally, we disclose that AI tools (ChatGPT, Gemini AI) were used to assist in language refinement and formatting of the manuscript. The scientific content, data analysis, and interpretation remain entirely the work of the authors.

Conflict of Interest

The authors declare that there is no conflict of interests.

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