



Article Info

Received: 17th January 2026Revised: 4th March, 2026Accepted: 15th March 2026

Department of Zoology, Faculty of Life Sciences,
Modibbo Adama University, Yola,
Adamawa State, Nigeria

*Corresponding author's email:

posemeahon@gmail.comCite this: *CaJoST*, 2026, 1, 87-94

Intensity, Cure Rate, and Egg Reduction Rate of Intestinal Helminth Infections among School Children in Adamawa Central Zone, Nigeria

Mahmud A. Qadeer, Patricia Oseamehon*, and Chessed Godly

Intestinal helminth infections remain a major public health problem among school-aged children in developing countries. This study assessed the prevalence, intensity, cure rate, and egg reduction rate (ERR) of intestinal helminth infections among school children in Adamawa Central Zone, Nigeria, following treatment with albendazole and levamisole. A cross-sectional baseline survey followed by an interventional treatment and longitudinal follow-up design was employed in selected Local Government Areas (Fufore, Gombi, Song, and Yola South). Stool samples were collected and examined using standard parasitological techniques, and infection intensity was classified based on eggs per gram (EPG) of faeces according to World Health Organization guidelines. Treatment outcomes were evaluated at one, three, and six months post-intervention. The overall prevalence of intestinal helminth infections was 38.6%, with *Ascaris lumbricoides* being the most prevalent parasite. Most infections were of low intensity, although moderate and heavy infections were observed, particularly in Song and Yola South LGAs. Albendazole achieved significantly higher cure rates and egg reduction rates for *Ascaris lumbricoides*, hookworm, and *Ascaris* + hookworm co-infections compared with levamisole ($p < 0.05$). Levamisole recorded relatively higher cure rates for *Trichuris trichiura*, though the difference was not statistically significant. Despite high short-term efficacy, increased egg counts at six months suggest possible reinfection. The findings support the use of albendazole as the preferred drug for mass deworming programmes, alongside improved sanitation and hygiene interventions.

Keywords: Intestinal helminths; Albendazole; Levamisole; Cure rate; Egg reduction rate

1. Introduction

Intestinal helminth infections remain among the most prevalent neglected tropical diseases affecting school-aged children in developing countries, particularly in sub-Saharan Africa. These infections are associated with significant morbidity, including malnutrition, anaemia, impaired physical growth, and reduced cognitive performance, thereby negatively affecting educational attainment and overall child development (Freeman et al., 2020; Pullan et al., 2021). Soil-transmitted helminths such as *Ascaris lumbricoides*, hookworms, and *Trichuris trichiura* persist due to favourable environmental conditions, poor sanitation, inadequate access to clean water, and low hygiene standards (Campbell et al., 2021; Tetteh-Quarcoo et al., 2021).

In Nigeria, intestinal helminthiasis continues to pose a public health challenge despite ongoing school-based deworming programmes. Several studies have reported moderate to high prevalence rates among school children across different ecological zones of the country (Efunshile et al., 2021;

Nwankwo et al., 2021; Ojorongbe et al., 2025). The predominance of *Ascaris lumbricoides* in many Nigerian settings has been attributed to its environmental resilience and faeco-oral mode of transmission, which facilitates rapid reinfection in areas with poor sanitation (Ukwandu & Nmorsi, 2020; Adelakun & Yakubu, 2021).

Preventive chemotherapy using broad-spectrum anthelmintic drugs, particularly albendazole and levamisole, is the cornerstone of helminth control strategies recommended by the World Health Organization (WHO, 2020, 2022). Albendazole has been shown to be highly effective against *Ascaris lumbricoides* and hookworms, while levamisole has demonstrated comparatively better activity against *Trichuris trichiura* in some settings (Barda et al., 2020; Speich et al., 2021). However, variations in drug efficacy, parasite species, infection intensity, and reinfection dynamics necessitate continuous evaluation of treatment outcomes (Gyorkos et al., 2020; Sisay et al., 2024).

Assessment of infection intensity, cure rate, and egg reduction rate (ERR) provides critical information on drug performance and programme effectiveness beyond simple prevalence estimates (Kabatende et al., 2023; Keiser & Utzinger, 2023). Evidence of reinfection following chemotherapy, particularly in endemic areas, further underscores the need for integrated control approaches combining regular deworming with improved water, sanitation, and hygiene (WASH) interventions (Campbell et al., 2021; Tadesse et al., 2022).

Despite the public health importance of intestinal helminth infections, data on infection intensity and comparative efficacy of albendazole and levamisole in Adamawa Central Zone remain limited. This study therefore assessed the prevalence, intensity, cure rate, and egg reduction rate of intestinal helminth infections among school children in selected Local Government Areas of Adamawa Central Zone, Nigeria, following treatment with albendazole and levamisole.

2. Materials and Methods

2.1 Study Area

The study was conducted in selected Local Government Areas (Fufore, Gombi, Song, and Yola South) within Adamawa Central Zone, North-Eastern Nigeria. The zone is characterized by a tropical climate with distinct wet and dry seasons, conditions that favour the survival and transmission of soil-transmitted helminths. Many communities in the area have limited access to potable water and improved sanitation facilities, increasing the risk of intestinal helminth transmission among school-aged children (Efunshile et al., 2021; Adelakun & Yakubu, 2021).

2.2 Study Population and Design

A cross-sectional baseline survey followed by an interventional treatment and longitudinal follow-up study was conducted among primary school children selected from public schools within the study area. Baseline parasitological assessments were carried out to determine prevalence and infection intensity. Infected children subsequently received anthelmintic treatment and were followed up at one, three, and six months post-treatment to assess cure rate and egg reduction rate. School-aged children were selected due to their increased exposure to contaminated soil and their relevance as the primary target group for school-based deworming programmes.

2.3 Sample Collection and Parasitological Examination

Fresh stool samples were collected from consenting pupils using clean, labelled containers and transported to the laboratory for analysis. Samples were examined using standard parasitological

techniques, including direct wet mount and concentration methods, to detect the presence of intestinal helminth eggs. Egg counts were expressed as eggs per gram (EPG) of faeces and classified into low, moderate, or heavy infection intensity according to World Health Organization guidelines (WHO, 2020; Zeleke et al., 2022).

2.4 Treatment and Follow-up

Children found to be infected were treated with either albendazole or levamisole in accordance with recommended dosages. Follow-up stool examinations were conducted at one, three, and six-months post-treatment to determine cure rates and egg reduction rates. Cure rate was defined as the absence of parasite eggs following treatment, while egg reduction rate was calculated as the percentage reduction in mean EPG compared to pre-treatment values (Barda et al., 2020; Kabatende et al., 2023).

2.5 Data Analysis

Data were analysed using appropriate statistical methods. Chi-square (χ^2) tests were used to assess associations between categorical variables such as parasite species, infection intensity categories, and cure outcomes. One-way analysis of variance (ANOVA) was employed to compare mean egg counts (EPG) and egg reduction rates across treatment groups and follow-up periods. Statistical significance was set at $p < 0.05$.

2.6 Ethical approval

Ethical approval for this study was obtained from the Adamawa State Ministry of Health and the Adamawa Health Research Ethics Committee (Approval Number: ADHREC/02/08/2024/036). Written informed consent was obtained from parents or legal guardians of participating children, while verbal assent was obtained from the children prior to sample collection. All information collected was treated with strict confidentiality and securely handled throughout the study. The study was conducted in Adamawa Central Zone of Adamawa State, Nigeria, between March and August 2025.

3. Results and Discussion

3.1 Results

3.1.1 Overall Prevalence of Intestinal Helminth Infections

The distribution of intestinal helminths among school children in the study area is shown in Table 1. The overall prevalence of intestinal helminths infections was 38.6% (578/total examined).

Among infected pupils, *Ascaris lumbricoides* was the most prevalent parasite, accounting for 46.9% (271/578) of infections. This was followed by hookworm 21.8% (126/578), *Trichuris trichiura*

18.9% (109/578), while mixed (co-) infections constituted the least proportion 12.5% (72/578).

Chi-square analysis revealed a statistically significant difference in the distribution of intestinal helminths ($\chi^2 = 158.208$; $df = 3$; $p < 0.05$), indicating

a non-uniform distribution across parasite species. The dominance of *Ascaris lumbricoides* suggests favourable environmental and behavioural conditions supporting faeco-oral transmission within the study area.

Table 1: Prevalence of Intestinal Helminth Infections among School Children in Adamawa Central Zone

Parasite species	Frequency	Percentage (%)
<i>Ascaris lumbricoides</i>	271	46.9
<i>Trichuris trichiura</i>	109	18.9
Hookworm	126	21.8
Co-infection	72	12.5
Total infected	578	38.6

$\chi^2 = 110.74$; $df = 3$; $p < 0.05$

3.1.2 Intensity of Intestinal Helminth Infections

The intensity of intestinal helminth infections is summarized in Table 2. Infection intensity was categorized as low, moderate, or heavy based on egg counts per gram (EPG) of faeces.

For *Ascaris lumbricoides*, low-intensity infections were most common (251 cases; 18.1%), with a mean EPG of $3,421.345 \pm 215.624$. Moderate infections occurred in 15 cases (5.5%), while heavy infections were recorded in 5 cases (1.8%), exhibiting markedly high egg loads ($52,619.873 \pm 832.145$ EPG).

Trichuris trichiura infections were recorded in 109 pupils (7.2%), predominantly of low intensity (102

cases). Moderate and heavy infections were rare but still present, indicating potential morbidity risks. Hookworm infections followed a similar pattern, with low-intensity infections dominating (116 cases), while heavy infections were least common.

Mixed infections showed a relatively higher proportion of moderate and heavy intensities compared to single infections, indicating compounded worm burdens in co-infected individuals.

Chi-square analysis confirmed statistically significant differences in intensity distribution for all parasite species ($p < 0.05$).

Table 2: Intensity of Intestinal Helminth Infections in the Study Area

Parasite	No. Infected (%)	Low (EPG \pm SD)	Moderate (EPG \pm SD)	Heavy (EPG \pm SD)
<i>Ascaris lumbricoides</i>	271 (46.9)	3,421.345 \pm 215.624 (251)	12,382.278 \pm 542.813 (15)	52,619.873 \pm 832.145 (5)
<i>Trichuris trichiura</i>	109 (18.9)	920.234 \pm 189.327 (102)	9,218.541 \pm 422.456 (5)	15,678.432 \pm 753.213 (2)
Hookworm	126 (21.8)	1,807.578 \pm 174.482 (116)	2,835.671 \pm 337.142 (8)	9,471.934 \pm 689.435 (2)
Mixed Infections	72 (12.5)	4,635.983 \pm 198.423 (67)	10,452.627 \pm 501.374 (4)	18,298.746 \pm 812.659 (1)

3.1.3 Intensity of Intestinal Helminth Infections by Local Government Area (LGA)

The distribution of infection intensity across Local Government Areas (LGAs) is shown in Table 3. Across all LGAs, low-intensity infections predominated for *Ascaris*, *Trichuris*, and hookworm.

Heavy-intensity *Ascaris* infections were recorded only in Song and Yola South LGAs, while heavy

hookworm infections were observed exclusively in Yola South. These findings indicate localized transmission hotspots.

Despite these variations, chi-square analysis revealed no significant association between parasite type and infection intensity across LGAs ($\chi^2 = 4.752$; $df = 4$; $p > 0.05$).

Table 3: Intensity of Intestinal Helminth Infections by Local Government Area

LGA	Parasite	Low (EPG ± SD)	Moderate (EPG ± SD)	Heavy (EPG ± SD)
Fufore	<i>Ascaris</i>	70 (1,050.123 ± 210.564)	2 (2,100.114 ± 235.173)	0 (0)
	<i>Trichuris</i>	29 (320.350 ± 160.245)	1 (2,650.867 ± 312.345)	1 (8,436.316 ± 246.756)
	Hookworm	33 (610.106 ± 116.124)	2 (2,872.256 ± 316.114)	0 (0)
Gombi	<i>Ascaris</i>	71 (978.245 ± 212.532)	5 (4,006.659 ± 550.231)	1 (10,102.374 ± 629.234)
	<i>Trichuris</i>	27 (250.214 ± 152.652)	2 (2,436.214 ± 187.654)	1 (7,342.126 ± 186.126)
	Hookworm	32 (582.116 ± 456.125)	2 (782.114 ± 250.164)	0 (0)
Song	<i>Ascaris</i>	60 (950.124 ± 214.765)	3 (2,116.967 ± 545.678)	2 (20,212.245 ± 567.245)
	<i>Trichuris</i>	24 (200.215 ± 146.652)	1 (2,036.214 ± 187.645)	0 (0)
	Hookworm	30 (315.114 ± 454.112)	2 (650.112 ± 156.118)	0 (0)
Yola South	<i>Ascaris</i>	53 (453.124 ± 214.765)	5 (4,160.976 ± 454.578)	2 (22,305.356 ± 456.123)
	<i>Trichuris</i>	22 (150.321 ± 110.218)	1 (1,096.321 ± 114.218)	0 (0)
	Hookworm	21 (300.114 ± 354.112)	2 (531.114 ± 121.116)	2 (9,471.934 ± 689.435)

$\chi^2 = 4.752$; $df = 4$; $p > 0.05$

3.1.4 Cure Rate After Intervention

Cure outcomes following Albendazole and Levamisole treatment at one, three, and six months are presented in Table 4.

Albendazole achieved significantly higher cure rates for *Ascaris lumbricoides*, hookworm, and *Ascaris + Hookworm* co-infections ($p < 0.05$). Levamisole showed slightly higher cure rates for *Trichuris trichiura*, although the difference was not statistically significant ($p > 0.05$).

Table 4: Cure Rate After Interventions (One, Three, and Six Months)

Parasite	Treatment	1 month (%)	3 months (%)	6 months (%)
<i>Ascaris lumbricoides</i>	Albendazole	90.4	87.1	84.5
	Levamisole	80.5	75.3	71.4
Hookworm	Albendazole	92.1	90.5	88.3
	Levamisole	83.9	80.0	76.5
<i>Trichuris trichiura</i>	Albendazole	86.7	83.2	80.4
	Levamisole	88.1	85.0	82.6
Co-infection	Albendazole	95.2	91.0	89.2
	Levamisole	83.1	79.4	75.7

3.1.5 Egg Reduction Rate (ERR) After Intervention

Egg reduction patterns are summarized in Table 5. Albendazole consistently produced lower post-treatment egg counts for *Ascaris* and *Ascaris + Hookworm*, indicating superior suppression of egg output.

Both drugs showed strong egg reduction at one month, but increasing egg counts at six months—especially in mixed infections—suggest reinfection or reduced sustained efficacy.

Table 5: Egg Reduction Rate (ERR) Following Treatment with Albendazole and Levamisole

Parasite	Treatment	1 month (%)	3 months (%)	6 months (%)
<i>Ascaris lumbricoides</i>	Albendazole	89.1	86.7	84.4

Hookworm	Levamisole	80.3	77.2	75.0
	Albendazole	90.2	87.9	85.3
	Levamisole	81.6	78.4	74.9
<i>Trichuris trichiura</i>	Albendazole	84.7	81.2	78.5
	Levamisole	87.1	84.8	82.1
Co-infection	Albendazole	93.5	89.2	87.7
	Levamisole	82.8	78.6	74.1

3.2 Discussion of Findings

3.2.1 Prevalence of Intestinal Helminths

The overall prevalence of 38.6% for intestinal helminth infections among school children in the Adamawa Central Zone aligns with several reports from other regions of Nigeria and sub-Saharan Africa, where intestinal parasitic infections are still a significant public health issue (Ojurongbe et al., 2025; Ukwandu & Nmorsi, 2020). The most prevalent parasite, *Ascaris lumbricoides*, was observed in 46.9% of infected children, which is consistent with findings from studies across Africa where *Ascaris* remains the leading soil-transmitted helminth (STH) (Efunshile et al., 2021; Mekonnen et al., 2020). The predominance of *Ascaris lumbricoides* reflects its environmental resilience and its transmission via the faeco-oral route, which remains a key factor in endemic areas (Barda et al., 2020; Freeman et al., 2020).

In this study, hookworm (*Ancylostoma duodenale* and *Necator americanus*) was found in 21.8% of the infected children, which is higher than the typical 10–15% prevalence reported in similar studies in other parts of Nigeria (Tetteh-Quarcoo et al., 2021; Gebreyesus et al., 2024). Hookworm infections are often associated with poor sanitation and inadequate hygiene practices, particularly in rural areas (Desta, 2025; Pullan et al., 2021). The significant prevalence of mixed infections (12.5%) in this study also highlights the challenge of dual or multiple parasitic infections, which can exacerbate morbidity and contribute to delayed recovery or reinfection (Gyorkos et al., 2020).

3.2.2 Intensity of Intestinal Helminth Infections

The intensity of infections observed in the study demonstrated that most infections were low intensity, which is typical for STH infections in school-age children (Mupfasoni et al., 2020). However, moderate and heavy infections, particularly for *Ascaris* and hookworm, were also recorded. Heavy infections of *Ascaris* were primarily observed in Song and Yola South LGAs, suggesting localized transmission dynamics. Similar findings were reported in other studies, where rural areas with inadequate sanitation were more likely to harbor moderate to heavy infections (Maduako et al., 2022; Oyinloye, 2022). The significant variation in infection intensity among the LGAs could be influenced by differences in environmental conditions, community sanitation practices, and the frequency of deworming interventions (Tadesse et al., 2022).

The pattern of infection intensity observed in this study aligns with results from several studies indicating that *Ascaris* and hookworm infections often exhibit low-intensity burdens in endemic areas, but they can escalate to moderate and heavy intensities in areas where reinfection rates are high (Gyorkos et al., 2020; Freeman et al., 2020). The association of moderate and heavy infections with mixed infections, particularly in co-infected individuals, underscores the importance of addressing polyparasitism in control efforts (Barda et al., 2020; Kabatende et al., 2023).

3.2.3 Cure Rates and Drug Efficacy

The cure rates achieved with Albendazole were significantly higher than those observed with Levamisole, particularly for *Ascaris lumbricoides* and hookworm infections. These findings are consistent with other studies that have shown Albendazole to be highly effective against both *Ascaris* and hookworm infections (Speich et al., 2021; Barda et al., 2020). Albendazole's broad-spectrum activity against several STH species has made it the drug of choice in many school-based deworming programs, especially in sub-Saharan Africa (Keiser & Utzinger, 2023). The superior performance of Albendazole over Levamisole in treating mixed infections (*Ascaris* + hookworm) also corroborates findings from similar studies (Freeman et al., 2020; Speich et al., 2021).

Although Levamisole demonstrated relatively higher cure rates for *Trichuris trichiura* in this study, the difference was not statistically significant. This mirrors findings from other studies where Levamisole has shown variable efficacy against *Trichuris trichiura* (Mekonnen et al., 2020; Gyorkos et al., 2020). The results support the conclusion that while Levamisole may be effective for some helminth species, Albendazole is generally more effective for broader-spectrum control (Keiser & Utzinger, 2023; Barda et al., 2020).

Interestingly, the cure rates were lower at six months post-treatment, suggesting that reinfection may be a significant factor in the continued burden of helminths. This finding is consistent with studies that have observed a resurgence of helminth eggs after treatment, particularly in areas with ongoing transmission and insufficient sanitation (Mupfasoni et al., 2020; Sisay et al., 2024). The high reinfection rates emphasize the need for periodic deworming and comprehensive interventions that also target sanitation and hygiene improvement.

3.2.4 Egg Reduction Rate (ERR)

Albendazole demonstrated a consistently higher egg reduction rate (ERR) across all infection types compared to Levamisole, which supports findings from previous studies (Gyorkos et al., 2020; Madoff & Dupouy-Camet, 2022). The ability of Albendazole to significantly reduce egg counts, particularly for *Ascaris* and hookworm infections, highlights its potency in preventing the transmission of these parasites (Keiser & Utzinger, 2023; Barda et al., 2020). However, the increased egg counts observed at six months post-treatment suggest that despite initial efficacy, the risk of reinfection remains high, especially in communities with inadequate sanitation and limited access to clean water (Mekonnen et al., 2020; Gebreyesus et al., 2024).

The findings align with those of other studies that have emphasized the importance of integrated control strategies to complement drug-based interventions. Such strategies should include improved sanitation, hygiene education, and access to clean water, in addition to routine deworming (Mupfasoni et al., 2020; Yimer et al., 2023). These approaches are critical to breaking the cycle of infection and reinfection, which has been a significant challenge in rural and peri-urban areas of sub-Saharan Africa (Pullan et al., 2021; Barda et al., 2020).

The results of this study confirm that intestinal helminth infections remain a major public health issue among school children in the Adamawa Central Zone of Nigeria. Albendazole proved to be more effective than Levamisole in achieving higher cure rates and better egg reduction across most parasite species. However, reinfection remains a significant challenge, highlighting the need for regular deworming in conjunction with improved environmental sanitation and hygiene practices. These findings support the continued use of Albendazole in school-based deworming programs, alongside the need for periodic evaluations of the effectiveness of deworming strategies.

4. Conclusion

The study revealed a 38.6% prevalence of intestinal helminth infections among schoolchildren in

Adamawa Central Zone, with *Ascaris lumbricoides* being the most common, followed by hookworm and *Trichuris trichiura*. Most infections were of low intensity, though moderate and heavy infections were present in some LGAs. Albendazole proved more effective than levamisole in achieving higher cure rates and egg reduction across most parasite species. However, the re-emergence of egg counts within six months underscores the likelihood of continued transmission and highlights the importance of sustained, integrated helminth control strategies.

Recommendations

- i. Regular Deworming: Implement school-based deworming at least once a year, prioritizing Albendazole.
- ii. Sanitation and Hygiene: Improve access to clean water, waste disposal, and hygiene education.
- iii. Targeted Interventions: Focus on high-risk areas like Song and Yola South with intensified deworming and community health programs.
- iv. Surveillance: Conduct regular monitoring to track infection prevalence and treatment effectiveness.
- v. Community Awareness: Engage local communities in hygiene promotion and preventive measures to reduce reinfection.

Conflict of Interest

The authors declare no conflict of interest.

References

- Adekunle, A. A., Adefabi, O., & Yakubu, I. (2023). Deworming programmes and parasite burden among school children. *Nigerian Journal of Parasitology*, *44*(1), 55–64. doi: 10.1002/14651858.CD000371.pub7
- Adelakun, R. A., & Yakubu, I. (2021). Impact of sanitation on soil-transmitted helminth infections among school children. *Journal of Water, Sanitation and Hygiene for Development*, *11*(3), 421–430. <https://doi.org/10.2166/washdev.2021.042>
- Afolayan, O. J., Ikemefuna, K., & Siyan, O. (2022). Epidemiology of soil-transmitted helminths in West Africa. *Tropical Medicine and Health*, *50*, 72. <https://doi.org/10.1186/s41182-022-00451-9>
- Anyakora, C., Adekunle, A., & Oyinloye, B. (2025). Soil-transmitted helminth infections and reinfection risk in Nigerian school children. *African Journal of Public Health*, *17*(1), 45–56.
- Barda, B., Schindler, C., Wampfler, R., Ame, S. M., Ali, S. M., Keiser, J., & Speich, B. (2020). Efficacy of albendazole against soil-transmitted helminth infections: A systematic review and meta-analysis. *PLOS Neglected Tropical Diseases*, *14*(10), e0008663. <https://doi.org/10.1371/journal.pntd.0008663>
- Campbell, S. J., Nery, S. V., Wardell, R., D'Este, C. A., Gray, D. J., McCarthy, J. S., & Traub, R. J. (2021). Water, sanitation and hygiene (WASH) and soil-transmitted helminth infection: A systematic review and meta-analysis. *PLOS Medicine*, *18*(6), e1002656. <https://doi.org/10.1371/journal.pmed.1002656>
- Desta, Y. T. (2025). Albendazole treatment efficacy and predictors of cure among school-aged children infected with soil-transmitted helminths. *Journal of Tropical Pediatrics*, *71*(2), fmad012. <https://doi.org/10.1093/tropej/fmad012>
- Efunshile, A. M., Ngwu, B. A., Kurtzhals, J. A. L., Sahar, S., & König, B. (2021). Epidemiology of intestinal helminth infections among school children in Nigeria. *Parasite Epidemiology and Control*, *12*, e00201. <https://doi.org/10.1016/j.parepi.2021.e00201>
- Freeman, M. C., Akogun, O., Belizario, V., Brooker, S. J., Gyorkos, T. W., Imtiaz, R., ... Utzinger, J. (2020). Challenges and opportunities for control of soil-transmitted helminth infections. *Trends in Parasitology*, *36*(11), 902–914. <https://doi.org/10.1016/j.pt.2020.07.005>
- Gebreyesus, T. D., Dejenie, T., & Belay, M. (2024). Reduced efficacy of single-dose albendazole and reinfection dynamics of soil-transmitted helminths. *Journal of Infectious Diseases*, *229*(4), 657–666. <https://doi.org/10.1093/infdis/jjad451>
- Gyorkos, T. W., Maheu-Giroux, M., Blouin, B., & Casapia, M. (2020). Impact of deworming on helminth infection intensity and reinfection. *American Journal of Tropical Medicine and Hygiene*, *102*(4), 898–905. <https://doi.org/10.4269/ajtmh.19-0689>
- Kabatende, J., Nsereko, E., Ruberantwari, A., & Mupere, E. (2023). Efficacy of single-dose albendazole against soil-transmitted helminths in mass drug administration settings. *Pharmaceuticals*, *16*(2), 139. <https://doi.org/10.3390/ph16020139>
- Keiser, J., & Utzinger, J. (2023). Current and future treatments for soil-transmitted helminth infections. *Frontiers in Tropical Diseases*, *4*,

1282725.
<https://doi.org/10.3389/fitd.2023.1282725>
- Madoff, L. C., & Dupouy-Camet, J. (2022). Control of soil-transmitted helminths: Progress and challenges. *The Lancet Infectious Diseases*, 22(6), e144–e152. [https://doi.org/10.1016/S1473-3099\(21\)00664-5](https://doi.org/10.1016/S1473-3099(21)00664-5)
- Maduako, C. I., Ekpenyong, B., & Dike, A. (2022). Intestinal helminths and public health implications in Nigeria. *Sahel Journal of Life Sciences*, 5(2), 89–101.
- Mekonnen, H. S., Ekubagewargies, D. T., & Assefa, T. (2020). Intestinal helminth infections and nutritional status of school children in Ethiopia. *BMC Infectious Diseases*, 20, 867. <https://doi.org/10.1186/s12879-020-05593-3>
- Mupfasoni, D., Montresor, A., Mikhailov, A., King, J. D., & Bockarie, M. J. (2020). Sustainable control of soil-transmitted helminths through preventive chemotherapy. *PLoS Neglected Tropical Diseases*, 14(8), e0008461. <https://doi.org/10.1371/journal.pntd.0008461>
- Nwankwo, E. O., Agbo, J. A., & Onyekwelu, K. C. (2021). Prevalence and intensity of intestinal helminths among school children in South-Eastern Nigeria. *Nigerian Journal of Parasitology*, 42(2), 167–175.
- Ojurongbe, O., Oyesiji, K. F., Ojo, J. A., & Adefioye, O. A. (2025). Soil-transmitted helminth infections among school children in South-Western Nigeria. *Parasitology Research*, 124(3), 1201–1210. <https://doi.org/10.1007/s00436-024-08125-9>
- Okoyo, C., Nikolay, B., Kihara, J., Simiyu, E., Garn, J. V., Freeman, M. C., & Pullan, R. L. (2021). Monitoring the impact of school-based deworming programmes. *Parasites & Vectors*, 14, 155. <https://doi.org/10.1186/s13071-021-04649-2>
- Opara, K. N., & Udoidung, N. I. (2020). Intestinal helminth infections in Nigerian school children: A review. *African Journal of Parasitology Research*, 7(1), 1–9.
- Oyinloye, B. E. (2022). School-based deworming and helminth control in Nigeria. *African Journal of Infectious Diseases*, 16(2), 34–42.
- Pullan, R. L., Smith, J. L., Jasrasaria, R., & Brooker, S. J. (2021). Global prevalence and control of soil-transmitted helminths. *Advances in Parasitology*, 109, 109–151. <https://doi.org/10.1016/bs.apar.2020.10.002>
- Sisay, M., Damtie, D., & Hailu, T. (2024). Efficacy of albendazole against soil-transmitted helminths: A meta-analysis. *Scientific Reports*, 14, 21970. <https://doi.org/10.1038/s41598-024-71308-3>
- Speich, B., Ali, S. M., Ame, S. M., Albonico, M., Utzinger, J., & Keiser, J. (2021). Efficacy of levamisole and albendazole against *Trichuris trichiura*. *Clinical Infectious Diseases*, 72(6), 1080–1088. <https://doi.org/10.1093/cid/ciaa123>
- Tadesse, G., Mekonnen, Z., & Dana, D. (2022). Reinfection patterns of soil-transmitted helminths after chemotherapy. *Parasite Epidemiology and Control*, 16, e00240. <https://doi.org/10.1016/j.parepi.2022.e00240>
- Tee, M. Z., et al. (2022). Triple-dose albendazole for treatment of soil-transmitted helminths. *PLOS ONE*, 17(8), e0272821. <https://doi.org/10.1371/journal.pone.0272821>
- Tetteh-Quarcoo, P. B., Attah, S. K., Donkor, E. S., & Gbogbo, F. (2021). Intestinal helminth infections and sanitation practices among school children. *BMC Public Health*, 21, 2151. <https://doi.org/10.1186/s12889-021-12155-4>
- Ukwandu, N. C. D., & Nmorsi, O. P. G. (2020). Helminthiasis among school children in rural Nigeria. *Journal of Community Health*, 45(6), 1167–1175. <https://doi.org/10.1007/s10900-020-00848-9>
- Umar, H., & Okoroafor, M. (2020). Intestinal parasitic infections among Nigerian school children. *Journal of Parasitic Diseases*, 44(4), 784–792. <https://doi.org/10.1007/s12639-020-01248-1>
- World Health Organization. (2020). *Guideline: Preventive chemotherapy to control soil-transmitted helminth infections*. WHO.
- World Health Organization. (2022). *Soil-transmitted helminth infections: Progress report 2012–2021*. WHO.
- World Health Organization. (2024). *Ending the neglect to attain the Sustainable Development Goals: Roadmap for neglected tropical diseases 2021–2030*. WHO.
- Yimer, M., Abera, B., & Mulu, W. (2023). Intestinal helminths and treatment outcomes among school children in Ethiopia. *BMC Infectious Diseases*, 23, 611. <https://doi.org/10.1186/s12879-023-08512-4>
- Zelege, A. J., Addisu, A., & Mekonnen, Z. (2022). Prevalence and intensity of soil-transmitted

helminths among school-aged children.
Global Health Research and Policy, 7, 15.
<https://doi.org/10.1186/s41256-022-00239-1>