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DIVERSITY OF HELMINTHS ON ECONOMIC IMPORTANCE IN TARABA STATE, NIGERIA: A REVIEW

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ABSTRACT

Helminths are parasitic organisms of major public health and veterinary significance, exerting profound impacts on human health, livestock productivity, and socio-economic development. This review synthesizes existing literature on the diversity, prevalence, and distribution of helminths of economic importance in Taraba State, Nigeria, with emphasis on their zoonotic potential and implications for disease control. Findings from multiple studies reveal that soil-transmitted helminths, schistosomes, filarial worms, cestodes, and trematodes remain widely distributed across the state, affecting humans, livestock, poultry, fish, and non-human primates. Among humans, intestinal helminthiasis is highly prevalent in school-aged children, with *Ascaris lumbricoides*, hookworm, and *Strongyloides stercoralis* most frequently reported, while lymphatic filariasis and onchocerciasis persist as major endemic diseases despite ongoing control programs. In livestock, gastrointestinal nematodes, liver flukes, and cestodes significantly reduce productivity and contribute to economic losses. Poultry and pigeons also harbor diverse endoparasites such as *Ascaridia galli* and *Raillietina spp.*, whereas aquatic helminths compromise fish health and threaten aquaculture development. Recent studies further highlight genetic diversity in *Onchocerca volvulus* and zoonotic transmission risks from both livestock and wildlife reservoirs. The climatic conditions, poor sanitation, and socio-economic realities of Taraba State provide favorable environments for helminth persistence and transmission. This review highlights the urgent need for integrated One Health approaches combining epidemiological surveillance, veterinary interventions, public health education, and improved sanitation to mitigate helminth burden, safeguard food security, and reduce poverty in the region.

1. Introduction

Helminths are worm-like parasitic organisms that have had a profound impact on both human and animal health, causing a wide range of diseases and contributing significantly to public health costs worldwide. (Houmsou *et al.*, 2015; Majewska *et al.*, 2021; Weinstock & Leung, 2022).

The global burden of helminth infections is substantial. More than five billion people are at risk, with an estimated two billion currently infected (Chen *et al.*, 2024; Lubis *et al.*, 2025). Soil-transmitted helminths (STHs), food-borne trematodes (FBTs), and schistosomes remain highly prevalent in tropical and subtropical regions where poor sanitation and hygiene practices create ideal transmission environments (Tidman *et al.*, 2023). Children are among the most vulnerable populations, and chronic helminth infections in this group often result in impaired physical growth, cognitive deficits, malnutrition, and anaemia, which collectively contribute to elevated mortality rates (Agbo *et al.*, 2025; Yusuf *et al.*, 2025). In Nigeria, helminthiasis remains endemic across all ecological zones, with prevalence strongly associated with poor sanitation, climatic conditions, and low socioeconomic standards (Agbajelola, 2025; Osaiyuwu *et al.*, 2025). The economic burden of these infections, particularly in ruminants, is considerable, and represents a major obstacle to food security and poverty alleviation.

In Taraba State, Nigeria, helminth infections particularly soil-transmitted helminths are widely distributed, especially in marginalized and economically disadvantaged communities. The transmission of these parasites is facilitated by the contamination of soil with human feces, a consequence of poor sanitation and hygiene practices in both rural and peri-urban settings. The climatic conditions of Taraba, characterized by warm and humid environments, provide favourable

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habitats for helminth survival and transmission (Houmsou *et al.*, 2015). Studies have documented a rich diversity of helminths across the sixteen local government areas of Taraba State, highlighting the urgent need for systematic evaluation of their prevalence, distribution, and public health significance (Akafyi *et al.*, 2021).

Given their wide-ranging effects on both human and animal health, as well as their economic and ecological significance, a comprehensive understanding of helminth diversity in Taraba State is crucial. Such knowledge not only provides insights into the epidemiology and risk factors associated with infection but also informs preventive and control strategies aimed at reducing morbidity and economic losses. This review therefore synthesizes available literature on the diversity of helminths of economic importance in Taraba State, examining their distribution patterns, zoonotic potential, and implications for public health and livestock productivity.

2. Diversity and Prevalence of Helminth Species in Taraba State

Helminth infections represent a major public health and veterinary concern in Nigeria, particularly in Taraba State, where ecological, socioeconomic, and cultural factors favor their persistence (Agbajelola, 2025). These agents are closely associated with inadequate sanitation, poor access to healthcare, and traditional practices surrounding water contact and food consumption. Their impact extends beyond humans to livestock, poultry, fish, and even non-human primates, with important zoonotic implications (Gimba *et al.*, 2019; Houmsou *et al.*, 2019; Shinggu *et al.*, 2019; Kwaghe *et al.*, 2020; Akafyi *et al.*, 2021; Inuwa *et al.*, 2021; Bobbo *et al.*, 2022).

2.1 Intestinal Helminthiasis in Children

Several studies have documented high prevalence of intestinal helminths among school-aged children in Taraba. Akwa *et al.* (2018) examined 600 stool samples in Kurmi LGA and found a prevalence of 42%. The most common parasites were hookworm (10.8%), *Ascaris lumbricoides* (9.3%), and *Strongyloides stercoralis* (6.5%). Polyparasitism occurred in ~4% of cases, and intensity ranged from scanty to heavy infections. The findings highlight the urgent need for routine deworming and health interventions in school populations.

Similarly, Ede *et al.* (2014) studied 1,123 pupils in Wukari LGA, reporting 36.5% prevalence. Hookworm dominated (26.5%), followed by protozoans such as *Entamoeba coli* (19.1%) and *Entamoeba histolytica* (6.6%). Helminths such as *Taenia spp.* (2.2%) and *Ascaris lumbricoides* (0.8%) were also present. This reinforces the endemicity of both protozoan and helminth infections in school settings.

Elkana *et al.* (2017) reported an overall prevalence of 41.9% among 420 children. *Hymenolepis nana* (18.8%) was most common, followed by *Strongyloides stercoralis* (9.04%). Infection prevalence was highest among younger children (5–7 years, 53.5%) and significantly correlated with poor nutritional status, indicating that helminth infections exacerbate malnutrition and growth deficits in children.

2.2 Helminths in Livestock

Livestock in Taraba are heavily burdened by helminths, which directly impact meat production and farmer livelihoods. At Jalingo abattoir, Ardo and Bitrus (2015) found 42.7% prevalence of gastrointestinal nematodes among 914 small ruminants (sheep and goats). *Haemonchus*, *Ostertagia*, and *Trichostrongyles* were dominant, with adults more affected than young animals. Although sex differences were not significant, age proved a critical factor.

Shitta and James-Rugu (2013) investigated 350 cattle in Wukari and reported 34.9% prevalence. Trematodes such as *Paramphistomum* spp. (23.7%) and *Fasciola gigantica* (8.9%) were common, alongside nematodes like *Oesophagostomum radiatum* (14.3%). Younger cattle showed significantly higher susceptibility, suggesting age-dependent immunity.

Shinggu *et al.* (2019) focused on liver flukes in 262 White Fulani cattle. They found *Fasciola* eggs in 28.2% and *Dicrocoelium* eggs in 80.5% of samples. Poor body condition strongly correlated with fasciolosis, demonstrating its economic burden on cattle health and productivity.

2.3 Poultry and Pigeons

Endoparasites also plague poultry production in Taraba. Gimba *et al.* (2019) studied 705 village chickens and found 43.3% infected, with nematodes (42.6%) dominating, especially *Ascaridia galli* (16.7%). Cestodes (*Raillietina* spp.) and protozoa (*Eimeria* spp.) were also present, reducing poultry productivity and household food security.

Inuwa *et al.* (2021) reported a prevalence of 28.6% among 500 slaughtered chickens in Jalingo, with nematodes again most common. *Ascaridia galli* and *Raillietina tetragona* were the dominant species. Both studies emphasize the need for veterinary extension services and parasite control measures to safeguard poultry health.

Umaru *et al.* (2017) examined domestic pigeons in Jalingo and found an alarming 78.3% prevalence. Nematodes included *Ascaridia columbae* and *Capillaria* spp., while cestodes such as *Raillietina tetragona* and *Hymenolepis columbae* were also detected. Adult pigeons and males were more susceptible, possibly due to behavioral or ecological factors.

2.3 Parasites in Non-Human Primates

Wildlife reservoirs contribute to parasite transmission dynamics. Houmsou *et al.* (2019) studied gastrointestinal parasites in non-human primates (NHPs) in Gashaka-Gumti National Park. They found 12 parasite species, with *Ascaris sp.* (38.7%) and *Trichuris sp.* (18.7%) dominating. Infection patterns varied by species and age but not sex. The zoonotic potential of these findings highlights risks for humans who share water sources with NHPs.

2.4 Fish Parasites

Aquatic helminths were reported by Bingari (2014), who examined 260 *Clarias* spp. in River Taraba. Gill parasites included *Macrogyrodactylus* sp. and *Ergasilus sarsi*, while digestive tract parasites included *Tetracampos ciliotheca* (cestode) and *Procamallanus laevionchus* (nematode). Infestation varied seasonally but not by fish size or sex. These findings underscore the need for quarantine practices in aquaculture to prevent parasite introduction into fish farms.

2.5 Onchocerciasis and Emerging Strains

Onchocerciasis remains endemic in Taraba. Akafyi *et al.* (2021) analyzed microfilariae from 211 participants in six endemic communities and discovered genetic diversity in *Onchocerca volvulus*. Sequencing suggested the emergence of new polymorphic strains and even zoonotic transmission of *O. ochengi* to humans. This raises concerns about ongoing transmission despite long-term ivermectin distribution, warranting further surveillance.

2.6 Lymphatic Filariasis

Badaki *et al.* (2013) studied bancroftian filariasis across three LGAs and found 21.2% prevalence of *Wuchereria bancrofti*. Lymphoedema was the most common morbidity, affecting women more severely. Prevalence increased with age, peaking in the 40–49 years' bracket. The findings confirm lymphatic filariasis as a persistent public health problem requiring elimination programs.

2.7 Zoonotic and Transboundary Diseases

Kwaghe *et al.* (2020) provided a broader overview of animal health surveillance in Taraba from 2013–2017, covering over 1.5 million livestock cases. Helminthoses, trypanosomosis, and ectoparasitism were the most prevalent zoonotic diseases, while Peste des Petits Ruminants and Foot and Mouth Disease represented key transboundary animal diseases. These findings call for a One Health approach integrating veterinary, environmental, and human health sectors.

2.8 Prevalence of Cestodes

From reports gathered, *Ascaris lumbricoides* has the highest prevalence rate from the Cestodes class, especially in Gassol Local Government Area with a prevalence of 68.5%. while the least prevalent Cestodes species is *Taenia saginata* with a prevalence of 2.6% in Wukari LGA (Table 1).

The prevalence rates reported in the table are consistent with the findings of the literature review, which highlights high rates of STH and schistosome infections in Taraba State. However, the table provides more specific data on the prevalence of individual helminth species across different locations, which complements the broader overview presented in the literature review (Table 1).

Table 1: Prevalence of Cestodes (Tapeworms) in Taraba State

SN	Family	Species	Prevalence (Study population and Location)	Reference
1	Family Taeniidae	***Taenia solium*** (Pork tapeworm)	2.2% (Wukari). 1.8 % (school-aged children in Kurmi).	Ede *et al.* (2014) Akwa *et al.* (2018)
2		***Taenia saginata*** (Beef tapeworm)	48.31 (Slaughtered Cows in Abattoirs in Bali).	Ukwubile & Bingari (2018)
3	Family Hymenolepididae	***Hymenolepis spp*** (Rat tapeworm)	1% (wukari).	Ede *et al.* (2014)

2.9 Prevalence of Nematodes (Roundworms) In Taraba State

The prevalence rates of different Nematodes as reported by several researchers among various populations in specific locations revealed that the Family Filariidae, *Wuchereria bancrofti*, the filarial worm causing lymphatic filariasis, showed varying prevalence rates: 31.29% among people in Northern Taraba, dropping to 27.80% after two rounds of mass drug administration in Lau LGA, and ranging from 21.20% to 30.80% among different groups in Lau, Yorro & Zing (Table 2). *Onchocerca volvulus*, from the Family Onchocercidae causing river blindness, displayed prevalence rates such as 13.3% among the people of Bali LGA, 45.2% in Bakundi district, and 64.7% among dwellers along the Taraba River valley, with reduced rates of 26% and 22% in Gashaka after long-term treatment with ivermectin. *Ascaris lumbricoides*, a giant intestinal roundworm from the Family Ascarididae, showcased rates of 20.8% among primary school pupils in Rafinkada District of Wukari LGA, 16.3% among internally displaced persons in Jalingo LGA, and 9.3% among school-aged children in Kurmi (Table 2).

Table 2: Prevalence of Nematodes (roundworms) in Taraba State

SN	Family	Species	Prevalence (population and location)	Reference
1	Family Filariidae	*Wuchereria bancrofti* (Filarial worm causing lymphatic filariasis)	31.29% (People Northern Taraba). 27.80% (After two rounds of mass drug administration in Lau LGA). 30.80% (Mumuye People in Yorro LGA). 21.20% (Lau, Yorro & Zing).	Elkanah *et al.* (2020) Akafyi *et al.* (2021) Elkanah *et al.* (2018) Badaki *et al.* (2001)
2	Family Onchocercidae	*Onchocerca volvulus* (Filarial worm causing river blindness)	13.3% (People of Bali LGA). 45.2% (Bakundi district). 39% (People of Gashaka LGA). 64.7% (Dwellers along the Taraba River valley). 26% & 22% (People of Gashaka, following long term treatment with ivermectin).	Akogun *et al.* (1994) Akogun *et al.* (1999) Olamiju *et al.* (2023) Akogun *et al.* (1991) Idowu *et al.* (1991)
3	Family Ascarididae	*Ascaris lumbricoides* (Giant intestinal roundworm)	20.8% (Primary schools' pupils in Rafinkada District of Wukari LGA). 16.3% (Internally displaced persons in Jalingo LGA). 9.3% (School-aged children in Kurmi). 0.8% (Wukari).	Usman *et al.* (2025) Wama *et al.* (2022) Akwa *et al.* (2018) Ede *et al.* (2014)

2.10 Prevalence of Trematodes (Flukes) In Taraba State

Schistosoma mansoni, a Schistosome causing intestinal schistosomiasis from the Family Schistosomatidae, exhibited varying rates: 5.6% among school-aged children in Kurmi, 7.40% in a cross-sectional study in Northeastern Nigeria, and 9.5% during a Schistosomiasis outbreak in Takum. Another Schistosome, *Schistosoma haematobium*, causing urinary schistosomiasis, displayed rates of 2.77% in a cross-sectional study in Northeastern Nigeria and a significantly higher prevalence of 28.9% during a Schistosomiasis outbreak in Takum, Northeast Nigeria. Fasciola hepatica, a liver fluke from the Family Fasciolidae, showed a prevalence rate of 50.81% in slaughtered cows in Abattoirs in Bali and 8.29% in a study on bovine fasciolosis in Jalingo abattoir (Table 3).

Table 3: Prevalence of Trematodes (Flukes) in Taraba State

S/N	Family	Species	Prevalence (study population and location)	Reference
1	Family Schistosomatidae	***Schistosoma mansoni*** (Schistosome causing intestinal schistosomiasis)	5.6% (school-aged children in Kurmi). 7.40% (Cross-sectional study and spatial distribution of schistosomiasis among children in Northeastern Nigeria). 9.5% (A study Schistosomiasis outbreak during COVID-19 pandemic in Takum, Northeast Nigeria).	Akwa *et al.* (2018) Houmsou *et al.* (2016) Olamiju *et al.* (2022)
2		***Schistosoma haematobium*** (Schistosome causing urinary schistosomiasis)	2.77% (Cross-sectional study and spatial distribution of schistosomiasis among children in Northeastern Nigeria). 28.9% (A study Schistosomiasis outbreak during COVID-19 pandemic in Takum, Northeast Nigeria).	Houmsou *et al.* (2016) Olamiju *et al.* (2022)
3	Family Fasciolidae	***Fasciola hepatica*** (Liver fluke)	50.81 (A study on Slaughtered Cows in Abattoirs in Bali). 8.29% (A Study on bovine fasciolosis in Jalingo abattoir).	Ukwubile & Bingari (2018) Obialigwe *et al.* (2024)

3. Conclusion

This study highlights the diversity and prevalence rate of helminths diseases and their economic importance on human health, livestock productivity, and socio-economic stability in Taraba State, Nigeria. The evidence shows that helminth infections remain highly prevalent in the state, with soil-transmitted helminths, schistosomes, and filarial worms being dominant among human populations. School-aged children and pregnant women are the most vulnerable groups, with infections linked to malnutrition, stunted growth, anaemia, and impaired cognitive development.

Livestock and poultry production in Taraba are equally constrained by parasitic burdens. Gastrointestinal nematodes, trematodes, and cestodes in ruminants, chickens, and pigeons contribute to reduced productivity and economic losses for farmers. The detection of helminths in non-human primates and fish further demonstrates the ecological diversity of these parasites and their zoonotic potential, raising concerns about cross-species transmission and emerging strains, such as those observed in *Onchocerca volvulus*.

The distribution and prevalence patterns reflect the strong influence of poor sanitation, unsafe water sources, cultural practices, and inadequate veterinary and healthcare services. Outbreaks of schistosomiasis in Takum, high prevalence of fasciolosis in cattle, and persistent *Ascaris* and hookworm infections in children illustrate the urgent need for targeted interventions in specific hotspots across the state.

To address these challenges, there is a pressing need for improved public health interventions such as routine deworming, health education, and provision of clean water and sanitation facilities. Strengthened veterinary services, parasite surveillance, and community engagement are also essential to reduce helminth-associated economic losses in livestock production. In addition, molecular monitoring of emerging strains and zoonotic parasites should be prioritized to detect and control potential cross-species transmission risks.

Effective control will require a comprehensive and sustainable One Health approach, integrating human, animal, and environmental health strategies. This study therefore provides an evidence-based foundation for policy makers, researchers, and health authorities to design targeted interventions aimed at reducing morbidity, improving food security, and enhancing public health resilience in the region.

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