


Ecological and host determinants of parasite prevalence and diversity in edible land snails from a rural Nigerian community

Okwerekwu, N. J.¹, Ogonna C. A.¹, Nnamonu, E. I.^{1*} , Ezechukwu, C. S.³, Obealor, O. L.², Odikamnoru, O. O.², Uhuo, C. A.²

¹Department of Biology, Federal College of Education, Eha-Amufu, Enugu State, Nigeria.

²Department of Applied Biology, Ebonyi State University, Abakaliki, Ebonyi State, Nigeria.

³Drug Discovery and Biotechnology Unit, Lion Science Park, University of Nigeria, Nsukka, Nigeria.

*Corresponding Author: Emmanuel I. Nnamonu. nnamonue@gmail.com

Received: 06 April, 2026

Revised: 21 June, 2026

Accepted: 24 June, 2026

Keywords: Parasite prevalence, edible land snail, rural Nigerian community, ecological factors, public health



© 2026 Zoological Society of Nigeria



This is an Open Access article distributed under the terms of Creative Commons Attribution License 4.0 (CC BY-NC-SA)

Introduction

Parasitic infections involving snail intermediate hosts continue to constitute a significant public health burden in sub-Saharan Africa, driven by interacting environmental conditions, socio-economic constraints, and human behavioural practices that sustain transmission pathways. Notably, schistosomiasis remains one of the most prevalent neglected tropical diseases worldwide, with an estimated 240 million people currently infected and over 700 million at risk of exposure. The disease disproportionately affects populations in tropical and subtropical regions, particularly in low-resource settings characterised by inadequate access to clean water, sanitation, and hygiene facilities (WHO 2023; WHO 2024). Nigeria carries a significant share of this burden, with millions of people at risk of schistosomiasis requiring preventive chemotherapy annually, according to the latest WHO endemic country data (WHO 2023; WHO 2024). Although most national burden estimates focus on freshwater schistosomiasis, other snail-associated parasitic infections also contribute to morbidity and potential zoonotic risk where terrestrial snails are part of local food systems.

Abstract

Parasitic infections associated with terrestrial gastropods remain a neglected public health concern in sub-Saharan Africa, sustained by environmental and host-related factors. This study examined the ecological and host-related determinants of parasite prevalence and diversity in edible land snails from Southeast Nigeria. A cross-sectional study was conducted over six months. Snails were collected and identified using standard morphological features. Morphometric parameters (shell length, width, and weight) were recorded, and specimens were grouped into four stages. Snails were euthanized and dissected for parasitological analysis using standard laboratory procedures. A total of 834 snails comprising *Achatina achatina*, *Archachatina marginata* and *Achatina fulica* were examined. *Achatina achatina* was the most abundant species (346), while *A. fulica* was the least represented (189). Overall prevalence of infection was 45.6% (380/834), with parasites including protozoans, trematodes, nematodes, and mites. Infection rates were highest in *A. achatina* (192) and lowest in *A. fulica* (21). *Achatina achatina* also exhibited the highest parasite diversity. Edible land snails act as reservoirs of parasitic infections, with patterns influenced by host species. Enhanced public health awareness, improved food safety practices, and sustained epidemiological surveillance are recommended mitigation measures for endemic rural settings.

In Nigeria, edible terrestrial snail species, including *Achatina achatina*, *Achatina fulica*, and *Archachatina marginata*, are commonly utilized as important sources of dietary protein and livelihood among local populations (Igbinsa *et al* 2016). Research conducted in southern Nigeria, including Lagos and Cross River states, has documented substantial parasitic infection prevalence in edible land snails, with parasite taxa including nematodes (e.g. *Strongyloides* spp. and *Angiostrongylus* spp.) and protozoans detected in both wild and farmed snail populations (Igbinsa *et al* 2016). These infections underscore the health risk posed by consumption of undercooked contaminated snails, as well as through environmental contact during harvest and processing (Igbinsa *et al* 2016).

Despite this, ecological and epidemiological data on land snail-borne parasite infections remain sparse in many parts of Nigeria, particularly states in the southeastern region, like Enugu State. Few studies have investigated terrestrial snail parasite profiles in southeastern Nigeria, although *Biomphalaria pfeifferi*, a freshwater snail intermediate host of several parasites have been found in several rivers in the region (Onayemi and Fabiyi 2016; Gboeloh and Ike-Ihunwo 2022). The public health implications extend beyond schistosomiasis; diverse parasitic taxa identified in

edible land snails in other Nigerian states pose additional potential disease burdens that are not accounted for in national neglected tropical disease reports (Igbinosa *et al* 2016).

This incomplete epidemiological picture represents a significant knowledge gap in understanding how ecological variables (e.g. collection microhabitats) and host factors (e.g., species identity, age, and morphometry) influence parasite prevalence and diversity among edible land snails, and how these interactions could affect human and animal health. Addressing this gap is critical not only for informing food safety and health risk assessments but also for integrating terrestrial snail parasite dynamics into broader disease control strategies aligned with WHO's 2021–2030 roadmap for neglected tropical diseases, which aims to eliminate snail-borne disease transmission as a public health problem (WHO 2023; WHO 2024). The present study thus evaluated the ecological and host-related determinants of parasite prevalence and diversity in edible land snails from Eha-Amufu, Southeast Nigeria. The study sought to determine the species composition, abundance, and overall parasite prevalence in edible land snails, and to compare parasite prevalence and diversity among *Achatina achatina*, *Achatina fulica*, and *Archachatina marginata*, as well as assess the influence of collection microhabitats and host age and morphometric characteristics on infection patterns.

Materials and methods

Study area

The research was conducted in the villages of Ihenyi and Mgbuji, located within Eha-Amufu in Enugu State, southeastern Nigeria. Eha-Amufu is a rapidly expanding town comprising a mix of agricultural and commercial activities. It falls under the jurisdiction of Isi-Uzo Local Government Area and is geographically positioned at latitude 6°39'32" N and longitude 7°45'34" E, with an elevation of approximately 109 meters above sea level. The town experiences an average temperature of 27.0°C

and receives roughly 1,669mm of rainfall annually (Nnamonu *et al* 2018). The Ehenyi River and its tributaries traverse the area, supporting local agriculture and fishing activities.

The population is predominantly Igbo-speaking, with most residents engaged in farming, fishing, artisanal work, and trading. Major crops such as rice, yam, and potatoes are cultivated extensively, alongside products like oil and garri, which are sold during the local Eke market days that attract buyers from surrounding communities. Eha-Amufu is also home to a Federal College of Education, contributing to a high density of students and academic staff. The town experiences two main seasons: a dry season from November to April and a rainy season from May to October. The landscape is marked by lush vegetation and green forested areas (Nnamonu *et al* 2018).

Sample collection

A total of 834 land snails were collected from the study area over a six-month period, spanning August 2022 to January 2023, which included both the rainy season when snail activity is typically high and the dry season, when activity is reduced. Local snail collectors from the area were engaged to assist in the collection process. Samples were obtained from Mgbuji and Ihenyi villages in Eha-Amufu, within the Isi-Uzo Local Government Area of Enugu State.

Snails were gathered from various microhabitats, including the undersides of logs and leaves, refuse sites, tree buttresses, and the bases of houses. Sampling was conducted twice weekly, during early morning hours (5:00–7:00 am) and in the evening (6:00–8:00 pm). All snails observed during these periods were collected and included in the study. The specimens were transported in ten ventilated plastic containers to the Department of Applied Biology Laboratory at Ebonyi State University, Abakaliki, for species identification and parasitological examination, following the identification guidelines of Raut and Barker (2002).

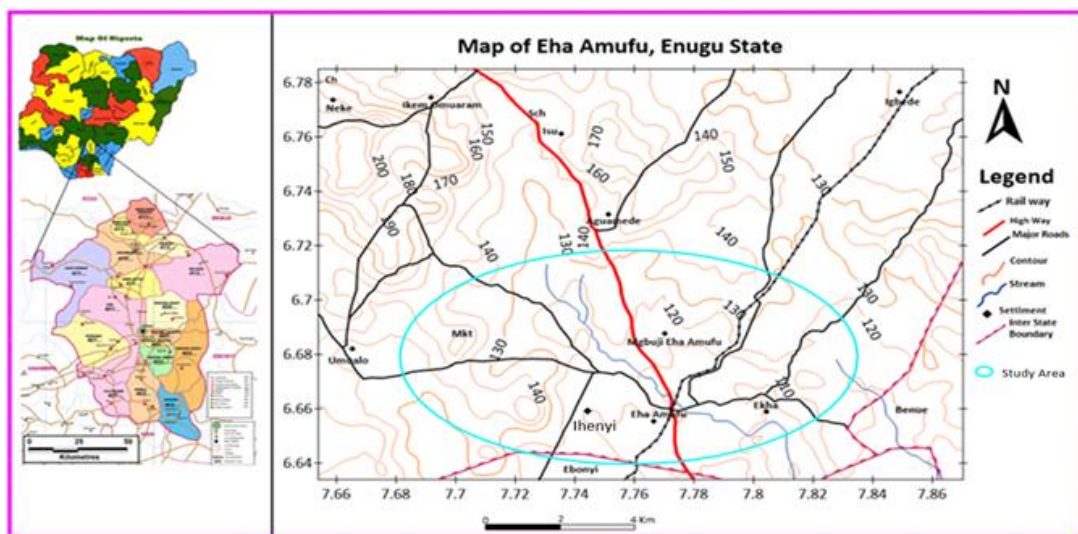


Figure 1. Map of Eha-Amufu showing study area (Maps of Nigeria and Enugu State inserted)
Source: Nnamonu *et al* (2018)

Snail identification, morphometry, and parasite recovery. Collected land snails were initially sorted by size and colour, and identified to species level using morphological features such as shell shape, spire angle, aperture, sculpture, and colouration, following Raut and Barker (2002). Morphometric measurements, including shell length, width, and weight, were recorded using callipers and a precision balance, and snails were classified into four size categories: newly hatched (0–10mm), juveniles (11–40mm), young adults (41–70mm), and adults (>70mm). Age estimation was further informed by mantle orientation. Snails were humanely asphyxiated in water for 24 hours prior to dissection. Key organs, including the mucus gland, digestive gland, stomach, crop, intestine, foot, and ovotestis were carefully dissected, and their contents examined microscopically for parasites (Igbinsosa *et al* 2016). Parasite recovery employed three complementary techniques: direct wet mount, sodium chloride flotation, and formal-ether concentration (Cheesbrough 2006). For the direct examination, the contents of the organs were suspended in normal saline, mounted on a microscope slide, and observed using $\times 10$ and $\times 40$ objectives. Flotation involved straining fresh specimens through gauze, centrifugation, and recovery of parasites at the meniscus using a cover slip, followed by microscopic identification. The formal-ether concentration method included emulsification of tissue in saline, sequential centrifugation, fixation with formalin, and extraction with ethyl acetate prior to slide examination under low and high power objectives. All parasites detected were identified and counted using the guidelines provided in the *Atlas of Human Parasitology* (Ash and Orihel 2007), allowing for a detailed evaluation of parasite load, organ-specific distribution, and species diversity within the snail populations.

Data analysis

Data derived from parasite eggs, larvae, and cysts were analysed using the Statistical Package for the Social Sciences (SPSS) version 20 (IBM Corp., Armonk, New York) and Microsoft Excel 2007 (Microsoft Corp., Redmond, USA). Parasite prevalence in the snails was examined based on size class, host organ(s), and village location. Differences in infection rates among snail

species, predilection sites, and villages were assessed using the Chi-square test. Analysis of Variance (ANOVA) was employed to determine statistically significant differences between group means. A significance threshold of $p < 0.05$ was adopted.

Results

Species of edible land snails collected, examined and percentage positive cases from different locations in Eha-Amufu

A total of 834 land snails, representing three species *Achatina achatina*, *Achatina fulica*, and *Archachatina marginata* were collected from two villages in Eha-Amufu: Ihenyi (466 snails) and Mgbuji (368 snails). Among the species, *A. achatina* was the most abundant, with 190 individuals in Ihenyi and 156 in Mgbuji. This was followed by *A. marginata*, with 146 in Ihenyi and 126 in Mgbuji, while *A. fulica* was the least abundant, totalling 130 in Ihenyi and 86 in Mgbuji (Table 1).

Of the 834 snails examined, 380 were found to harbour various parasites, including protozoans, trematodes, nematodes, and mites. Infection rates varied among the species: *A. achatina* showed the highest prevalence, with 93 (48.95%) in Ihenyi and 72 (46.15%) in Mgbuji, followed by *A. marginata* with 69 (47.26%) and 60 (47.61%), respectively. *Achatina fulica* exhibited the lowest infection rates, with 57 (43.84%) in Ihenyi and 29 (33.72%) in Mgbuji (Table 1). Statistical analysis indicated significant differences in infection among the snail species ($p < 0.05$).

Parasite prevalence in relation to collection points

The findings indicate that the location of snail collection influenced parasite prevalence. At refuse dump sites, *Achatina achatina* exhibited the highest infection rate with 57 individuals (50.44%), followed by *Archachatina marginata* with 44 (40.37%), and *Achatina fulica* showing the lowest prevalence at 18 (30.51%). In samples collected from the bases of houses, *A. fulica* had the highest parasite recovery with 35 individuals (80.74%), followed by *A. achatina* with 18 (26.09%), while *A. marginata* had the lowest with 16 (61.54%) (Table 2). Statistical analysis confirmed that parasite prevalence varied significantly according to the collection site ($p < 0.05$).

Table 1. Location-based abundance and prevalence of infection of edible land snails in Eha-Amufu

Location	Snail species	Number examined	Number infected	Percentage (%)
Ihenyi	<i>Achatina achatina</i>	190 ^a	93	48.95
	<i>Achatina fulica</i>	130 ^c	57	43.84
	<i>Archachatina marginata</i>	146 ^c	69	47.26
	Total	466	219	46.99
Mgbuji	<i>Achatina achatina</i>	156 ^b	72	46.15
	<i>Achatina fulica</i>	86 ^d	29	33.72
	<i>Archachatina marginata</i>	126 ^f	60	47.61
	Total	368	161	43.75

Key: Values with different superscript in the same column are significant ($p < 0.05$).

Table 2. Parasite prevalence in relation to snail collection points in Eha-Amufu

Collection point	<i>A. achatina</i>		<i>A. fulica</i>		<i>A. marginata</i>	
	NC	NP (%)	NC	NP (%)	NC	NP (%)
Logs / leaves	89	53 (59.55)	82	24 (29.27)	91	42 (46.15)
Refuse dump sites	113	57 (50.44)	59	18 (30.51)	109	44 (40.37)
Buttresses of large trees	75	37 (49.33)	36	9 (25.00)	46	27 (58.69)
House bases	69	18 (26.09)	39	35 (89.74)	26	16 (61.54)
Total	346	165 (47.68)	216	86 (39.81)	272	129 (47.42)

NC = Number of land snails collected; NP = Number of snails positive for parasitic infection;
% = percentage of total collected snails at collection point

Occurrence of different parasite species in the species of edible land snails

The distribution of parasite species across the different snail species is presented in Table 3. *Achatina achatina* harboured all the identified parasite species, with a total of 192 infected individuals (50.53%). *Archachatina marginata* hosted all parasite species except *H. rabidus*, while *Achatina fulica* was infected by four parasite species: *T. achatinae*, *Protostrongylus* spp., *Angiostrongylus* larvae, and mites. Statistical analysis revealed that the differences in parasite infections among the snail species were significant ($p < 0.05$).

Parasites of edible land snails in Eha-Amufu according to age

Analysis of parasite prevalence in relation to the age of edible land snails indicated that older snails harboured a higher number of parasites compared to younger individuals (Table 4). Snails aged four years and above showed the highest infection in *Achatina fulica*, with 27 individuals (28.72%) and the lowest in *Achatina achatina*, with 20 individuals (14.0%) (Table 6). The differences in parasite prevalence across age groups were statistically significant ($p < 0.05$).

Table 3. Prevalence of infection in species of edible land snail in Eha-Amufu

	<i>A. achatina</i>	<i>A. fulica</i>	<i>A. marginata</i>	Total (%)
	PC (%)	PC (%)	PC (%)	
<i>Trichodinae achatinae</i>	44 (53.7)	3 (3.7)	35 (42.7)	82
<i>Enteromonas</i> spp	26 (52.0)	0 (.0)	24 (48.0)	50
<i>Mesocercaria alaria</i>	20 (50.0)	0 (.0)	20 (50.0)	40
<i>Protostrongylus</i> spp	10 (35.7)	6 (21.4)	12 (42.9)	28
<i>Hyostromylus rubidus</i>	14 (100.0)	0 (.0)	0 (.0)	14
<i>Angiostrongylus</i> larva	6 (16.7)	9 (25.0)	21 (58.3)	36
<i>Phasmarhabditis hermaphrodita</i>	2 (18.2)	0 (.0)	9 (81.8)	11
<i>Oesophagostanum</i> egg	36 (55.4)	0 (.0)	29 (44.6)	65
<i>Globocephallus urosbulatus</i> egg	20 (66.7)	0 (.0)	10 (33.3)	30
Mites observed	14 (58.3)	3 (12.5)	7 (29.2)	24
Total	192 (50.5)	21 (5.5)	167 (43.9)	380

PC = parasite count

Table 4. Age-based prevalence of parasite in edible land snails from Eha-Amufu, Enugu State

Age of snails	<i>A. marginata</i>		<i>A. fulica</i>		<i>A. achatina</i>		Total positive (%)
	NC	NP (% +ve)	NC	NP (% +ve)	NC	NP (% +ve)	
2 months	21	6 (5.08)	11	2 (1.74)	21	6 (3.77)	14
4 months	20	8 (6.78)	9	1 (0.97)	36	11 (6.92)	20
6 months	18	5 (4.24)	20	5 (4.85)	30	9 (5.66)	19
1yr	20	9 (7.63)	20	9 (8.74)	31	14 (8.81)	32
1.5yr	21	4 (3.39)	13	10 (9.71)	36	11 (6.92)	25
2yr	15	12 (10.17)	15	6 (5.83)	28	16 (10.06)	34
2.5yr	25	14 (11.86)	17	4 (3.88)	43	20 (12.58)	38
3yr	30	13 (11.02)	33	19 (18.45)	49	36 (22.64)	68
3.5yr	34	18 (15.25)	30	20 (19.42)	42	16 (10.06)	54
4yr and above	59	29 (24.58)	48	27 (26.21)	39	20 (12.58)	76
TOTAL	263	118 (100)	216	103 (100)	355	159 (100)	380

NC = Number of land snails collected; NP = Number of snails positive for parasitic infection;
%+ve = percentage of total positive snails

Discussion

This study provides comprehensive evidence that parasitic infections in edible land snails from Eha-Amufu are shaped by a complex interaction of host species, ecological microhabitats, and age structure. The overall parasite prevalence observed across *A. achatina*, *A. marginata*, and *A. fulica* aligns with growing evidence that terrestrial snails in tropical settings constitute significant reservoirs of diverse parasite taxa, extending the scope of snail-associated disease burden beyond classical freshwater schistosomiasis systems (Ekechukwu *et al* 2023; WHO, 2024).

The notably higher parasite prevalence observed in *A. achatina* and *A. marginata* compared to *A. fulica* indicates a species-specific susceptibility, which may be influenced by differences in shell size, feeding habits, habitat preference, and lifespan. Larger-bodied snails with longer life spans may experience cumulative exposure to infective stages of parasites in soil and organic matter, thereby increasing infection probability over time. Comparable trends have been documented in studies of terrestrial snails in southern Nigeria and other tropical regions, where larger *Achatina* species were found to host a wider range of parasites and exhibited greater infection intensities than their smaller counterparts (Ekechukwu *et al* 2023; Mbah *et al* 2022).

The recovery of protozoans, trematodes, nematodes, and mites further underscores the ecological versatility of edible land snails as intermediate or paratenic hosts. Of particular concern is the presence of nematode taxa such as *Angiostrongylus* spp. and *Protostrongylus* spp., which have been implicated in zoonotic and veterinary infections elsewhere. The WHO has emphasized that foodborne parasitic infections remain underreported in endemic countries due to limited surveillance outside freshwater transmission systems (WHO 2023; WHO 2024). The findings from Eha-Amufu, therefore, highlight an unaddressed component of Nigeria's parasitic disease ecology.

The present study demonstrates a comparatively high parasite prevalence (45.6%) and clear species, habitat, and age-dependent variation in infection among edible land snails (*A. achatina*, *A. fulica*, and *A. marginata*) in Eha-Amufu. These findings are consistent with earlier reports from southeastern Nigeria and other tropical settings which have consistently identified terrestrial snails as significant reservoirs of helminths and protozoans of public health importance (Igbiosa *et al* 2016; Onyishi *et al* 2018; Mbah *et al* 2022). In agreement with Onyishi *et al* (2018), *A. achatina* emerged as the most abundant and most heavily infected species, supporting the view that larger *Achatina* spp. accumulate higher parasite loads due to prolonged exposure and favourable physiological conditions for parasite establishment. Similarly, the observed overall parasite spectrum including nematodes, trematodes, protozoans, and mites corroborates previous findings in Nigeria that reported diverse helminth communities in edible snails and confirms their role as intermediate or paratenic hosts in transmission cycles. However, the present findings also diverge in notable respects: unlike Ekechukwu *et al*

(2023), who reported relatively low overall parasite prevalence (~20%) in market-sourced snails, this study recorded substantially higher infection levels, suggesting intensified environmental contamination and more active transmission foci in rural collection sites. Furthermore, while previous studies such as Mbah *et al* (2022) documented *A. fulica* as the most infected species in some Nigerian localities, the present study found it to be the least infected, indicating possible ecological or microhabitat-driven suppression of parasite acquisition in this species within the study area. In addition, the strong association between infection rates and microhabitats particularly refuse dumps and domestic surroundings partially aligns with earlier reports emphasising anthropogenic waste as a driver of snail infection, but the pronounced variability observed across house bases and vegetation zones extends current knowledge by highlighting more localized transmission heterogeneity. Age-dependent increases in parasite prevalence also concur with established parasitological principles and prior snail studies, confirming cumulative exposure effects across the lifespan. Collectively, these consonant and variant patterns suggest that while general ecological and host determinants of snail parasitism are consistent across West African studies, local environmental conditions and habitat structure may substantially modify species-specific infection dynamics and parasite distribution patterns.

From a public health perspective, this finding is particularly relevant because adult snails are preferentially harvested for consumption due to their size and market value. Consequently, the segment of the snail population most likely to be consumed by humans is also the most heavily infected, amplifying potential health risks. The WHO has repeatedly emphasized the need to integrate food safety considerations into neglected tropical disease control frameworks, especially in endemic rural communities (WHO 2023).

Although terrestrial snail-borne parasitic infections are not systematically included in Nigeria's national NTD surveillance, the present findings suggest that they may contribute meaningfully to localized disease burden, particularly in agrarian communities such as Eha-Amufu. Southeast Nigeria, including Enugu State, has documented endemicity of snail-related parasitic diseases within freshwater ecosystems, and the coexistence of infected terrestrial snail populations adds another layer of epidemiological complexity (Gboeloh and Ike-Ihunwo 2022; WHO 2024).

The WHO's 2021–2030 NTD Roadmap emphasizes the need for integrated, context-specific approaches to interrupt transmission of snail-borne infections (WHO 2023). However, terrestrial snail systems remain largely absent from intervention strategies, representing a critical policy and research gap. The evidence generated in this study supports the inclusion of terrestrial snail surveillance, public education on safe snail handling and preparation, and environmental sanitation measures as complementary strategies to existing control programmes.

Conclusion

This study establishes that edible land snails in Eha-Amufu, Enugu State, are significant reservoirs of parasitic infections, with an overall prevalence of 45.6% across three commonly consumed species. *Achatina achatina* exhibited the highest infection rates ($\approx 48.5\%$), while older and larger snails were disproportionately parasitised, indicating a direct relationship between host morphometry and parasite burden. Identified parasites included nematodes, protozoans, trematodes, and mites, several of which such as *Angiostrongylus* larvae and *Oesophagostanum* eggs carry recognised zoonotic potential. Parasite prevalence was higher during the rainy season, coinciding with increased snail abundance, thereby amplifying human exposure risk. These findings quantitatively demonstrate that consumption of improperly processed snails may pose measurable public health threats in rural Nigerian communities, particularly in Southeast Nigeria, where snail consumption is culturally prevalent.

Conflict of interests

The authors declare that they have no competing interests.

References

- Ash, L.R. and Orihel, T.C. 2007. *Ash and Orihel's Atlas of Human Parasitology* (5th ed.). American Society for Clinical Pathology Press, 540pp.
- Cheesbrough, M. 2006. *District Laboratory Practice in Tropical Countries* (2nd ed.). Cambridge University Press, Cambridge, 442pp.
- Ekechukwu, N.E., Ekeh, F.N. and Ezech, I.U. 2023. Species diversity of edible land snail and parasites: A case study of Ogige and Obollor-Afor markets in Nsukka Area, Eastern Nigeria. *Int. J. Res. Innov. Sustain. Dev.* 12(2): 50–59.
- Ezenwaka, C.O. and Obakimo, M.I. 2024. Parasitic fauna of *Achatina achatina* in Otuoke community, Ogbia Local Government Area, Bayelsa State, Nigeria. *Afr. J. Environ. Nat. Sci. Res.* 7(1): 106–112. <https://doi.org/10.52589/AJENSR-DX4TUO2X>.
- Gboeloh, L.B. and Ike-Ihunwo, C.N. 2022. Prevalence of *Schistosoma cercariae* in snail vectors in Ntawogba Creek, Port Harcourt, Rivers State, Nigeria. *Fac. Nat. Appl. Sci. J. Sci. Innov.* 3(2): 20–27.
- Igbinosa, I.B., Isaac, C., Adamu, H.O. and Adeleke, G. 2016. Parasites of edible land snails in Edo State, Nigeria. *Helminthologia* 53(4): 331–335. <https://doi.org/10.1515/helmin-2016-0031>.
- Mbah, J.O., Osondu A.C. and Imalele, E. 2022. Parasitic profile of five species of terrestrial *Achatina* snail in Cross River State, Nigeria: Public health implications. *Uttar Pradesh J. Zool.* 43(1): 13–21. <https://doi.org/10.56557/upjz/2022/v43i12880>.
- Ngwa, M.A. and Smith, J.P. 2023. Human schistosomiasis in Nigeria: Present status, diagnosis, treatment and control strategies. *Parasitol. Res.* 122: 4001–4016. <https://doi.org/10.1007/s00436-023-07993-2>.
- Nnamonu, E.I., Nkitnam, E.E., Ugwu, F.J., Ejilibe, O.C., Ezenwosu, S.U. and Ogbodo, G.U. 2018. Physicochemical assessment of vulnerability of the River Ebenyi in Eha-Amufu and environs, Southeast Nigeria. *Annu. Res. Rev. Biol.* 27: 1–9.
- Oladejo, T.O. and Oboh, B. 2024. Parasitic fauna of *Achatina achatina* in Otuoke community, Ogbia Local Government Area, Bayelsa State, Nigeria. *Afr. J. Environ. Nat. Sci. Res.* 7(1): 106–112. <https://doi.org/10.52589/AJENSR-DX4TUO2X>.
- Onyishi, G.C., Aguzie, I.O., Okoro, J.O., Nwani, C.D., Ezenwaji, N., Oluah, N.S. and Okafor, F.C. 2018. Terrestrial snail fauna and associated helminth parasites in a tropical semi-urban zone, Enugu State, Nigeria. *Pak. J. Zool.* 50(3): 1079–1085.
- Raut, S.K. and Barker, G.M. 2002. *Achatina fulica (Bowdich) and Other Achatinidae as Pests in Tropical Agriculture*. CAB International, Wallingford, 279pp.
- Ugbomoiko, U.S., Kareem, I.I., Awe, D.O., Abdulkareem, B.O., Gyang, P.V., Nwafor, T.E. and Akinwale, O.P. 2022. Characterization of freshwater snail intermediate hosts of schistosomes in four communities from Osun State, Nigeria. *One Health Implement. Res.* 2(2): 88–95. <https://doi.org/10.20517/ohir.2022.05>.
- WHO (World Health Organization). (2023). *Schistosomiasis fact sheet*. Available at: <https://www.who.int/news-room/fact-sheets/detail/schistosomiasis> (Accessed: 15 February 2026).
- WHO (World Health Organization). (2024). *Schistosomiasis (Bilharzia) overview*. Available at: <https://www.who.int/health-topics/schistosomiasis> (Accessed: 15 February 2026).

ORCID

Emmanuel I. Nnamonu. <https://orcid.org/0000-0002-6864-8618>