

Original Research Article

**Prevalence of Ecto- and Gastrointestinal Parasites of *Hemidactylus Frenatus* (Schlegel) in Akure North Local Government Area of Ondo State**

**Abstract**

The wall gecko is found in tropical, subtropical, and warm temperate regions. It is a nocturnal species that seeks shelter during the daytime and emerges at dusk to forage throughout the night. This small lizard has become established in areas close to human habitation in the tropics, creating a close association with people. Like other vertebrates, wall geckos are susceptible to parasitism. This study investigated the prevalence and intensity of ecto- and gastrointestinal parasites infecting *Hemidactylus frenatus* (wall geckos) in Akure North Local Government Area, Ondo State, Nigeria. A total of 360 geckos were sampled across six communities and examined for parasites using standard parasitological techniques. Overall, 68.9% were infected with ectoparasites and 66.4% with gastrointestinal parasites. The most prevalent ectoparasite was *Trombicula* sp. (35.8%), while *Parapharyngodon* sp. (37.5%) was the dominant gastrointestinal parasite. *Cryptosporidium* spp. was detected in 6.9% of specimens via modified Ziehl-Neelsen staining. Ectoparasites were mainly found on the back and limbs, while gastrointestinal parasites were most abundant in the large intestine. These findings highlight the high parasite burden in *H. frenatus*, underscoring potential public health risks associated with their proximity to human dwellings.

Key words: Wall gecko, ectoparasites, gastrointestinal parasites, prevalence, intensity, zoonotic risk, *Hemidactylus frenatus*.

**1. INTRODUCTION**

*Hemidactylus frenatus*, commonly known as the wall gecko, is a widespread reptile belonging to the family Gekkonidae. It thrives in warm climates across the globe (Keller *et al.*, 2002; Uetz, 2010; Djomnang *et al.*, 2016). This small lizard has become highly adapted to human environments, especially in tropical regions, where it is frequently found living in close proximity to people (Oluwafemi *et al.*, 2017). The common name “wall gecko” reflects its frequent presence on the walls and ceilings of human dwellings (Petren and Short, 2012).

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In Nigeria, wall geckos are a familiar sight in almost every household (Nwachukwu *et al.*, 2014), and over 140 gecko species have been recorded in Nigeria and other parts of West Africa (Oluwafemi *et al.*, 2017).

While wall geckos contribute to controlling insect populations within homes, they are also known to harbour a variety of ecto- and gastrointestinal parasites. Reported parasites include nematodes (Ameh and Ajayi, 2005; Obi *et al.*, 2013; Oluwafemi *et al.*, 2017), cestodes (Oluwafemi *et al.*, 2017), protozoans (El-Toukhy *et al.*, 2013), ticks (Ameh, 2005), and mites (Rivera, 2003; Ameh, 2005). Their close interactions with humans and domestic animals raise public health concerns, as geckos may act as reservoirs or vectors of zoonotic pathogens. For example, ticks found on geckos have been implicated in the transmission of diseases such as babesiosis, borreliosis, rickettsiosis, encephalitis, and helminth infections (Djomnang *et al.*, 2016).

The medical importance of these parasites is well established. Ticks are vectors of serious illnesses such as Lyme disease, caused by *Borrelia burgdorferi* (Schall *et al.*, 2000). Mites, particularly those in the genus *Geckobiella*, have been found on fence lizards and are known to transmit coccidian blood parasites such as *Schellackia occidentalis*. Additionally, protozoa such as *Cryptosporidium spp.* have been detected in wall geckos and are known to cause cryptosporidiosis in humans (Deming *et al.*, 2008).

Although wall geckos play an ecological role in controlling insect pests, their presence in human habitations also poses potential health risks due to their susceptibility to parasitic infections and their role in the transmission of zoonotic agents. Understanding their parasitic burden is therefore essential, particularly in residential settings where close contact is common.

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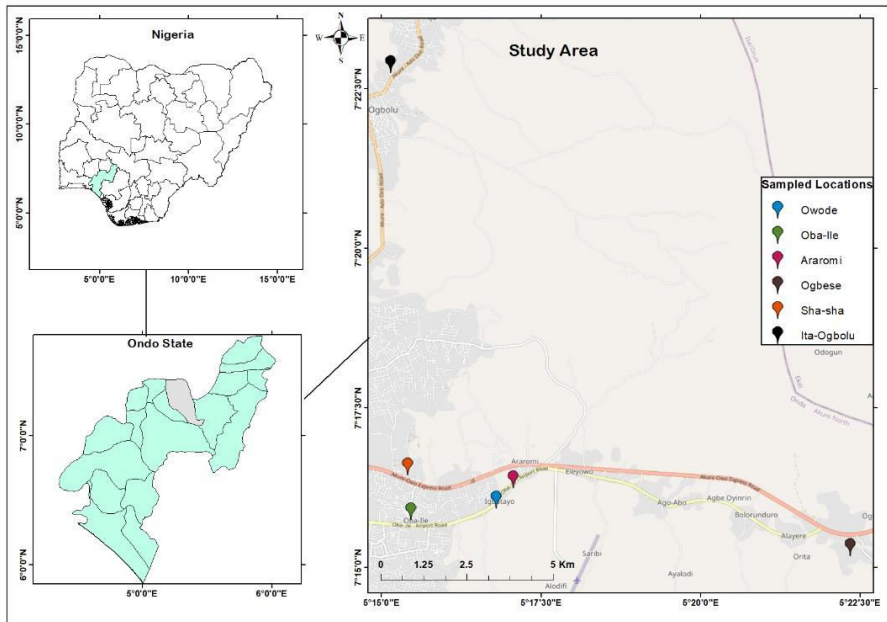
While several studies have been conducted in other parts of Nigeria on the parasitic fauna of wall geckos, data on the prevalence and diversity of parasites affecting *H. frenatus* in Akure North Local Government Area of Ondo State remain scarce. This study, therefore, aims to investigate the ecto- and gastrointestinal parasites of wall geckos in this region, with an emphasis on their potential zoonotic implications for human and animal health.

## 2. MATERIALS AND METHODS

### 2.1 Study Area

The study was conducted in Akure North Local Government Area of Ondo State, Nigeria. This region lies in the southwestern part of the country and is bordered by Ogun State and the Atlantic Ocean to the south. Six communities were randomly selected for specimen collection (Figure 1): Itaogbolu (N 7° 22' 53", E 5° 15' 9"), Ogbese (N 7° 15' 19", E 5° 22' 21"), Araromi (N 7° 16' 23", E 5° 17' 04"), Oba-Ile (N 7° 15' 53", E 5° 14' 88"), Sha-Sha (N 7° 16' 35", E 5° 15' 25"), and Owode (N 7° 16' 04", E 5° 16' 48").

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**Figure 1: Map of Akure North Local Government Area Showing locations of Sample collection**

## 2.2 Courtesy Visit and Informed Consent

Prior to sample collection, visits were made to the selected communities to seek permission and cooperation. Informed consent was obtained from residents of selected houses and shop owners, allowing access for specimen collection.

## 2.3 Collection of Specimens

A total of 360 wall geckos (*Hemidactylus frenatus*) were collected between 19:00 and 23:00 hours over a one-year period from March 2020 to March 2021. Collections were made from 20 residential houses and shops (three geckos each) across the six selected communities. The collection method followed the procedure described by Oluwafemi *et al.* (2017). Geckos were captured using forceps and placed in sealed but ventilated transparent containers. The specimens were then transported to the Parasitology and Public Health Research Laboratory in the Department of Biology, Federal University of Technology, Akure, Ondo State, Nigeria. Safety precautions, including the use of gloves, boots, and torchlights for illumination, were strictly observed during the collection process. Specimens were identified using the keys provided by Patel *et al.* (2016).

## 2.4 Examination of Wall Gecko for Parasites

### 2.4.1 Examination of Skin for Ectoparasites

Collected wall geckos were first weighed and measured to classify them into adults (male and female) and juveniles. Each specimen was examined for ectoparasites 12–20 hours after collection. The entire body surface was inspected under a dissecting microscope, with particular attention paid to common predilection sites such as the head, neck, limbs, and tail base. Ectoparasites were carefully removed using fine combs and soft forceps, then transferred into Petri dishes containing 70% ethanol for preservation. Subsequently, specimens were mounted on microscope slides using appropriate mounting media. Identification of parasites was conducted under a binocular microscope at magnifications of X40, X100, and X400.

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#### 2.4.2 Examination of Gastrointestinal Tract for Endoparasites

Each wall gecko was dissected by making a ventral incision using tongs and scissors. The gastrointestinal tract was removed and separated into two sections: the small intestine and the large intestine. The intestinal walls were gently scraped with forceps to extract any attached parasites. The intestinal contents were diluted with normal saline and repeatedly washed by decantation until a clear suspension was achieved, allowing for easier parasite detection.

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#### 2.4.3 Detection of *Cryptosporidium* via Modified Ziehl-Neelsen (MZN) Staining

To detect *Cryptosporidium* oocysts in faecal samples, a Modified Ziehl-Neelsen staining method was utilized. Approximately 0.2 grams of each faecal specimen was applied to a clean microscope slide using an applicator stick and spread into a thin, even smear. The prepared slides were then dried on a slide warmer set at 60 °C for about 5 minutes to ensure fixation.

The dried slides were arranged on a staining rack and covered with Kinyoun's carbol fuchsin stain for one minute. After staining, the slides were gently rinsed with distilled water and allowed to drain. Decolorization was performed using 1% acid-alcohol for two minutes, followed by a second rinse with distilled water.

Next, the smears were counterstained with methylene blue for two minutes. After a final rinse with distilled water, the slides were air-dried again on the slide warmer at 60 °C for an additional 5 minutes.

Microscopic examination was conducted using oil immersion at 100× magnification. *Cryptosporidium* oocysts were identified based on their distinct appearance, staining bright red to pink and standing out clearly against the blue-stained background (Sunnotel *et al.*, 2006).

### 2.5 Identification of Parasites

All recovered parasites were identified using standard identification keys provided by Krantz and Walter (2009) and Bush *et al.*, (1997) for gastrointestinal parasites.

### 2.6 Data Analysis

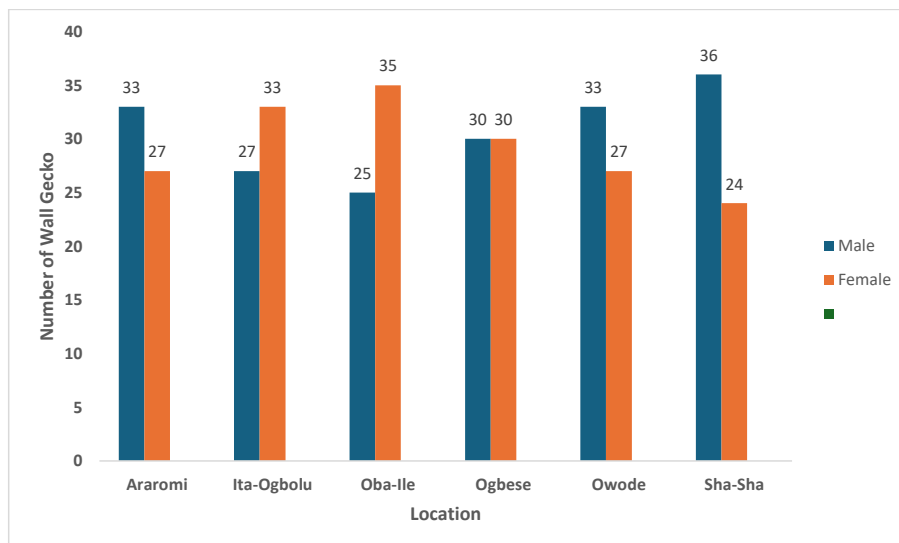
The prevalence and mean intensity of infection were calculated based on host sex, age, and anatomical location of the parasites. Statistical significance was assessed using Chi-square ( $\chi^2$ ) analysis at a 95% confidence level ( $P < 0.05$ ). All statistical analyses were performed using Microsoft Excel 2019 and the Statistical Package for the Social Sciences (SPSS) version 20.0.

### 3.0 Result

#### 3.1 Composition of the *Hemidactylus frenatus* Specimens collected in the study Sites

A total number of 360 *H. frenatus* specimens weighing between 1.7g and 5g were collected from the study sites. Their lengths varied between 40 mm and 145 mm. The specimens comprised 184 males and 176 females (Figure 2).

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**Figure 2: Distribution of *H. frenatus* collected from the Study area in relation to Site and Sex**

Figure 2 shows the distribution of wall gecko in the study sites.

#### 3.2 Prevalence of Infection of geckos sampled from the study Area

Of the 360 wall geckos examined, 25 (6.9%) tested positive for *Cryptosporidium spp.* using the Modified Ziehl-Neelsen (MZN) staining technique. In terms of ectoparasitic infections, the highest prevalence was recorded in geckos from Sha-Sha (80%), followed by Ita-Ogbolu and Ogbese, each with a prevalence of 65%. The lowest prevalence was observed in specimens from Oba-Ile, where 50% of the geckos were infected (Table 1). Despite the variation in prevalence among locations, Chi-square analysis revealed no statistically significant difference ( $P > 0.05$ ) in ectoparasite infection rates across the six study sites.

Similarly, the highest prevalence of gastrointestinal parasites was found in geckos from Sha-Sha (80%), followed by those from Owode (75%). The lowest prevalence was recorded in Araromi (45%). Chi-square test results also indicated no significant difference ( $P > 0.05$ ) in the prevalence of gastrointestinal parasites in *H. frenatus* across the six study locations (Table 1).

**Table 1: Overall Prevalence of Ecto- and Gastrointestinal Parasite Infection of Wall Geckos from different location in Akure North Local Government Area**

Parasite	Location	Number Examined	Number Infected (%)	$\chi^2$	Df	P value
Gastrointestinal	Araromi	60	27 (45)	9.59	5	0.09
	Ita-Ogbolu	60	30 (50)			
	Oba-Ile	60	30 (50)			
	Ogbese	60	28 (70)			
	Owode	60	30 (75)			
	Sha-Sha	60	48 (80)			
Ectoparasite	Araromi	60	39 (65)	4.60	5	0.47
	Ita-Ogbolu	60	39 (65)			
	Oba-Ile	60	30 (50)			
	Ogbese	60	39 (65)			
	Owode	60	33 (55)			
	Sha-Sha	60	48 (80)			

Table 1 shows the overall Prevalence of Parasitic Ecto- and Gastrointestinal Parasite Infection of Geckos from different location in Akure North Local Government Area

### 3.3 Prevalence and Mean Intensity of Parasite of geckos sampled from the study Area

Of the 360 *H. frenatus* examined, 68.9% were infected with ectoparasites and 66.4% with gastrointestinal parasites. *Trombicula sp.* had the highest ectoparasite mean intensity, particularly on the back and limbs. Among gastrointestinal parasites, *Parapharyngodon sp.* showed the highest intensity, mainly in the large intestine. These results indicate a high parasite burden with potential public health implications (Table 2).

### Table 2: Prevalence and Mean Intensity of Parasite of geckos sampled from the study Area

Table 2 shows the prevalence and mean intensity of the parasites recovered from wall geckos.

### 3.4 Prevalence of Parasites in Relation to Sex of *H. frenatus*

Figure 3 shows the prevalence of parasites in both male and female *H. frenatus* sampled from

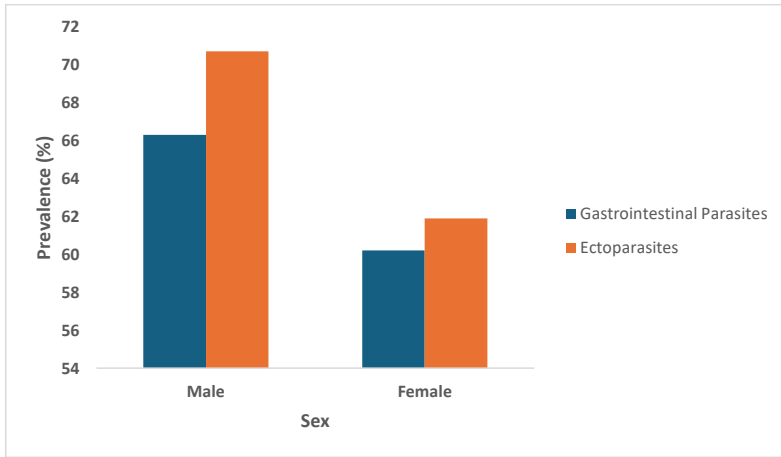
Parasite Species	Number of Wall Geckos examined	Number of Wall Geckos Infected (%)	Number of Parasites Recovered	Mean Intensity	$\chi^2$	Df	P value	
Gastrointestinal Parasites	<i>Parapharyngodon sp.</i>	360	135 (37.5)	279	2.12±0.08	4.27	2	0.12
	<i>Pharyngodon sp.</i>	360	87 (24.2)	216	2.45±0.21			
	<i>Oochoristica javaensis</i>	360	108 (30.0)	258	2.45±0.15			
Ectoparasites	<i>Argas sp.</i>	360	78 (21.7)	174	2.30±0.19	6.01	2	
	<i>Trombicula sp.</i>	360	129 (35.8)	363	2.30±0.21			
	<i>Gekobia sp.</i>	360	96 (26.7)	303	3.20±0.36			

all the location. The result obtained showed that the overall prevalence in the study area was higher in male compared to female for both ecto- and gastrointestinal parasites.

### 3.5 Distribution of Parasites of *H. frenatus* in Relation to Predilection sites

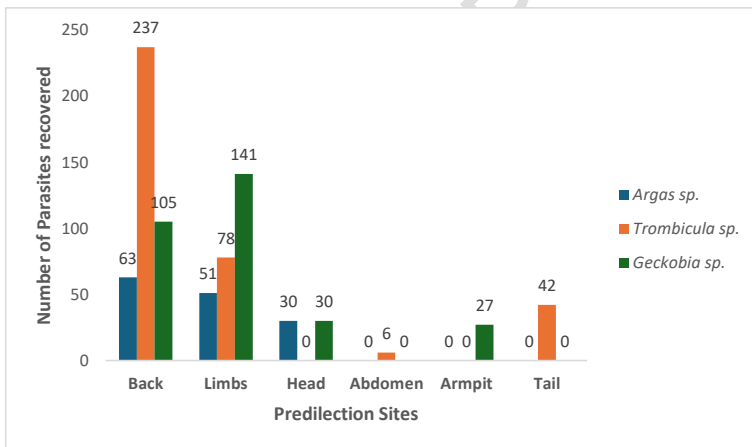
Ectoparasites showed distinct site preferences (Figure 3). *Gekobia sp* were most prevalent on the limbs (n = 141), followed by the back (n = 105), head (n = 30), and armpit (n = 27). *Trombicula* mites were primarily found on the back (n = 237), then limbs (n = 78), tail (n = 42), and abdomen (n = 6). Argas ticks favored the back (n = 63), limbs (n = 51), and head (n = 30). Overall, the back (n = 405) and limbs (n = 270) were the most infested regions.

Gastrointestinal parasites (Figure 5) totaled 753 across all samples. *Oochoristica javaensis* was restricted to the small intestine (n = 258). *Pharyngodon sp* were found mainly in the large intestine (n = 183), and in the colon (n = 18) and small intestine (n = 15). *Parapharyngodon sp* were recovered from the large intestine (n = 234) and colon (n = 45). The large intestine showed the highest overall parasite prevalence.



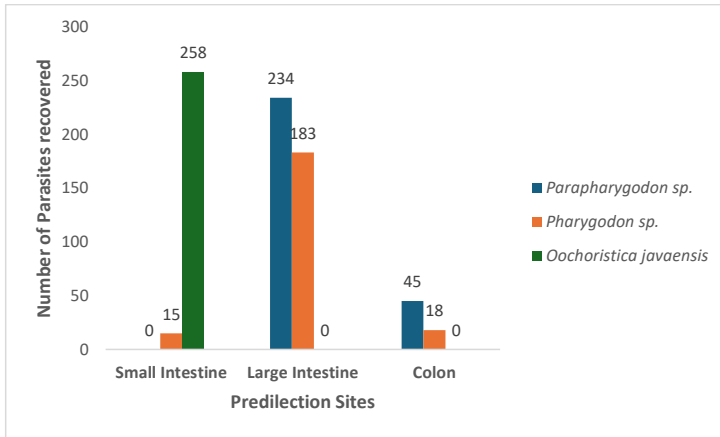
**Figure 3: Parasitic Infections of Wall Geckos in Akure North Local Government Area according to Sex of Host**

Figure 3 shows the prevalence of parasites between male and female wall gecko.



**Figure 4: Distribution of Ectoparasites in Relation to Predilection Sites on *H. frenatus***





**Figure 5: Distribution of Gastrointestinal Parasites in Relation to Predilection Sites on *H. frenatus***

Figure 4 and 5 shows the distribution of ecto- and gastrointestinal parasites in their different predilection sites.

#### 4. Discussion

Wall geckos (*Hemidactylus frenatus*) are highly susceptible to ectoparasitic and gastrointestinal infections. This study confirms the presence of parasites in geckos across all study locations. The highest ectoparasite prevalence (80%) was recorded in Sha-Sha, likely due to poor sanitation and abundant insect hosts. The lowest (50%) in Oba Ile may reflect cleaner environments, consistent with previous findings (Obi *et al.*, 2013; Djomnang *et al.*, 2016). Similarly, reduced prevalence in Araromi could result from fewer intermediate hosts (Ameh and Ajayi, 2005; Oluwafemi *et al.*, 2017).

Three ectoparasite genera; *Argas*, *Trombicula*, and *Geckobia*, were identified, consistent with previous studies (Rivera *et al.*, 2003; Ameh, 2005). Environmental factors like climate and temperature likely influence their distribution. *Trombicula* showed the highest prevalence (43.2%) and abundance (363), followed by *Geckobia sp.* (36.1%, 303), and *Argas* (20.7%, 174). Differences from other studies may result from variations in detection methods.

Habitat type and wide foraging behavior likely contribute to parasitism (Clopton and Gold, 1993; Ameh, 2005). Multiple ectoparasite species were often found on a single host. Although some studies report equal susceptibility across sexes, this study supports male-biased parasitism due to increased exposure from behaviors like foraging and mating (Duneau *et al.*, 2012; Brown and Symondson, 2014).

Parasites were most abundant in skin folds and scaled areas. *Argas* and *Trombicula* were common on the back, while *Geckobia* favored limbs (Ameh, 2005). *Trombicula* and *Geckobia* can parasitize other vertebrates, including humans, causing skin irritation. *Argas* ticks are medically important vectors of diseases like West Nile virus and Lyme disease (Demessie and Derso, 2015).

Three gastrointestinal parasites were identified: *Parapharygodon sp.* (37.1%), *Oochoristica javaensis*, and *Pharyngodon sp.* No trematodes or acanthocephalans were found, possibly due to the absence of required hosts. Findings on prevalence align with Oluwafemi *et al.* (2017), though Djomnang *et al.* (2016) found more *Pharyngodon*. *O. javaensis* may suppress nematode numbers by damaging tissues at attachment sites (Anu, 2018). Similar to ectoparasites, gastrointestinal parasite prevalence was higher in male geckos, likely due to increased exposure from active behaviors like hunting and mating. This supports the idea that behavioral differences, more than immune function, drive parasite transmission.

*O. javaensis* was found in the small intestine; nematodes were in the large intestine and rectum, consistent with prior studies (Oluwafemi *et al.*, 2017; Obi *et al.*, 2013; Djomnang *et al.*, 2016). The small intestine offers a nutrient-rich environment suitable for cestodes, while the large intestine provides shelter in undigested food residues for nematodes (Djomnang *et al.*, 2016).

The detection of *Cryptosporidium spp.* in 6.9% of samples is particularly noteworthy, given its zoonotic potential and role in causing gastrointestinal illnesses in humans. While variations in infection prevalence were observed across sex, sites, and locations, these differences were not statistically significant, suggesting a widespread and uniform risk across the region (Deming *et al.*, 2008).

Clinically, these gastrointestinal parasites can cause significant health issues such as inflammation, diarrhea, malnutrition, weight loss, anemia, and developmental delays, especially in young hosts (De-Silva *et al.*, 2003; Brooker *et al.*, 2006).

## Conclusion

This study confirms a high prevalence of both ectoparasitic and gastrointestinal infections in *Hemidactylus frenatus* across different locations, with significant variation influenced by environmental sanitation, host behavior, and habitat characteristics. Sha-Sha showed the highest infection rates, likely due to poor hygiene and abundant insect vectors, while Oba Ile and Araromi showed lower prevalence, suggesting better environmental conditions.

*Trombicula* species were the most common ectoparasites, and *Parapharygodon sp.* was the most prevalent gastrointestinal parasite. Male and adult geckos exhibited higher parasite loads, likely due to increased exposure from behavior and ecological range. Parasite distribution varied by body region and intestinal section, highlighting niche preferences. The presence of zoonotic species like *Cryptosporidium* and *Argas* ticks underscores potential public health implications. Overall, environmental management and further research are essential for understanding and mitigating parasitic transmission in urban reptile populations.

## Consent

Not applicable.

## Ethical Approval

The Department of Biology (BIO), Federal University of Technology, Akure determined that no formal ethics approval was required for this study.

## References

Ameh K. G. (2005). Ectoparasites of wall gecko. *Journal of Entomology*. 2(1):21-24.

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Ameh, I. G. and Ajayi, J. A. (2005). Morphology and Significance of Some Helminth Parasites of the Wall Gecko. *Journal of Biological Science*, 5(2): 141-144.

Anu P. V. (2018). Mode of Attachment and Pathogenicity of *Circumonchobothrium shindei* (Eucestoda: Ptychobothriidae) in *Mastacembelus armatus* of River Godavari, Andhra Pradesh, India. *International Journal of Zoological Research*. 14:1 7.

Brooker, S., Clements, A. C. and Bundy, D. A. (2006). Global epidemiology, ecology and control of soil transmitted helminth infections. *Advanced Parasitology*. 62:221-261.

Brown, D. S. and Symondson, W. O. (2014). Sex and Age-Biased Nematode Prevalence in Reptiles. *Molecular Ecology*. 23(15):3890-3899.

Bush, A. O., Lafferty, K. D., Lotz, J. M., Shostak, A. W. (1977). Parasitology meets ecology in its own terms. *Journal of Parasitology*. 83:575-583.

Clopton, R. E. and Gold, R. E. (1993). Distribution and seasonal and diurnal activity patterns of *Eutrombicula freddugesi* (Acari: Trombiculidae) in a forest edge ecosystem. *Journal of Medical Entomology*. 30:47-53.

De-Silva, N. R., Brooker, S., Hotez, P. J., Montresor, A., Engels, D. and Savioli, L. (2003) Soil transmitted helminth infections: updating the global picture. *Trends Parasitology*. 19(12):547-551.

Demessie, Y., and Derso, S. (2015). Epidemiology and Control of Bovine Theileriosis in Ethiopia: Review. *Journal of Medical Physiology and Biophysics*, 23. (This paper focuses on Theileriosis, a different tick-borne disease in cattle).

Deming, C., Greiner, E., and Uhl, E. W. (2008). Prevalence of cryptosporidium infection and characteristics of oocyst shedding in a breeding colony of leopard geckos (*Eublepharis macularius*). *J Zoo Wildl Med*. 39(4):600-7. doi: 10.1638/2006-016.1..

Djomnang, N. A. L., Chahdini, G. A., Wabo, P. J. and Mpoame, M. (2016). Occurrence of Ticks and Gastrointestinal Helminths in the House Gecko (*Hemidactylus Spp*) from Dschang in Cameroon. *International Journal of Fauna and Biological Studies*. 3(1): 117-120.

El-Toukhy, A.A., Abdel, A.A., Abosenna, F.M. and Abou, M.F. (2013). Three coccidian parasites from Moorish gecko, *Tarentolamauritanica* (Gekkonidae) (*Eimeria alexandriensis* Apicomplexa: Eimeriidae). *International Journal of Advance Research*. 1(7): 526-534.

Keller, A., Merin, S., Yinchang, A. L., Peattie, A.M., Hausen, W. R., Sponberg, S., Kenny, T. W., Fearing, R., Isrealachvili, J. N. and Full, R. J. (2002). Evidence for Van der Waals adhesion in gecko setal. *Proceedings of the national Academy of Science of the USA*. 99(122): 52-56.

Krantz, G. W., and Walter, D. E. (2009). A manual of acarology (3rd ed.). Texas Tech University Press.

Nwachukwu, M.I., Duru, M. K.C., Nwachukwu, I. O. and Anomodu, C.K. (2014). In Nigeria, particularly, just about every dwelling has its population Incidence of Pathogenic Bacteria in Wall Gecko Dropping. *Intraspecific Journal of Microbiology and Life Science*. 1(1): 1-6.

Obi, Z. C., Anyaegbunam, L. C, Igboanugo, N. A. (2013). The House Gecko (*Hemidactylus frenatus*) and Parasitaemia. *International Journal of Fauna and*

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*Biological Studies.* 1(2): 13-15.

Oluwafemi, T. A., Sowemimo, O. A. and Bamidele, A. O. (2017). Parasitic Infections of Two Species of Lizard (*Hemidactylus frenatus* and *Mabuya quinquetaeniata*) from Two Cities in South West Nigeria. *Australian Road Research Board.* 18(2): 1-13.

Patel, H., Naik, V. and Tank, S. (2016). The Common House Gecko, *Hemidactylus frenatus* Schlegel in Dumeril & Bibron 1836 (Reptilia: Gekkonidae) in Gujarat, India. *IRCF Reptiles and Amphibians.* 23(3): 178-182.

Rivera, C. C., Negron, A. G., Bertrand, M. and Acosta, J. (2003). *Hemidactylus mabouia* (Sauria: Gekkonidae), Host of *Geckobia hemidactyli* (Actiniedida: Pterygosomatidae), throughout the Caribbean and South America. *Caribbean Journal Science.* 39(3): 321-326.

Schall, J. J., Prendeville, H. R. and Hanley, K. (2000). Prevalence of the tick, *Ixodes pacificus*, on western fence lizards, *Sceloporus occidentalis*: trends by site, gender, size, season, and mite infestation. *Journal of Herpetology.* 34: 160-163.

Sunnotel O, Snelling WJ, Xiao L, Moore P, Millar BC, Dooley JSG, Lowery CJ (2006) Rapid and sensitive detection of single *Cryptosporidium* oocysts from archived glass slide. *J Clin Microbiol* 44(9):3285-3291.

Uetz, P. (2010). The original descriptions of reptiles. *Zootaxa.* 23(34): 59-68.

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