



Research Article

Study on the Prevalence of Ectoparasites and Endoparasites in Domestic Cats as Indicators of Zoonotic Parasite Risk in Dutsin-Ma Metropolis, Katsina State, Nigeria

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ABSTRACT

Ectoparasites and oral swabs from domestic cats indicate zoonotic parasite risk, yet data on the prevalence and associated risk factors in Dutsin-Ma Metropolis, Katsina State, Nigeria, are limited. This cross-sectional study determined the prevalence of ectoparasites and endoparasites in domestic cats and assessed associated risk factors. We sampled 180 domestic cats, 90 from Dutsin-Ma A Ward and 90 from Dutsin-Ma B Ward. Ectoparasites were collected using fine combs and forceps, while oral swabs were obtained for microscopic examination. Risk factor data were collected using a structured questionnaire. Data were analysed using SPSS version 25. Prevalence was calculated using descriptive statistics and risk factors were assessed using Odds ratios. The overall prevalence was 15.6% (28/180) for ectoparasites and 54.4% (98/180) for endoparasites. Four ectoparasite species were identified: *Hyalomma impeltatum* (35.7%), *Amblyomma variegatum* (25.0%), *Rhipicephalus sanguineus* (21.4%), and *Hyalomma rufipes* (17.9%). Six endoparasite species were detected from oral swabs: *Toxocara cati* (18.3%), *Toxascaris leonina* (9.4%), *Toxoplasma gondii* (8.9%), *Aelurostrongylus abstrusus* (7.2%), *Ancylostoma tubaeforme* (6.7%), and *Echinococcus granulosus* (3.9%). Multi-cat household was the only significant risk factor for ectoparasite infestation ($P = 0.040$). Significant ward associations occurred for *A. tubaeforme* ($P = 0.017$) and *A. abstrusus* ($P = 0.044$). The detection of zoonotic parasites such as *T. cati*, *T. gondii*, and *E. granulosus* indicates a public health concern. Strengthening vector control, routine deworming, public health education, and the One Health approach are recommended.

Keywords: Cats; Dutsin-Ma; Ectoparasites; Endoparasites; Risk factors; Zoonotic parasites

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INTRODUCTION

Domestic cats (*Felis catus*) are among the most widespread companion animals and live in close proximity to humans and other domestic animals worldwide (Adesina, 2023). Their close association with households makes them relevant to the epidemiology of zoonotic diseases (Adesina, 2023; Usman, 2024). Cats commonly harbour various

ectoparasites such as fleas, ticks, mites, and lice, many of which are competent vectors of zoonotic pathogens (Kalu, 2021; Okoye, 2022). Reported agents associated with ectoparasites and cats include *Bartonella henselae*, *Rickettsia felis*, and protozoa such as *Toxoplasma gondii* (Kalu, 2021; Okoye, 2022). In Nigeria, especially in rural and peri-urban areas like Dutsin-Ma, cat ownership is common but public

awareness about ectoparasite infestation and associated zoonotic risks remains low (Bello, 2023; Ibrahim, 2024). The oral cavity of cats is an additional but often overlooked potential route of zoonotic parasite exposure (Lawal, 2023; Adebayo, Yusuf and Ibrahim, 2024). Despite these plausible risk pathways, literature in Nigeria has focused more on intestinal parasites of livestock and humans than on companion animals and oral parasitic carriage (Okonkwo, 2022; Bello, 2023). This study was therefore designed to determine the prevalence of ectoparasites and zoonotic parasites in oral swabs of domestic cats in Dutsin-Ma Metropolis, Katsina State, Nigeria.

MATERIALS AND METHODS

Study Area

The study was carried out in Dutsin-Ma Local Government Area (LGA), Katsina State, Nigeria. Dutsin-Ma is located between latitude 12.456°N and longitude 7.497°E (Google Maps, 2024). The LGA is bordered by Kurfi and Charanchi to the north, Kankia to the east, Safana and Dan-Musa to the west, and Matazu to the south-east. The population consists predominantly of Hausa-Fulani people whose major occupations include farming, animal rearing, and petty trading (NPC, 2022). The climate is tropical with distinct wet and dry seasons.

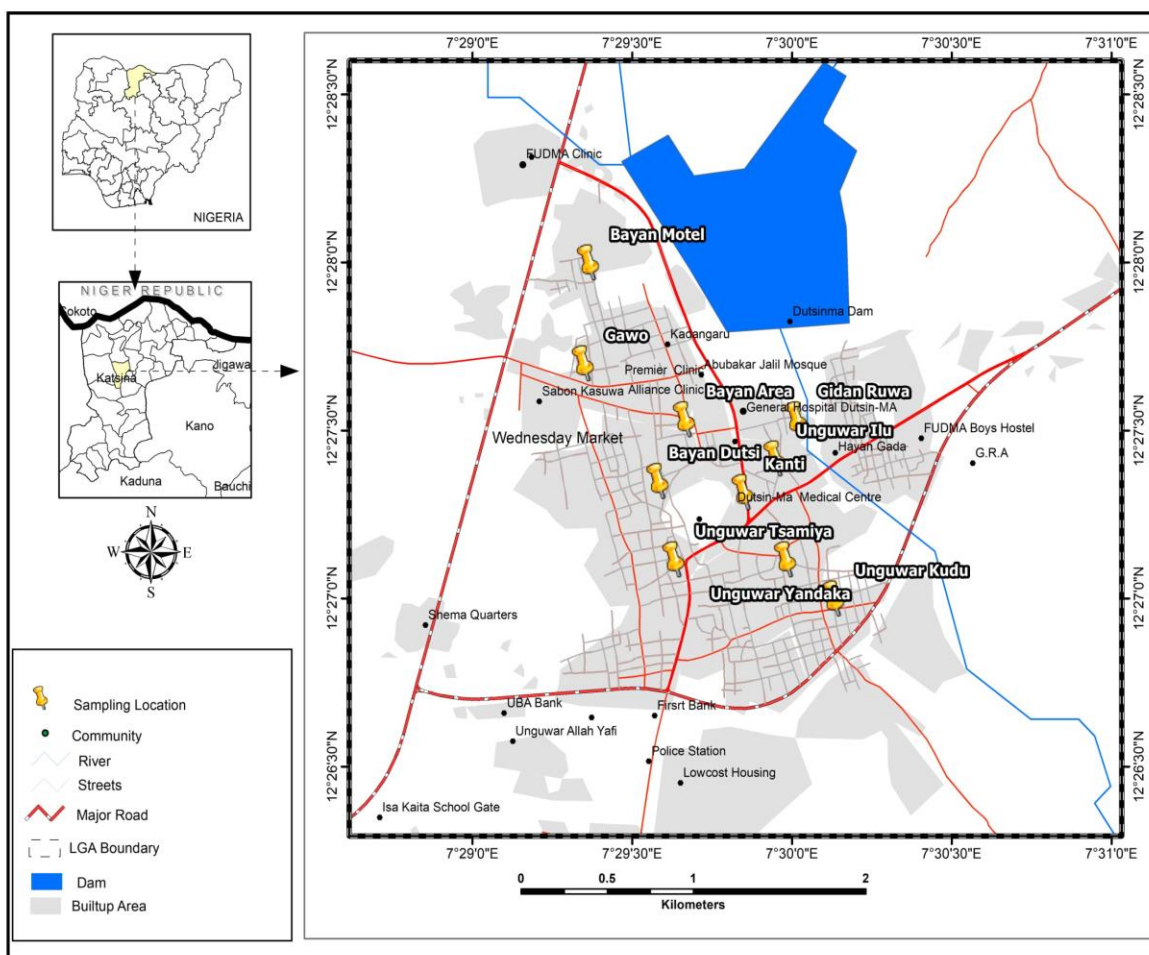


Figure 1. Map of Dutsin-Ma Showing Study Area (GIS FUDMA, 2026)

Research Design

A cross-sectional design was used. Domestic cats were examined once for ectoparasites and oral parasites.

Study Population

Domestic cats (*Felis catus*) kept in households within Dutsin-Ma LGA were included. Both young (≤ 3 years) and adult (≥ 3 years) cats, irrespective of sex or breed,

were included. Severely ill or aggressive cats were excluded.

Sample Size Determination

A total of one hundred and eighty (180) domestic cats were examined during the study. The sample size was based on the accessible cat population within the study area and was supported by previous parasitological studies that examined between 100

and 200 domestic cats for ectoparasites and zoonotic parasites (Abubakar, 2023; Bello *et al.*, 2023).

Sampling Technique

A multistage sampling technique was employed. Dutsin-Ma A Ward and Dutsin-Ma B Ward were selected. Five sampling points were selected from each ward. Eighteen cats were sampled from each point, giving 90 per ward and 180 in total.

Collection of Samples

Each cat was gently restrained. Ectoparasites were collected using fine combs and forceps from predilection sites, preserved in 70% ethanol, and identified morphologically (Okoye *et al.*, 2022; Usman and Bello, 2023; Abubakar, 2023; Lawal, 2024). Oral swabs were collected using sterile rayon-tipped swabs, placed in transport medium, and transported to the laboratory within 24 hours (Garba and Yusuf, 2023; Ogbu *et al.*, 2023).

Laboratory Analysis

Ectoparasites were identified using standard taxonomic keys (Okoye, 2022; Oladipo *et al.*, 2022; Usman and Bello, 2023; Abubakar, 2023). Oral swabs were processed by centrifugation, wet mount, Lugol's iodine, and Giemsa staining, and examined microscopically for identification of the parasites using coloured parasitological atlases as guide. (World Health Organization, 2016; Ogbuewu and Nwosu, 2018; Adeola and Olaleye, 2019; Ewurum and Umeaku, 2020; Adebayo *et al.*, 2024).

Data Analysis

Data were entered into Microsoft Excel and analysed using SPSS version 26. Prevalence was calculated using descriptive statistics. Odds ratio and Chi-square tests were used to assess associations, with significance set at $P \leq 0.05$.

RESULTS

Prevalence of Ectoparasites

The overall prevalence of ectoparasite infestation was 15.6% (28/180). Four ectoparasite species were identified: *Hyalomma impeltatum* (5.6%), *Amblyomma variegatum* (3.9%), *Rhipicephalus sanguineus* (3.3%), and *Hyalomma rufipes* (2.8%). Prevalence was higher in Dutsin-Ma A (21.1%) than Dutsin-Ma B (10.0%), but the difference was not statistically significant ($P = 0.881$) (Table 1).

Prevalence of Endoparasites in Oral Swabs

The overall prevalence of endoparasite detection was 54.4% (98/180). Six species were detected: *Toxocara cati* (18.3%), *Toxascaris leonina* (9.4%), *Toxoplasma gondii* (8.9%), *Aelurostrongylus abstrusus* (7.2%), *Ancylostoma tubaeforme* (6.7%), and *Echinococcus granulosus* (3.9%). Prevalence was higher in Dutsin-Ma A (57.8%) than Dutsin-Ma B (51.1%), but not significant ($P = 0.065$). Significant differences were observed for *A. tubaeforme* ($P = 0.017$) and *A. abstrusus* ($P = 0.044$) between wards (Table 2).

Risk Factors for Ectoparasite Infestation

Among the risk factors evaluated, only multi-cat household showed a significant association with ectoparasite infestation on cats ($P=0.040$) and also serve as risk factor ($OR>1$). Cats from multi-cat households had higher occurrence of ectoparasites (21.0%) than single-cat households (10.0%) (Table 3). Other factors (like outdoor access, previous tick/flea treatment, environmental sanitation, presence of dog, hunting rodents, contact with livestock) were not statistically significant ($P>0.05$).

Risk Factors Associated with Endoparasite Infection

Odds ratios were calculated for several risk factors including outdoor access, environmental sanitation, raw meat consumption, access to animal offal, access to untreated water, hunting rodent, and deworming history. None of these evaluated risk factors showed a statistically significant association (Table 4).

Table 1: Prevalence of Ectoparasites Infesting Domestic Cats in Dutsin-Ma Metropolis

Ectoparasite species	Dutsin-Ma A			Dutsin-Ma B			Total			P-value
	No. examined	No. positive	Prevalence (%)	No. examined	No. positive	Prevalence (%)	No. examined	No. positive	Prevalence (%)	
<i>Rhipicephalus sanguineus</i>	90	4	4.4	90	2	2.2	180	6	3.3	0.682
<i>Hyalomma rufipes</i>	90	4	4.4	90	1	1.1	180	5	2.8	0.368
<i>Hyalomma impeltatum</i>	90	6	6.7	90	4	4.4	180	10	5.6	0.747
<i>Amblyomma variegatum</i>	90	5	5.6	90	2	2.2	180	7	3.9	0.444

Table 2: Prevalence of Endoparasites Parasites Detected in Oral Swabs of Domestic Cats in Dutsin-Ma Metropolis

Endoparasite species	Dutsin-Ma A			Dutsin-Ma B			Total			P-value
	No. examined	No. positive	Prevalence (%)	No. examined	No. positive	Prevalence (%)	No. examined	No. positive	Prevalence (%)	
<i>Ancylostoma tubaeforme</i>	90	10	11.1	90	2	2.2	180	12	6.7	0.017
<i>Toxocara cati</i>	90	17	18.9	90	16	17.8	180	33	18.3	0.847
<i>Toxascaris leonine</i>	90	8	8.9	90	9	10.0	180	17	9.4	0.799
<i>Echinococcus granulosus</i>	90	5	5.6	90	2	2.2	180	7	3.9	0.444
<i>Toxoplasma gondii</i>	90	9	10.0	90	7	7.8	180	16	8.9	0.600
<i>Aelurostrongylus abstrusus</i>	90	3	3.3	90	10	11.1	180	13	7.2	0.044

Table 3: Risk Factors Associated with Ectoparasite Infestation in Domestic Cats in Dutsin-Ma Metropolis

Factors	No. Examined	No. Positive n= (%)	Odd Ratio (95% CI)	P value
Outdoor access				
Yes	92	17(18.5)	1.59 (0.7-3.61)	0.269
No	88	11(12.5)	1.00 (Ref)	
Previous Tick/flea Treatment				
Yes	96	14(14.6)	0.85(0.38-1.91)	0.700
No	84	14(16.7)	1.00 (Ref)	
Environmental Sanitation				
Good	91	16(17.6)	1.37(0.61-3.09)	0.448
Poor	89	12(13.5)	1.00 (Ref)	
Multi-Cat Household				
Yes	90	19(21.0)	2.41(1.02-5.65)	0.040
No	90	09(10%)	1.00 (Ref)	
Presence of Dog				
Yes	101	13(12.9)	0.63(0.28-1.42)	0.261
No	79	15(19.0)	1.00 (Ref)	
Hunt Rodents				
Yes	132	20(15.2)	0.89(0.37-2.19)	0.804
No	48	08(16.7)	1.00 (Ref)	
Contact with Livestock				
Yes	82	15(18.3)	1.46(0.65-3.29)	0.354
No	98	13(13.3)	1.00 (Ref)	

Note: OR = Odds Ratio, CI = Confidence Interval, Ref = Reference category. SPSS used "No" or "Poor" as the reference group (OR = 1.00). Odds Ratios and 95% CIs shown for "Yes" and "Good" are the inverse (1/OR) of the SPSS output. P-values are from the Chi-square test.

Table 4: Risk Factors Associated with Endoparasite Infection in Domestic Cats in Dutsin-Ma Metropolis

Factors	No. Examined	No. Positive n= (%)	Odd Ratio (95% CI)	P value
Outdoor Access				
Yes	92	55(59.8)	1.56(0.86-2.81)	0.141
No	88	43(48.9)	1.00 (Ref)	
Raw Meat Consumption				
Yes	111	60(54.1)	1.04(0.57-1.91)	0.894
No	69	38(55.1)	1.00 (Ref)	
Access to Animal Offal				
Yes	92	55(59.8)	0.64(0.36-1.16)	0.141
No	88	43(48.9)	1.00 (Ref)	
Access to Untreated Water				
Yes	104	54(51.9)	1.27(0.70-2.31)	0.427
No	76	44(57.9)	1.00 (Ref)	
Environmental Sanitation				
Good	101	58(57.4)	1.32(0.73-2.38)	0.364
Poor	79	40(50.6)	1.00 (Ref)	
Hunt Rodents				
Yes	132	73(55.3)	1.14(0.59-2.21)	0.701
No	48	25(52.1)	1.00 (Ref)	
Deworming History				
Yes	59	35(59.3)	0.74(0.40-1.40)	0.359
No	121	63(52.1)	1.00 (Ref)	

Note: OR = Odds Ratio, CI = Confidence Interval, Ref = Reference category. SPSS used "No" or "Poor" as the reference group (OR = 1.00). ORs and 95% CIs shown for "Yes" and "Good" are the inverse (1/OR) of the SPSS output. P-values are from the Chi-square test.

DISCUSSION

The detection of ectoparasites and endoparasites in domestic cats in the present study confirms the existence of parasitic infections in Dutsin-Ma Metropolis. The higher prevalence of endoparasites compared with ectoparasites is consistent with Bowman *et al.* (2021) and Taylor *et al.* (2022), who reported that gastrointestinal and systemic parasites are generally more prevalent than external parasites in feline populations. This may be due to diverse transmission routes for endoparasites, including ingestion of contaminated food, water, and prey.

The overall prevalence of ectoparasites in this study (15.6%) is comparable with 14.8% reported by Okoye *et al.* (2022), 16.2% reported by Usman and Bello (2023), and 14.1–18.7% reported by Abubakar (2023), possibly because these studies were conducted in similar ecological zones. It was lower than 22.5% reported by Bello *et al.* (2022) in Sokoto and 19.3% reported by Musa *et al.* (2022) in Maiduguri, due to differences in acaricide use and sanitation. It was higher than 11.2% reported by Eze *et al.* (2021) in Enugu and 9.6% reported by Oladipo *et al.* (2022) in Jos, likely due to the cooler climate of Jos and the urbanised nature of Enugu.

The species composition of ectoparasites agrees with the reports of Adeyemi *et al.* (2023) and Lawal *et al.* (2024), who reported *Hyalomma* and *Amblyomma* as predominant in northern Nigeria. The presence of *A. variegatum* and *H. rufipes* is of public health importance because they are vectors of *Ehrlichia ruminantium*, Crimean-Congo haemorrhagic fever virus, and *Rickettsia* species (Dantas-Torres *et al.*, 2021; Jongejan and Uilenberg, 2021; World Health Organization, 2023). *Rhipicephalus sanguineus* is a competent vector of *Ehrlichia canis*, *Babesia vogeli*, and *Rickettsia conorii* (Dantas-Torres *et al.*, 2021).

The prevalence of endoparasites in oral swabs (54.4%) was higher than the reports of 45.2% by Ogbu *et al.* (2023), 51.3% by Garba and Yusuf (2023), and 48.7% by Adebayo *et al.* (2024), possibly due to unrestricted free-roaming behaviour in Dutsin-Ma. It was lower than 62.0% by Rahman *et al.* (2010) in Malaysia, and 58.3% by Patcharathorn *et al.* (2013) in Bangkok; this is likely due to tropical climates favouring parasite survival. The prevalence of endoparasites in this study was also higher than 36.2% by Adeola and Olaleye (2019) in Ilorin and 33.8% by Ewurum and Umeaku (2020) in Owerri, possibly due to better veterinary care in those urban centres.

Toxocara cati was the most frequently detected endoparasite, consistent with report of Lawal *et al.* (2023) and Bello *et al.* (2024). *Toxoplasma gondii* is of public health importance because cats are the only definitive hosts (Dubey, 2022). Occurrence of *E. granulosus* is concerning because it causes cystic echinococcosis in humans and livestock (World Health Organization, 2023).

Among the evaluated risk factors, only multi-cat household was significantly associated with ectoparasite infestation (21.0% vs 10.0%, OR = 2.41, 95% CI: 1.02–5.65, P = 0.040), consistent with Bowman *et al.* (2021) and Taylor *et al.* (2022), who reported that overcrowding and close contact facilitate the transmission of ectoparasites. Conversely, none of the evaluated risk factors for endoparasite infection showed statistically significant associations (P > 0.05), despite observed trends such as outdoor access (59.8% vs 48.9%, OR = 1.56, 95% CI: 0.86–2.81, P = 0.141).

CONCLUSION

This study confirmed the presence of ectoparasites and endoparasites among domestic cats in Dutsin-Ma Metropolis, Katsina State, Nigeria. Four ectoparasite species and six endoparasite species were identified. Multi-cat household was the only significant risk factor for ectoparasite infestation. The detection of zoonotic parasites such as *Toxocara cati*, *Toxoplasma gondii*, and *Echinococcus granulosus* indicates a potential public health concern. Strengthening vector control, routine deworming, public health education, and the One Health approach are recommended.

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