# PREVALENCE OF ECTOPARASITES OF DOGS IN UMUAHIA NORTH AND IKWUANO LOCAL GOVERNMENT AREAS OF ABIA STATE, NIGERIA

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**ABSTRACT**

***A study on the prevalence of ectoparasites of dogs in Umuahia North and Ikwuano Local Government Areas of Abia State, Nigeria was investigated. A total of 220 dogs were examined, using purposive sampling method to select the households within the communities in the two LGA. The animals were examined for ectoparasites and identification was made using standard microscopic examination procedures. 145 dogs had infestation of ectoparasites with overall prevalence of 65.91%. Location showed association (p<0.05) with the occurrence of ectoparasites. Umuahia North and Ikwuano had a prevalence of 58/105, 55.24% and 87/115, 75.65% respectively. Sex had no association (p>0.05) with prevalence of ectoparasites. Males had numerically higher prevalence of 65/96, 67.71% than females 80/124, 64.52%. Breed showed association (p<0.05) with prevalence of ectoparasites. Prevalence was significantly higher in the local breeds 61/111, 77.06%, than in the exotic breeds 84/109, 54.96%. Age had no association (p>0.05) with the occurrence of ectoparasites. Ages 0 – 6 months showed prevalence of 49/75, 65.33%, ages 7 – 12 months showed prevalence of 52/78, 66.67% and above 12 months showed prevalence of 44/67, 65.67%. Species of ectoparasites showed association (p<0.05). Rhipicephalus sanguineus was the most prevalent (38.62%), followed by Haemaphysalis leachi (11.04%) and Ctenocephalides canis (6.21%). However, mixed infestation between R. sanguineus and C. canis was recorded with 44.14% prevalence. In conclusion, there was high prevalence of ectoparasite of public health importance in dogs from the studied area. Hence, the need for public health awareness on the impacts of these ectoparasites and their control measures.***

**Keywords:** Prevalence, Ectoparasites, Dogs, Umuahia north, Ikwuano

## INTRODUCTION

Dogs' remarkable success as a companion animal worldwide rests on a set of adaptations to cohabitation with humans (Wynne, 2021). They have contributed immensely to the physical, social and emotional development of children and the well-being of their owners in both developed and under-developed countries (Purewal *et al.*, 2017). The reasons for keeping dogs vary considerably with culture, social and economic activities of individuals (Arong *et al.,*

2011; Abdulkareem *et al.,* 2019). Dogs are mainly kept for guarding, hunting or as pets in most communities (Vanacore, 2023). However, despite the beneficial effects of keeping dogs, they remain a threat to human population as they harbour bewildering number of ectoparasites of zoonotic potentials and thus remain a major threat to public health (Ugbomoiko *et al.,* 2008; Klimpel *et al.,* 2010). The ectoparasites inhabit the external body surfaces of vertebrates, including dogs (Wall and Shearer, 1997). They have considerable pathogenicity and may even cause death, depending on the intensity of infestation, nutrition and immune status of the host (Scott *et al.,* 2001).

The ectoparasites known to infest domestic dogs are ticks, fleas, lice and mites, and they cause considerable pathological conditions such as severe allergic dermatitis and non-pruritic skin disorders (González *et al.,* 2004; Bahrami *et al.,* 2012). Besides the direct damage to the host's skin, some ectoparasites also act as vectors of various diseases in domestic animals such as babesiosis, bartonellosis, ehrlichiosis and anaplasmosis, which are commonly associated with life threatening anaemia (Alcaíno *et al.,* 2002; Nuchjangreed and Somprasong, 2007). *Rhipicephalus sanguineus* Latreille, 1806 (Ixodida: Ixodidae) and *Ctenocephalides canis* Curtis, 1826 (Siphonaptera: Pulicidae) are the most encountered ticks and flea species of veterinary importance affecting dogs in most tropical environment (Kamani *et al.,* 2013).

These ectoparasites have devastating impacts on health and economy, as other species of animals such as cat, cattle, sheep, goat, pig, chicken are also affected (Radostits *et al.,* 1994; Odenu *et al.,* 2016; Yakhchali *et al.,* 2016; Agu *et al.,* 2020). Identifying these ectoparasites and understanding their distribution are fundamental for designing control programmes and strategies. In Nigeria, the occurrence of ectoparasite infestations have been well documented (Ugbomoiko *et al.,* 2008; Arong *et al.,* 2011), but climate changes leading to environmental changes have altered the distribution and abundance of ectoparasites in many parts of the country including Abia State. Thus, this work was designed to ascertain the prevalence and risk factors associated with the occurrence of ectoparasites in dogs in Umuahia north and Ikwuano local government areas of Abia State. It is believed that the outcome of this study will help to create awareness on the public health impacts of ectoparasites of dogs and how to implement strategic control programmes.

## MATERIALS AND METHODS

**Study Area:** The study was conducted in Umuahia North and Ikwuano Local Government Areas of Abia State. Umuahia North is located between latitude 5.5769° N and longitude 7.5031° E, with 2022 projected population of about 324,900 (City Population, 2023a). Ikwuano is located between latitude 5.4093° N and longitude 7.5897° E, with 2022 projected population of about 200,800 (City Population 2023b). Majority of the inhabitants of Umuahia North are business owners and salary earners. Ikwuano inhabitants consist of farmers, hunters and few wage earners.

**Sampling Technique:** Purposive sampling method was used to sample dogs in the study area. The risk factors considered in the study were age, sex, breed, location, species and patterns of infestation.

**Sample Collection and Identification:** Ectoparasites were collected from the dogs by rubbing the entire body with a piece of cotton wool soaked in ether and then the entire fur was combed from the head region to the limbs, onto a clean large white paper spread underneath the dog (Adamu *et al.,* 2012). Ticks were also removed with a pair of forceps. The ectoparasites recovered from each dog were preserved separately in 70% alcohol. The specimens from each dog were transferred to the Veterinary Parasitology Laboratory, Michael Okpara University of Agriculture, Umudike for identification. Ectoparasites were displayed on a Petri dish, examined using a magnifying hand lens and identified to species level, using morphological features as described by Wall and Shearer (2008).

The *R. sanguineus* and *Haemaphysalis leachi* Audouin, 1826 (Ixodida: Ixodidae) were identified using a magnifying hand lens, with the ectoparasites placed in a Petri dish. *R. sanguineus* was identified by the hexagonal shape of the basis capitulum when viewed dorsally, their possession of a reddish-brown inornate scutum and short mouth parts. The *R. sanguineus* was identified by the colour of the scutum, and this is a distinguishing feature from the *H. leachi*. *The C. canis* were identified by their characteristic ctenidia (or combs), and possession of a pair of long hind limbs for limping (Wall and Shearer, 2008).

**Statistical Analysis:** Statistical analysis was performed using SPSS Version 23 (IBM Corporation, Armonk, New York, USA). Descriptive statistics used for the infestations were percentages and frequencies, while the Chi-square ($X^2$) statistics was used to test the strength of the association between the variables, and level of significance were detected by the actual p-value if it was equal to or less than 0.05.

## RESULTS

A total of 220 dogs were sampled with overall prevalence of 145(65.91%). The location had significant association (p<0.05) with the occurrence of ectoparasites. Umuahia North and Ikwuano had a prevalence of 58/105 (55.24%) and 87/115 (75.65%) respectively ($X^2$ = 10.18, d = 1, p = 0.001) (Figure 1).

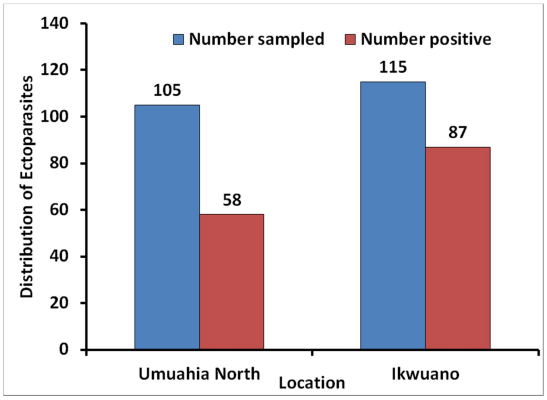


**Figure 1: Distribution of ectoparasites of dogs in Umuahia North and Ikwuano Local Government Areas of Abia State, Nigeria**

Sex had no association (p>0.05) with the occurrence of ectoparasites. Males had prevalence of 65/96 (67.71%), while females had 80/124 (64.52%) ($X^2$ = 0.25, d = 1, p = 0.026) (Figure 2).

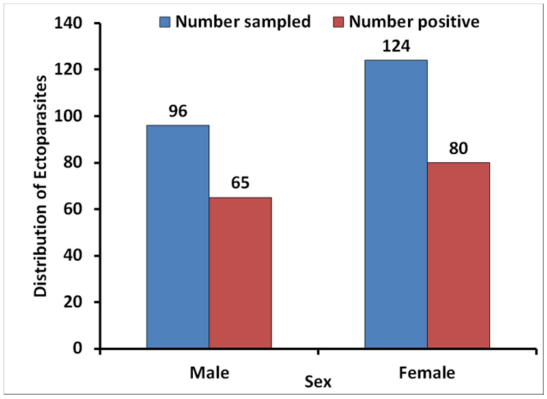


**Figure 2: Sex distribution of ectoparasites of dogs in Umuahia North and Ikwuano Local Government Areas of Abia State, Nigeria**

Breed had association (p<0.05) with prevalence of ectoparasites. Prevalence was significantly higher in the local breeds 61/111 (77.06%) than in the exotic breeds 84/109 (54.96%) ($X^2$ = 11.96, d = 1, p = 0.001) (Figure 3).

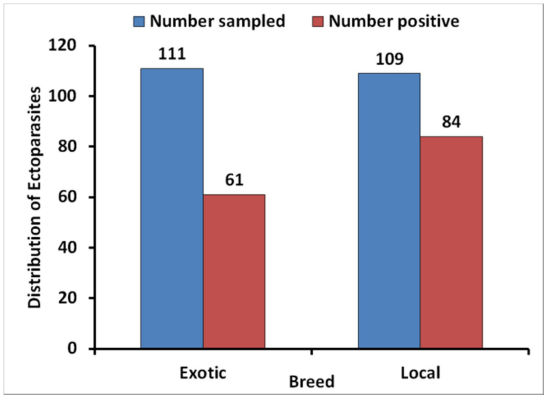


**Figure 3: Breed distribution of ectoparasites of dogs in Umuahia North and Ikwuano Local Government Areas of Abia State, Nigeria**

Furthermore, age had no association (p>0.05) with the occurrence of ectoparasites. Ages 0 – 6 months showed prevalence of 49/75 (65.33%), ages 7 – 12 months had prevalence of 52/78 (66.67%) and those above 12 months of age had prevalence of 44/67 (65.67%) ($X^2$ = 0.03, d = 2, p = 0.984) (Figure 4).

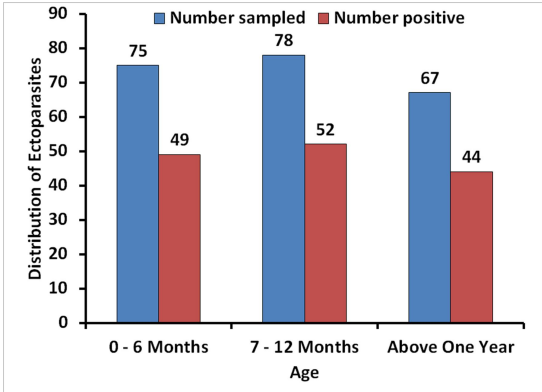


**Figure 4: Age distribution of ectoparasites of dogs in Umuahia North and Ikwuano Local Government Areas of Abia State, Nigeria**

Three species of ectoparasites were identified, namely; *R. sanguineus*, *H. leachi,* and *C. canis*. Species of ectoparasites showed association ($p<0.05$) with the occurrence of ectoparasites. *R. sanguineus* was the most prevalent (38.62%), followed by *H. leachi* (11.04%) and then *C. canis* (6.21%). However, mixed infestation between *R. sanguineus* and *C. canis* was recorded with a prevalence of 44.14% ($X^2 = 24.50$, d = 3, p = 0.000) (Figure 5).

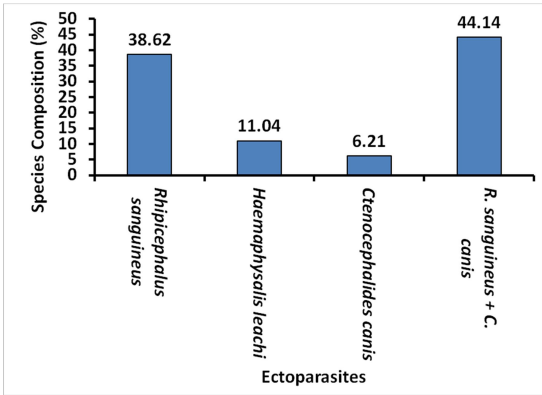


**Figure 5: Species composition of ectoparasites of dogs in Umuahia North and Ikwuano Local Government Areas of Abia State, Nigeria**

## DISCUSSION

This present study revealed an overall prevalence of 145(65.91%) in the population of dogs sampled. This result was almost similar to 68.2% and 71.2% prevalence recorded in Ibadan, Oyo State and Ilorin, Kwara State, Nigeria respectively (Ojo *et al.,* 2019; Shilereyo *et al*., 2022). The result is however at variance with 81.4% and 98.5% prevalence reported in Ilorin and some selected neighboring rural communities (Omaran, Oke-oyi, Ile-Apa, Osin-Tunji, Osin Aremu and Tanke iledu) in Kwara State and Ijebu communities, Ogun State, Southwestern Nigeria respectively (Agbolade *et al.,* 2008; Abdulkareem *et al.,* 2019). Similar high prevalence (95.05%) has been reported in dogs from Jimma town, southwest Ethiopia (Tadesse *et al.,* 2019). These variations in ectoparasite density may be attributed to differences in environmental and management conditions, and geographical locations that favour the development and transmission of these ectoparasites (Nayak *et al.,* 1997; Shilereyo *et al*., 2022).

The most prevalent ectoparasite species recorded was *R. sanguineus* (38.62%), followed by *H. leachi* (11.04%) and *C. canis* (6.21%). These results corroborated the finding of Elom *et al.* (2015), who reported *R. sanguineus* as the most abundant tick in two Local Government Areas (Ikwo and Ezza) of Ebonyi State, Nigeria. Similarly, Troyo *et al.* (2012) and Adamu *et al.* (2014) reported *R. sanguineus* as the most abundant ectoparasites in slaughtered dogs in Maiduguri, Nigeria. *R. sanguineus* has also been reported as the most prevalent tick of rural dogs in the municipality of São Vicente Férrer, Pernambuco, Northeastern Brazil (Dantas-Torres *et al*., 2009). Furthermore, the dominance of *R. sanguineus* among other ticks of dogs had been reported in Iran (Mirani *et al.,* 2017) and Costa Rica (Troyo *et al.,* 2012). Several studies have attributed the abundance of *R. sanguineus* to suitable environmental factors; high temperature, rainfall and humidity (Konto *et al.,* 2014; Okoli *et al.,* 2016; Foley *et al*., 2019; Muhanguzi *et al*., 2020).

The prevalence was found to be significant between the two locations studied, with a higher prevalence recorded in Ikwuano than in Umuahia North, which may be attributed to the fact that Ikwuano is situated in the rural area, with little or no veterinary care available for the dogs. Several studies have demonstrated that ectoparasites of dogs are commonly found among dogs in rural areas (Dantas-Torres *et al*., 2009; Costa-Junior *et al*., 2012; Abdulkareem *et al.,* 2019).

Sex had no association with the occurrence of ectoparasites in the studied dogs. This result implies that ectoparasites infestation is not gender-dependent and was in agreement with the findings of Agu *et al.* (2020) who did not observe any significant difference in ectoparasite infestations due to sex of dogs in Nsukka cultural zone, Enugu State, Nigeria. It has also been reported by Omudu *et al.* (2012) that sex does not play a major role in the susceptibility of dogs to parasitic infestations. The result of this study on sex disagreed with Aldemir (2007) and Tadesse *et al.* (2019) that found higher prevalence in female and male dogs in their various studies in Turkey and Ethiopia respectively.

The age of dogs had no association with prevalence of ectoparasites in this study. This result was in agreement with Agu *et al.* (2020), but contradicted the findings of Abdulkareem *et al.* (2019) who found younger dogs 0 – 6 months to be more susceptible to ectoparasites infestation than the adult dogs. Previous workers have reported confinement to houses as a leading factor to greater exposure to ectoparasites re-infestation as well as less efficient grooming of adult dogs, which predisposes other dogs to high risk of ectoparasitic infestation (Eckstein and Hart, 2000; Abdulkareem *et al.,* 2019; Agu *et al.,* 2020).

The local breeds were found to be more susceptible to the ectoparasites infestation than the exotic breeds. This result was in agreement with the reports of Bryson *et al.* (2000) in Northwest Province, South Africa and Abdulkareem *et al.* (2019) in Kwara State, Nigeria. Agu *et al.* (2020) on the contrary observed a higher prevalence of ectoparasites infestation in exotic breeds than the local breeds. The higher prevalence in local breeds may be attributed to the fact that most of the local breeds sampled in this study were on semi free range management, with little or no veterinary care, which exposes them to parasitic infestations.

The close bonds of these animals with their owners as recorded in this study present risk of zoonotic infections for the dog owners and other inhabitants of these communities. The presence of other susceptible animals (cat, goat and sheep) may contribute to the high prevalence of ectoparasites recorded because where dogs have frequent contact with other animals harbouring the parasites, there is a resulting higher risk of infestation in the dogs (Bryson *et al.,* 2000).

**Conclusion:** This study demonstrated a relatively high ectoparasites infestation in the study area, which raises a public health alarm especially among the rural dwellers of Ikwuano LGA; hence the need for the integrated multidisciplinary one health approach, involving veterinary and medical care personnel, as well as public enlightenment and awareness on the zoonotic impact of these parasites. Regular control measures are important to keep the arthropods in check, as they are vectors of other diseases of dogs. Veterinary and animal health clinics should be established in the study areas to enable dog owners have adequate access to affordable veterinary care and treatment.

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