IPS Journal of Public Health
IPS J Public Health, 5(2): 188-191 (2025)
DOI: https://doi.org/10.54117/ijph.v5i2.36

Surveillance of Indoor Biting Mosquito Vectors in Uga Rural Community Aguata Local Government Area Anambra State, Nigeria

Anthony Obinna Ekesiobi

Department of Biological Sciences, Chukwuemeka Odumegwu Ojukwu University, Uli

*Email of correspondence: ao.ekesiobi@coou.edu.ng; anthonyekesiobi2@gmail.com

Abstract

A survey was carried out to determine the species composition and abundance of indoor biting mosquitoes in Uga rural community, Aguata Local Government Area, Anambra state Nigeria. Between May and July 2024, mosquitoes collection was carried out using Pyrethrum knockdown method. Houses were randomly selected using stratified random sampling techniques. A total of 160 indoor adult biting mosquitoes comprising of 3 species were collected. *Culex quinquefasciatus* collected in total is 9 (5.63%), *Anopheles gambiae* 149(93.13%) and *Aedes aegypti* 2 (1.25%). There was a significant difference among the species of the indoor biting mosquitoes collected in the communities (P>0.05). Awarasi village recorded the highest abundance 45 (28.13%), followed by Oka village, 42 (26.25%, Umuoru 39 (24.38% and the least being Umueze 34 (21.25%). The difference in abundance was not significant (P>0.05). The finding of this study indicated the abundance of indoor man-biting mosquitoes which are of serious public health implication in Uga. The fact that this study was done during wet season may have contributed to the abundance of these mosquitoes through the creation of suitable breeding habitats. This work provided an entomological baseline data required for evaluation and implementation of future vector control interventions in the study area. Adequate vector control in the study area is strongly recommended.

Keywords: *Indoor biting mosquitoes, Species composition, Vector surveillance, Public health entomology, Uga community, Anambra State*

Article History
Received: 24 Mar 2025
Accepted: 04 Apr 2025
Published: 06 Apr 2025

Scan QR code to view[1]

How to cite this paper: Ekesiobi, A. O. (2025). Surveillance of Indoor Biting Mosquito Vectors in Uga Rural Community Aguata Local Government Area Anambra State, Nigeria. *IPS Journal of Public Health*, *5*(2), 188–191. https://doi.org/10.54117/ijph.v5i2.36.

1. Introduction

Mosquitoes are generally considered annoying and some species transmit diseases, thus leading to variety of human efforts to eradicate or reduce their presence (Ekesiobi et al., 2008). Apart from disease mosquitoes also cause nuisance problems for rural home owners and ruin recreational activities such as hunting and outdoor sports. In extreme situations high levels nuisance mosquitoes can pose a threat to livestock and wild animals as well. Nuisance mosquitoes, they bother people around homes or in parks and recreational areas, they reduce real estate values, adversely affect tourism and related business interests, or negatively impact livestock or poultry production, they also serve as vectors, or transmitters, of infectious disease to man and in animals including Dengue, yellow fever, rift valley fever, chikungunya, Malaria and Lymphatic filariasis.

Arthropod-borne infectious has emerged as a major human health concern worldwide. Those spread by mosquitoes have caused most serious parasitic diseases and arbovirus diseases worldwide and are ubiquitous in both rural and urban settings (Ottessen, 2000). The virus includes; Dengue, yellow fever, rift valley fever and chikungunya among others. Infected mosquitoes carry these organisms from person to person without exhibiting symptoms themselves (Baylis, 2017

Malaria and Lymphatic filariasis are among the world's most dreaded killer diseases claiming several million lives yearly and disabling and disfiguring more and hence the need to establish their vector status in Uga community which informed the present study.

Many important vectors of malaria bite indoors at night, and may rest on indoor surfaces after biting, whereas larval

Thank you for publishing with us.

habitats vary markedly among anopheline species (WHO, 2006). The development of pyrethroids with long residual action and very low mammalian toxicity suggested the possibility of treating mosquito nets to add an insecticidal effect to their mechanical protection, as mosquitoes are positively attracted by the odour of the sleeper inside the net, making the ITN like a baited trap. The insecticidal treatment of nets adds a chemical barrier to the often-physical barrier provided by the net and thus improves its effectiveness in personal protection (WHO, 2006).

Mosquitoes and biting flies seek undisturbed resting sites for part of their life. In drier regions, houses are important resting places for mosquitoes and phlebotomies sand flies. In humid forested areas the insects are less dependent on houses and often rest in vegetation outdoors. However, even species that usually rest outdoors may enter houses to feed and may then spend some time resting indoors before and after feeding (Rozendaal, 1997).

When mosquitoes and other insects rest in houses it is possible to kill them by spraying the walls with residual (long lasting) insecticide. Mosquitoes resting on sprayed walls come into contact with insecticide through their feet and are killed a house may bite first and then be killed when resting on a treated wall (Rozendaal, 1997).

As most anopheline vectors of malaria enter houses to bite and rest, malaria control programmes have focused primarily on the indoor application of residual insecticides to the walls and ceilings of houses.).

When mosquitoes and other insects rest in houses it is possible to kill them by spraying the walls with residual (long lasting) insecticide. Mosquitoes resting on sprayed walls come into contact with insecticide through their feet and are killed. Some insecticides irritate mosquitoes and cause them to leave houses. In dry or windy areas, this may also result in death due to lack of suitable outdoor resting places. Wall-spraying may not prevent biting. Hungry mosquitoes entering a house may bite first and then be killed when resting on a treated wall (Rozendaal, 1997). As most anopheline vectors of malaria enter houses to bite and rest, malaria control programmes have focused primarily on the indoor application of residual insecticides to the walls and ceilings of houses.

2. Methodology

Study area

Uga is a town in the Aguata Local Government Area of Anambra State, Nigeria, located 13 km southeast of Igbo-Ukwu, 12 km south of Ekwulobia, and 45 km south of Awka, the state capital. It comprises four communities: Umueze, Oka, Umuoru, and Awarasi, and features the natural spring and tourist attraction "Obizi Uga". It is located at 5.9353° N, 7.0794° E. It experiences two seasons: wet and dry seasons. The majority of the inhabitants are traders and farmers with a few civil servants. As a rural community, pipe born water, government hospitals and other government establishments are lacking. Most houses in the community are built of concrete walls with corrugated iron roofing although there are still a few mud and thatched houses around. The vegetation is partly rainforest type and mosaic savanna.

Study Design

The surveillance of man-biting mosquitoes was carried out in four communities in Umueze, Oka, Umuoru and Awarasi which involved adult collection, and identification.

Ethical Considerations

Advocacy visit to the traditional ruler and opinion leaders of Uga community with a letter of introduction from the Head of Department of Biological science, Chukwuemeka Odumegwu Ojukwu University was used to obtain permission to carry out the study in the community. Inhabitants were mobilized through town meetings, notices in the church, schools and markets. The aim and objective of the research was also explained to them and also advocacy visit was paid to the heads of the four communities comprising Uga namely: Umueze, Oka, Umuoru and Awarasi and their permission was also sought. Occupants whose houses were used during the indoor spray were properly informed and their consent equally obtained. Volunteer staff used for collection of the indoor man-biting adult mosquitoes and were given adequate training on how best to collect the mosquitoes.

Collection of indoor biting mosquitoes using pyrethrum knock down technique

Indoor biting and resting adult mosquitoes were collected from the residents' rooms using pyrethriod (insecticide) knockdown collection technique (PKC) according to Youdeowei and Service (1995). Rooms were selected on residents' co-operation. A large sheet of white cloth was used to cover the floor of each room. The windows and doors were properly shut and the whole room sprayed with Baygon aerosol commonly available in the local markets. After about 20 minutes of fleeting the room, the doors and windows were opened and the cloths were folded.

Identification of mosquitoes

The mosquitoes were identified at National arbovirus and vector research Centre Enugu. Adult mosquitoes collected were separated based on their morphological characteristics (i.e length of the palps, antennae, spotted wings and speckled legs) into Anopheline and Culicine groups. The Culicine group was separated into *Aedes* and *Culex* mosquitoes, using presence of dark and white silvery patterns on the thorax and abdomen for *Aedes*, and pale brown coloration without viable ornamentation for *Culex*. Individual species was identified using the keys of Service (1980) and Gillet (1972).

Data analysis

Data from the prevalence study were analyzed statistically for significant differences using the Chi Square.

3. Results

A total of 160 mosquitoes were collected from the studies (Table 1). Of this number, *Anopheles gambiae* were

149(93.13%), *Aedes aegypti* 2(1.25%) and *Culex quinquefasciatus* 9(5.63).

Table 1: Relative abundance of indoor-biting mosquitoes in Nnewi

Mosquito Species	No Collected	% Collected
Anopheles gambiae	149	93.13
Culex quiniquefasciatus	9	5.63
Aedes aegypti	2	1.25

Of the 160 indoor-biting and resting adult mosquitoes collected (Table 1, Figure 1), *Anopheles gambiae* were 149(93.13%), *Aedes aegypti* 2(1.25%) and *Culex quinquefasciatus* 9(5.62%). *Anopheles gambiae* 149(93.13%) was the most abundant followed by *Culex quinquefasciatus* 9(5.62%).

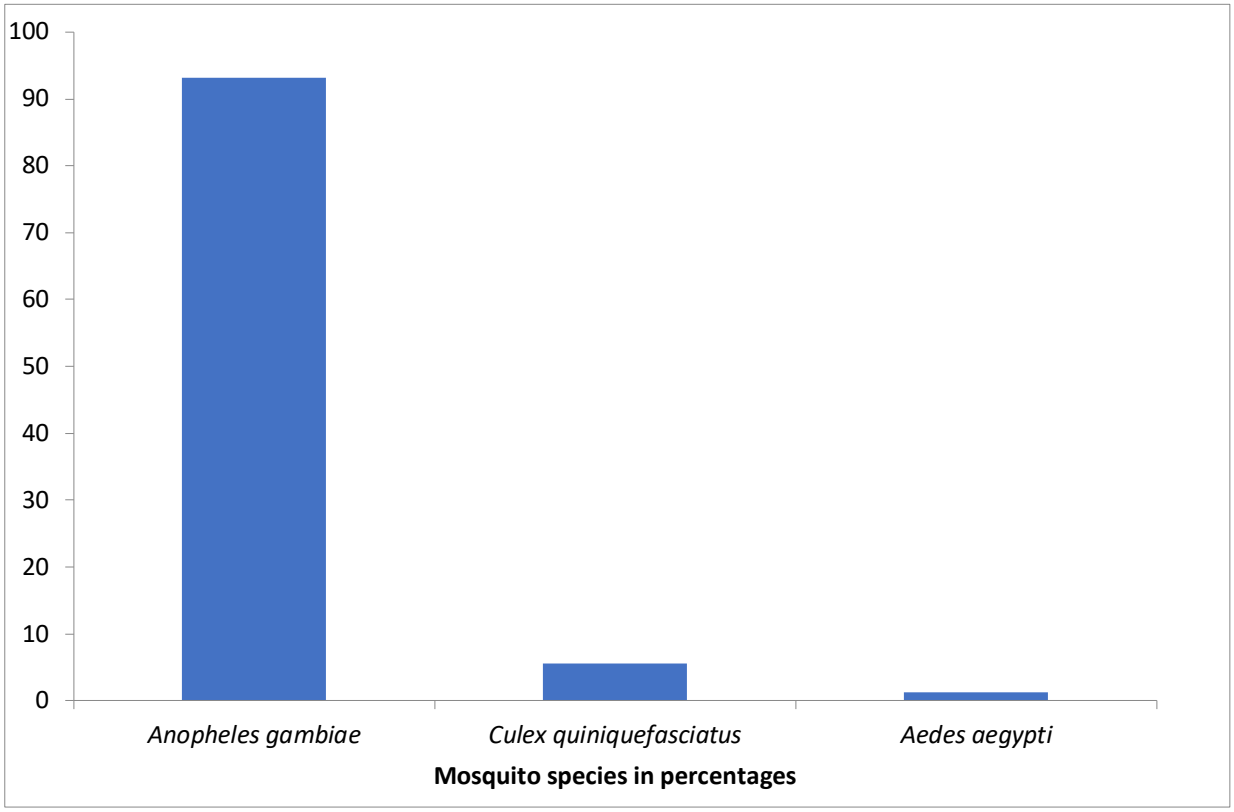

Figure 1: Indoor biting adult mosquitoes collected through pyrethrum knockdown method

The highest number of indoor biting mosquitoes were collected at Awarasi village 45(28.13%) and the least from Umueze village 34(21.25%) (Table 2).

Statistical analysis showed that there was no significant difference in the number of the mosquitoes collected from the villages ($p > 0.05$).

Table 2: Relative Abundance of indoor biting mosquitoes among the villages in Uga.

Village	Mosquitoes species			Total (%)
	Anopheles gambiae (%)	***Culex quiniquefasciatus (%)***	***Aedes aegypti (%)***	
Umueze	32(94.12)	2(5.88)	0(0.00)	34(21.25)
Oka	38(90.48)	3(7.14)	1(2.24)	42(26.25)
Umuoru	35(89.74)	3(7.69)	1(2.56)	39(24.38)
Awarasi	44(97.77)	1(2.22)	0(0.00)	45(28.13)
Total	**149(93.13)**	**9(5.63)**	**2(1.25)**	**160**

4. Discussion

The entomological survey (Pyrethrum knockdown collection of indoor-biting mosquito vectors) carried out revealed the preponderance of *Anopheles gambiae* in Uga, Aguata Local government area Anambra state, Nigeria. Awarasi village recorded the highest abundance of *A. gmabiae* while Umuoru village recorded the least. The high population of *Anopheles gambiae* in Awarasi village may be due to availability of good breeding sites for *Anopheles gambiae* in the area, which may be provided by fresh water pools in farm lands close to human habitations. *Anopheles gambiae*, the predominant species, can breed in undisturbed pools resulting from overflow of river but never in pollinated or alkaline water. (Aniedu, 1992). The availability of these species in this communities was due to the presence of ground water poles, domestic containers, poorly drained

gutters, plant axils and bushes around household where they breed and readily fly into houses to rest and feed on human host. *An. Gambiae* is an important vector of malaria as well as filariasis in Africa, especially in rural communities (Ekesiobi *et al.*, 2017; Gordon and Lavoipierre, 1997), while *Cx. Quinquefasciatus* transmits filarial nematode disease including loiasis and elephantiasis. *An. Gambiae* and *Cx. Quinquefasciatus* were largely responsible for indoor biting activities in the study area, exhibiting endophilic behaviour. From the result of this study, *Cx. Quinquefasciatus* was found breeding mostly in sites around household, making it easier for them to fly into houses to feed and rest. The highest number of indoor biting mosquitoes was collected at Awarasi village is 45(28.13%), followed by Oka 42(26.25%), Umuoru, 39 (24.38%), and the least Umueze 34 (21.25%). The total abundance of mosquitoes in the study area was slightly higher than that of Umeanaeto *et al*., (2008) who reported 150 abundance rate in Nnewi North Local Government Area, Anambra state and that of Onyiudo *et al*. (2011) who reported a total of 110 indoor-biting and resting adult *Anopheles* mosquitoes in Ogunike. *Culex* and *Anopheles* mosquitoes are night biters and usually enter houses to bite their victims while asleep (Ekesiobi *et al.* (2014) Service, 1980). *Aedes* usually bite and rest out-doors. Important vectors of mosquito-borne diseases are those which show a close association with man and prefer man to other animals as source of food (Gordon and Lavoipierre, 1997), hence these mosquitoes were collected indoors where they bite their victims while asleep.

5. Conclusion and Recommendation

The study area is prone to attack of the diseases vectored by these mosquito species and this necessitates action towards mosquito population reduction or elimination.

The preponderance of proven mosquito vectors of public health diseases in the community indicates that the community is thus exposed to a variety of mosquito bites and perhaps mosquito-borne diseases. As many villagers may not afford the daily use of insecticide aerosols in their rooms, long-lasting insecticide treated nets (LLITNs) and indoor residual sprays (IRS), it is suggested that these should be provided for the people to reduce mosquito-man contact and avoid disease transmission among the community dwellers. Also, the availability of mosquito breeding sites is an important ecological factor in mosquito abundance and diseases transmission in the community. The community should be educated on mosquito ecology and diseases. They should be enlightened on those factors that contribute.

References

Aniedu, I. (1992). A comparative study of the distribution of seasonal abundance of malaria vectors in three ecologically distinct habitats in Baringo district, Kenya Journal of applied Entomology, 144:268-275.

Ekesiobi, A.O., Anene C.C., Nwaigwe H.C., Emmyegbe , I.O., and Igbodika M.C (2014). Seasonal distribution and abundance of yellow fever mosquito vector, *Aedes aegypti* (Diptera: Culicidae) in Aguata local government area Anambra state Nigeria. COOU Interdisciplinary Journal 1(1): 25-32.

Ekesiobi, AO., Igbodika, MC. and Njoku OO. (2008). Co-infection of malaria and typhoid fever in a tropical community. Animal Research International, 5(3): 888-891 10.4314/ari.v5i3.48754.

Ekesiobi, A.O,. Anene, C.C, Igbodika, M.C., Nwigwe, H.C (2017). Evaluation of repellent and larvicidal activity of *Cybopogon citratus* (Lemon grass) against Filarial vector, *Culex quinquifasciatus*. *African journal of education, science and technology.3(4:25-32.)*

Federal Ministry of Health (2009a). Policy on indoor residual spraying for malaria vectors in Nigeria..National Malaria Control Programme, Federal Ministry of Health. Abuja, Nigeria .22pp.

Gillett, J. D.African mosquitoes and their medical importance.Willam Heinemann Medical Books Ltd London, 1972, pp 236Gordon RM and Laviopierre MM (1976). *Entomology for Students of Medicine*, 4th Printing. Blackwell Scientific Publications Oxford.pp. 17.

Gordon, R.M., Lavoipierre, M.M. (1997). *Entomology for students of medicine*, fourth printing, Blackwell Scientific Publications, Oxford **pp**. 235.

Onyido, A.E., Obi, N.C., Umeanaeto, P.U., Obiukwu, M.O. and Egbuche, M.C., (2011). Malaria prevalence and indoor-biting mosquito vector abundance in Ogbunike. African Research Review, Vol. 5 1-13Ottesen, E.A. (2000). The global programme to eradicate Lymphatic filariasis. *Tropical Medicine International Health* **5**: 591 – 594.

Rozendaal, J. (1997). Vector Control Methods for use by individuals and communities, WHO, *Geneva* **pp** 412.

Service M.W (1980). *S guide to medical entomology*. Macmillia International and College edition. Macmillian press Ltd. London 99-226.

Service MW (1980). *A Guide to Medical Entomology*. MacMillan International College Edition. MacMillan Press Ltd. London. pp. 1-44

Umeanaeto P.U., Eneanya C.I, Ifechukwu M.O., Obiukwu M.O., Obianika S.C., Onyebuchi E.I, and Obiekwe M. (2008). Prevalence and intensity of Maleria among HIV seropositive Patients in Nnewi, Anambra State.*Journal of Biomedical Investigation* **6** (2): 13-18.

World Health Organization (2006). *Malaria vector control and personal protection*. Technical report series No. 936 World Health Organization Geneva.

Youdeowei, A. and service, M.W. (1995). Pest and Vector management in the tropics. Second edition, long man Nigeria .p 84-92.

.