ABUNDANCE AND DIVERSITY OF MOSQUITO GENERA AT ILOKUN AND IRASA COMMUNITIES, ADO-EKITI, NIGERIA

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ABSTRACT

Mosquitoes are slender biting insects found everywhere except for Antarctica. Mosquitoes serve as hosts for a variety of disease causing agents including viruses, sporozoans and nematodes. Diseases vectored by mosquitoes affect hundreds of millions of people every year, causing immense suffering in most countries and Nigeria inclusive. This work was initiated with the aim to investigating the abundance and diversity of mosquito genera in two rural settlements at the suburb of Ado-Ekiti, Ekiti State, Nigeria. Mosquitoes were collected from the settlements by bait trapped method. A total of three hundred and Ten (310) mosquitoes were collected which consisted of three genera including *Anopheles, Culex, Aedes. Anopheles* mosquitoes were the most abundant and this explains why malaria is prevalent in the areas since female *Anopheles* mosquitoes are known to transmit malaria. The environment was observed to provide breeding places for mosquitoes. People in the areas need to be educated on how to manage their environment.

Keywords: Mosquito, Ado-Ekiti, Ekiti, Anopheles, Culex, Aedes,

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INTRODUCTION

Mosquitoes are slender biting insects of the order Diptera, sub order Nematocera and family Culicidae, with about three and half thousand species (Sogoba *et al.*, 2007). Mosquitoes are cosmopolitan found everywhere except for Antarctica (Mullen *et al.*, 2009). In warm and humid tropical regions, various mosquito species are active for the entire year, but in temperate and cold regions they hibernate or enter diapauses (Fang, 2010). The worldwide introduction of various mosquito species over large distance into regions where they are not indigenous has occurred through human agencies, primarily on sea routes, in which the eggs, larvae and pupae inhibiting water-filled used tires and cut flowers for their transport. Apart from sea transport, mosquitoes have been effectively carried by personal vehicles, delivery trucks, trains. Man-made areas such as stagnant water, retention basin, or dirty drainage which also provide sprawling area for mosquito, in addition, outdoor pool areas makes a perfect place for mosquito to grow (WHO, 1975). Mosquitoes serve as hosts for a variety of disease causing agents such as viruses, sporozoans and nematodes. The female biting habit of mosquitoes during their search for blood meal shortly before oviposition increases their propensity to transmit various diseases associated with high morbidity and mortality. Such diseases vectored by mosquitoes include: malaria, filariasis and yellow fever, which affect hundreds of millions of people every year, causing immense suffering and hindering development. Nigeria is known for high prevalence of malaria (FMH, 2007) and filariasis has been shown to be a public health problem in Africa, particularly in the northern savannah and in the south-western coastal parts of Africa (Dunyo *et al.*, 1996). Yellow fever transmission is under control in many parts of Africa as a result of mass immunization undertaken in the countries (Godal *et al.*, 1998). This work was initiated with the aim to investigating the abundance and diversity of mosquito genera in two rural communities at the suburb of Ado-Ekiti, Ekiti State, Nigeria.

MATERIALS AND METHODS

Study areas

The study took place at Ilokun and Irasa. These communities with overall population of 2,402 (ESGN, 2006) are rural settlements located at the suburb of Ado-Ekiti, along the road leading to Ekiti State University. Ado-Ekiti is the headquarters of Ekiti State which is one of the 36 states in Nigeria. Although the land where the settlements are located are owned by the native people of Ado-Ekiti of Yoruba ethnic group, but the people inhabiting there are majorly Ebira Ethnic group who came from Kogi State, a neighboring state to Ekiti State for farming activities. The settlements lack necessary social amenities such as schools and health centers. There are 105 houses at Irasa and 120 houses at Ilokun (this was obtained through personal counting of the houses).

Sample collection

Mosquitoes were collected from the two areas from March 2015 to August

2015 by bait trapped method. Insect boxes which contained ripe pawpaw and watermelon were positioned around buildings in each of the study areas. The ripe pawpaw and watermelon were used as baits to attract mosquitoes into the insect boxes. The captured mosquitoes were killed inside the insect box with an insecticide and then carefully picked with forceps and dropped into specimen bottles filled with a solution of 0.1 gram of silica gel (Cooper, 1998). The mosquitoes in preserved medium were later discharged into a clean petri dish for identification with the aid of hand lens and microscope. Identification of the adult mosquito was carried out microscopically with the aid of published keys by Hopkin (1952) and the taxonomic keys of Gillies and Coetzee (1987). The identification was based on gross external morphological features, appearance of the antennae, palps, proboscis, thorax, terminal abdominal segments, wings, colour of hind legs and striations on the body.

RESULTS AND DISSCUSSION

Table 1: Population diversity of mosquito genera at Ilokun and Irasa

Mosquito genera	Ilokun	Irasa	Total
Anopheles	77(24.8%)	97 (31.3%)	174 (56.1%)
Aedes	24 (7.7%)	47 (15.2%)	71 (22.9%)
Culex	22(7.1%)	43(13.9%)	65(21.0%)
Total	123(39.7%)	187(60.3%)	310(100.0%)

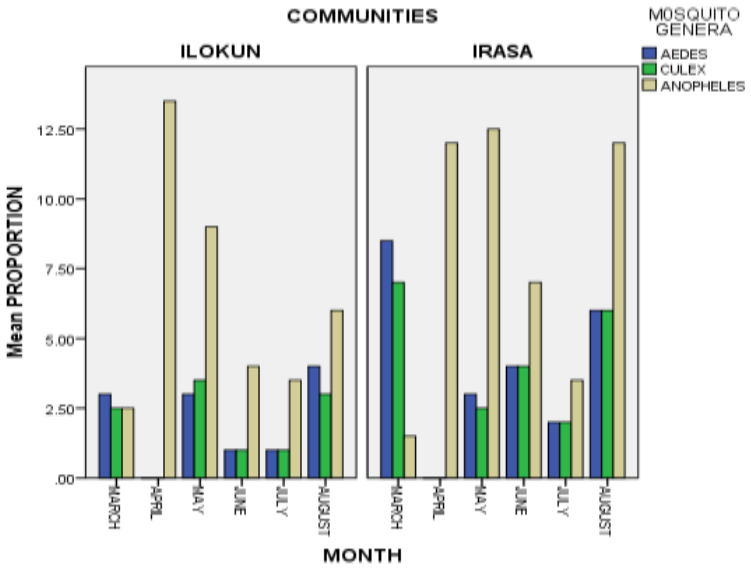

Fig 1: Abundance of mosquito genera at Ilokun and Irasa.

Table 2: Mean monthly distribution of mosquito genera at Ilokun and Irasa

Mosquito Genera	Ilokun		Irasa	
	Male	Female	Male	Female
Aedes	2.8±1.83	1.1±1.60	4.3±4.03	3.5±2.88
Culex	1.8±0.98	1.8±2.13	4±3.09	3.1±2.48
Anopheles	5.1±2.99	7.6±6.37	6.8±3.76	9.3±7.00

A total of three hundred and Ten (310) mosquitoes were collected. Three genera of mosquitoes including *Anopheles, Culex, Aedes* were identified (Table 1). The existence of mosquitoes in the areas was due to available blood meal obtained from the inhabiting people in the areas.Female mosquitoes need blood meal to support their reproductive activities. Abel-Hamid *et al.*, (2009) noted that the mosquito distribution was due to suitable ecological conditions between reservoir and host. Haddow and Ssenkubuge, (1973) reported that mosquito distribution was affected by abundance of blood meal host vectors. *Anopheles* mosquitoes were the most abundant in both communities (Fig. 1). The mean monthly distribution was shown in Table 2 with *Anopheles* mosquitoes having the highest mean monthly value, followed by *Aedes*, and least in *Culex*. Female *Anopheles* mosquitoes had the higher mean monthly value than their males, whereas the males of the other two mosquito genera (i.e *Aedes* and *Culex*) were more in the two locations. This explains why malaria is prevalent in the areas and in Ekiti State as a whole since female *Anopheles* mosquitoes are known to transmit malaria. Nyamngee *et al.* (2014) confirmed the high prevalence of malaria among the pregnant women at Ado-Ekiti in Ekiti State. Rueda (2008) reported that malaria vectors, *Anopheles gambiae* were widespread in Africa and are very difficult to control. For *Anopheles* mosquitoes to be more abundant in the two areas was connected with their breeding activities. Different mosquito species make use of different type of water quality and habitats for breeding (Onyido *et al*., 2009). Although, these mosquitoes breed in water, they differ in their micro-habitat requirements for their breeding. Some genera of mosquitoes are restricted to a single type of breeding habitat while others possess a larger adaptability, but their presence in a given type of breeding place is due to the oviposition habits of the female mosquito, which is the main determining factor of the presence of mosquitoes in different types of location (Huang *et al*., 2005, Chen *et al*., 2007). The abundance of *Anopheles* species in the two areas shows that they are very versatile and highly adapted to all the different types of environment found in the study areas. This is in lined with the report of Opoku *et al*. (2005), who stated that *Anopheles* species occur in a wide range of habitats, but with relatively low nutrient status and high oxygen levels. The

number of mosquitoes collected at Irasa was more than Ilokun (Table 1). This could be due to differences in the management of the environment by the inhabiting population of the areas. Simon-Oke *et al*. (2012) observed that mosquito distribution and abundance are related to population, land use and human activities. The surroundings houses of Irasa were observed to be bushier than Ilokun. Also the terrain of Irasa was observed to be swampy. All these factors enhance the breeding of mosquitoes. Adeleke *et al.,* (2008) reported that mosquitoes are abundant in swampy environment. The occurrence of mosquito genera in these areas is of medical importance. *Anopheles* mosquitoes are vector of both malaria and filariasis (Matur *et al*., 2001). *Aedes* have been established to transmit arbovirus diseases in Nigeria (Fagbani *et al.,* 2006). Considering the fact that *Aedes* mosquitoes are becoming common in many parts of Nigeria is an indicator that dengue fever outbreak may occur (Onyido *et al*., 2009). *Culex* mosquito was the least mosquito genera in the study areas but they are known to transmit *Bancroftian filariasis* (Amusan *et al*., 2003). However, *Culex* mosquitoes are known to prey on *Anopheles* larvae (Anosike *et al*., 2007) and this could serve as effective biological control for *Anopheles* mosquitoes. Poor environmental management is one of the key factors that enhance the breeding of these mosquitoes. Therefore, people in the rural communities need to be educated on the need to manage their environment. This will cause reduction in the population of mosquitoes, if not totally eliminated. This education should be given through talks and lectures for the grassroots to provide accurate and adequate knowledge.

REFERENCES

Abdel-hamid Y. M., Soliman M. I. and Allam K. M. (2009). Spatial distribution and abundance of culicine mosquitoes in relation to the risk of filariasis transmission in El Sharqiya Gover norate, Egypt. Egypt. Acad. J. Biolog. Sci. 1(1):39- 48.

Adeleke, M.A., Mafiana, C. F., Idowu, A.B., Adekunle, M.F. and Sam-Wobo, S.O. (2008). Mosquito Larval Habitats and Public health Implication in Abeokuta, Ogun State, Nigeria. *Tanzanian Journal of Health Research* 10(2): 103-107.

Amusan, A.A.S., Mafiana, C.F., Idowu, A.B. and Oke, O.A. (2003). Survey Of adult mosquitoes in the hostels of the University of Agriculture, Abeokuta, Ogun state Nigeria. *Nigerian Journal of Parasitology* 24:167 -172.

Anosike, J.C., Nwoke, B.E.B., Okere, A.N., Oku, E.E., Asor, J.E., Emmy-Egbe, I.O. and Adimike, D.A. (2007). Epidemiology of Tree-hole Breeding Mosquitoes in The Tropical Rainforest of Imo State, Southeast Nigeria. *Annals of Agric and Environ. Medicine* 14: 31-38.

Chen, C.D., Nazni, W.A., Seleena, B., Moo, J.Y., Azizah, M. and Lee H.L. (2007). Comparative oviposition preferences of *Aedes (Stegomyia) aegypti* (L) to water from storm water drains and seasoned tap water. *Dengue Bulletin* 31: 124-130.

Cooper, R..D. (1998). Preservation of Anopheline Mosquitoes for DNA Probe Analysis. *Journal Of The American Mosquitoes Control Association*.14(1):58 60.

Dunyo, S.K., Appawu, M., Nkrumah, F.K., Baffoe, W.H., Perdersen, E.M., Simonsen, P.E. (1996). Lymphatic filariasis on the coast of Ghana. *Trans. R. Soc. Trop. Med. Hyg*. 90:634- 638.

ESGN (2006). Ekiti State of Nigeria 2006 population figures and projections by towns and villages 2007-2013. Produced by Department of Population Activities, Research and Statistics, Ministry of Budget and Economic Planning, Ado-Ekiti.

Fagbani, J., Attah, E.B., Fabiyi, A., O'Connor, E.H. (2006). Yellow fever outbreak in Southwestern state of Nigeria. Virological and Serological Studies. *Nigerian Medical Journal* 6:34-41.

Fang, J. (July 21, 2010). "Ecology: A World without Mosquito Nature" *Nature* 466 (7305): 432-434.

FMH (2007), National Frame work for monitoring and Evaluation of Malaria Control in Nigeria. *Federal Ministry of Health* (2007), Abuja.

Gillies, M.T. and Coetzee, B.A. (1987). Supplementary to Anophelinae of Africa, South of Sahara (Afro-Tropical Region). *Publication of the South African Institute of Medical Research* 55:1-143.

Godal, T., Harvard, C., Adetokunbo, L. (1998). Research and training in tropical disease. In: *World Health Forum* 19 (4):377-381.

Haddow, A.J. and Ssenkubuge, Y. (1973). The mosquitoes of Bwamba County, Uganda. IX. Further studies on the biting behavior of an outdoor population of the Anopheles gambiae Giles complex. *Bull. Entomol. Res.* 62(3), 407-414.

Hopkin, G.H.E. (1952). Mosquitoes of the Ethiopian Region. Larval Bionomicsof Mosquitoes and Taxonomy of Culicine larvae. *British Museum (Nat.History)* 8:1-14.

Huang, J., Walter, E.D., Groux, P.Y., Vulule, J. and Miller, J.R. (2005). Ovipositional site selection by *Anopheles gambiae*: Influence of Substrate Moisture and Texture. *Medical and Veterinary Entomology* 19: 442-450.

Matur, B.M., Azare, B.A. and Ugbong, L. (2001). Prevalence of malaria parasites amongst undergraduate students of University of Abuja. *Nigerian Journal of Parasitology* 22(1&2):49-52.

Mullen, Gary, Durden, Lance (2009). Spatial Distribution and Habitat Characterization of *Anopheles* mosquito. *Journal of Vector Borne Diseases* 44: 44-51.

Nyamngee A., Edungbola L. D., Edogun, A. H., Akanbi A. A. (2014). Malaria Parasitaemia among Pregnant Women Possessing Freely Donated Insecticide-Treated Nets (ITNs) at Ado-Ekiti, Nigeria. *G.J.B.A.H.S.*, 3(1):86-91.

Onyido, A.E., Ezike, V.I., Ozumba, N.A., Nwankwo, A.C.N., Nwankwo, E.A. (2009).

Yellow fever vectors' surveillance in three satellite communities of Enugu Municipality. *The Nigerian Journal of Parasitology* 30(1): 13-17.

Opoku, A.A., Ansa-Asare, O.D. and Amoako, J. (2005). The Occurrences and Habitat Characteristics of Mosquitoes in Accra, Ghana. *CSIR-Water Research Institute*, 44pp.

Rueda L. M. (2008). Global diversity of mosquitoes (Insecta: Diptera: Culicidae) in freshwater Hydrobiologia 595: 477- 487

Simon-Oke, I.A., Afolabi, O.J., Olofintoye, L.K. (2012). Species abundance and monthly distribution of adult mosquito vector in Ekiti State, Nigeria. FUTA *J. Res. Sci.* 1:83-88.

Sogoba, N., Doumbia, S., Vounatsou, P., Baber I., Keita, M., Maiga, M., Traore, S.F., Toure, A., Dolo, G., Smith, T and Ribeiro, J.M.C. (2007). Monitoring of Larval Habitats and Mosquito Densities in the Sudan Savannah of Mali: Implication for Malaria Vector Control. *American Journal of Tropical Med. Hyg.* 77(1):82-88.

WHO (1975). World Health organization. Vector binomics and organization of anti-malaria activities. *Manual on Practical Entomology in Malaria*. WHO, Geneva. 332pp.