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Survey of mosquito's population and breeding sites in Gadau campus of Bauchi state University, Nigeria

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Abstract
A survey of mosquitoes population and breeding sites was conducted in Gadau campus of Bauchi state university, Nigeria. Dipping method was used for the sampling using a dipper or pipette based on container types. All the breeding sites or sources of mosquito larvae were grouped into four different container types: Reservoir A, natural container B, drainage C, & plastic containers D. A total of 188 mosquitoes were identified belonging to two genera (*Culex and Anopheles spp*) using dipping method. From the result site A had a total abundance of 48 (25.53%), site B had 68 (36.17%), site C had 43(22.87%) and site D had 29 (15.43%). *Anopheles* had a total abundance of 41 (21.81%) and *Culex* had a total abundance of 147 (78.19%). Out of the 188 mosquitoes sampled, 170 of the mosquitoes were separated into male *Culex* (51) and female *Culex* (78), male *Anopheles* (13) and female *Anopheles* (28) and female using the identification keys. The Shannon Index diversity of the mosquitoes was H 1.21 and the evenness was E 0.87, and the richness of the *Anopheles spp.* (0.49) mosquitoes was found to be lower than that of *Culex spp* (0.72). There is a significant difference between *Anopheles* and *Culex* mosquito species sampled in the four sites at ($p<0.05$). The abundance and richness of the mosquitoes was high due to the higher mosquitoes sampled, hence the risk of transmitting diseases was very high.

Keywords: mosquito, breeding sites, malaria, anopheles spp, anopheles, Gadau

1. Introduction
Environment plays a vital role for the survival of any living organism; the more conducive an environment is the more the reproduction, breeding, and interaction of the organism (Borkent and Grimaldi, 2004) [3]. Mosquitoes are one of the most important pests of public health nuisance with about 3500 species, and transmit disease worldwide. They have worldwide distribution and are found in both tropics and temperate regions of the world.
Containers are perhaps the critical factor that determines the breeding of mosquitoes, because artificial containers are the major larval habitats in and around human habitat. Artificial containers can be trash, tree holes, coconuts, bromeliads, rock holes or fallen leaves (Olson, 2003) [10]. Malaria, transmitted through the female Anopheles mosquito, is one of the diseases causing one third of death among humans all over the world (Onyido *et al.*, 2006) [11].
The control mechanism depends on the type of habitat the mosquitoes are using for depositing eggs. Many species of mosquitoes' use containers of water as egg deposit site and hot humid environments are most amenable to mosquito growth and survival (Rajes *et al*., 2013) [14].
The mosquito transmit disease through the bite of an infective female specie which mainly acquire the virus while feeding on the blood of an infected person, the virus infects the mosquitoes' mid-gut and subsequently spreads to the salivary glands over a period of 8-12 days. After the incubation period, the virus can be transmitted to humans through subsequent probing or feeding, hence they are called day time biters (Bayer, 2016) [2].
Surveillance of mosquito population and their biting activities is therefore a bold step towards providing the baseline information for the control of the mosquitoes and mosquito-borne disease (WHO, 2006) [16].
This study was aimed at determining the Mosquitoes populations and container breeding preferences of mosquitoes by larval survey in Gadau campus of Bauchi State University, Nigeria. Such information would provide a baseline for the effective control programmes in campuses.

2. Materials and Methods
2.1 Study Area
The survey was conducted from September to November 2018 in Gadau Campus ($11^{0'}$ 50' 08"N 10 10 12^{0}"E) of Bauchi State University. The campus is located In Gadau, Itas/Gadau local government area of Bauchi State Nigeria. The town of Gadau is in the east of the L.G.A located at latitude. It has an area of 1,398 km and a population of 229,996 at the 2006 census.

2.2 Survey of breeding sites of mosquitoes
During the survey, all the possible breeding sites were examined and divided into four namely; A, B, C and D for reservoirs; reachable tree holes; colbert; and disposed-off containers respectively.

2.3 Sample collection
Larvae collection was carried out indoors and outdoors by dipping method, using a dipper or pipette depending on location and the container type. The larvae were collected from all the four sites and transferred gently with glass sucking pipette to glass beaker separately for each spot and transported to the laboratory. The number, type and water condition of the containers which serve as a potential breeding site were examined and recorded.

The collected larvae and pupae ware kept in the laboratory for adult emergence (Mulla *et al.*, 1997).

2.4 Larval identification

After counting the total larvae for each collection site, 50% of the collected larvae was killed in 70% alcohol and preserved in glass bottle for the larval identification by using standard keys where 4th instar larva was examined and identified. The remaining 50% of the collected larvae was reared separately for adult emergence for confirmation of identification. The emerged adult was collected then pinned and identified using the standard keys (Oyindo *et al.*, 2008).

3. Results

The results showed 188 mosquitoes were sampled that belong to genera *Anopheles* and *Culex*. From the table 1, the total number of *Anopheles* and *Culex* that were sampled at each site was recorded. Site C has the highest abundance of *Anopheles* (15) while site B has lowest abundance of *Anopheles* (6) and site B has highest abundance of *Culex* (68) while site D has the lowest abundance of *Culex* ((9) mosquitoes.

Table 1: Distribution and abundance of Mosquitoes in Gadau campus

Site	Anopheles	Culex	Total	Abundance (%)
A	11	37	48	25.53
B	6	62	68	36.17
C	15	28	43	22.87
D	9	20	29	15.43
Total	41(21.81%)	147(78.19%)	188	100

The total abundance of *Anopheles* mosquitoes is 21.81%, total abundance of *Culex* mosquitoes is 78.19%.

Out of the 188 mosquitos sampled, 170 of the mosquitoes were separated into male and female *Anopheles* and *Culex*. The table 2 below shows the richness of both male and female *Anopheles* and *Culex* mosquitoes.

Table 2: Richness of Identified Mosquito Species in Gadau Campus

Specie	Number of species	Pi	ln(Pi)	Pi x ln (Pi)
Male *Culex*	51	0.03	-1.20	-0.36
Female *Culex*	78	0.46	-0.78	-0.36
Male *Anopheles*	13	0.08	-2.53	-0.20
Female*Anopheles*	28	0.16	-1.83	-0.29
Total	170			-1.21

The total richness of *Culex* Species is 0.72 and that of *Anopheles* is 0.49. The total species richness H is 1.21 i.e the Shannon diversity index and the species evenness E is 0.87.

4. Discussion

From table 1.0, it is evident that Gadau Campus of Bauchi State University provide habitat for mosquitoes. Site C has the highest abundance of *Anopheles* (15) and site B has highest abundance of *Culex* (68), site B has lowest abundance of *Anopheles* (6) and site D has the lowest abundance of *Culex* (9), this was due to favorable and unfavorable weather conditions attributed to the study sites. During the study, only two genera of mosquito species were identified from table 1.0 which is risk factors in causing dengue and filarial disease (Chitra *et al.*, 2014) [4]

The detection of *Anopheles spp.* (41) in the present study recorded from all the four sites in table 1.0 was in agreement with the report of (Guy and Nirmala, 1991; Godwin *et al.*, 2005) [6, 5], because eggs of *Anopheles* mosquitoes are known to hatch out in small batches as an adaptive strategy for surviving unfavorable environmental conditions. The collection of a larger number of *Anopheles* (15) in site C signifies the arrival of favorable weather conditions for the breeding of *Anopheles* mosquito. The Presence of *Culex spp* and *Anopheles* is worrisome, as these have been earlier identified as potential vectors of yellow fever and other diseases in Nigeria (Oguoma and Ikpeze, 2008).

The detection of *Culex spp.* (147) in the present study from all the four sites in table 1.0 corroborate with the report of (Godwin *et al.*, 2005), *Culex spp.* was reported to be the most important enzootic vector in northeastern United States (Andreadis *et al.*, 2001) [1] and in temperate regions because it is known to feed on both mammals and birds (Spielman, 2001) [15]. *Culex spp.* are responsible in transmitting the filarial worm, *Wuchereria bancroftii* to man of which heavy infection leads to elephantiasis (Iloeje, 2001) [7]. These mosquitoes also bite under tree shades which correspond to the time when many students are having their activities. The preponderance of these *Culex* mosquitoes which are reservoir hosts of filariasis and other Arbo viruses may make the environment uncomfortable for the students' activities (Onyido, 2009).

The small number of larvae of *Anopheles* and *Culex* mosquitoes that hatched into recovered from table 1.0 could be due to harsh dry weather prevalent at the time (Iloeje, 2001) [7] and because most mosquitoes especially the *Anopheles* group survive adverse weather conditions as larvae and there may not be adults to lay their eggs (Onyido 2009) [13].

In table 2., Shannon- Wiener and Simpson's diversity value of (1.21) was recorded for the mosquito species indicating low richness of the mosquitoes due to the prevailing weather condition at that particular time was higher than that reported by Oguoma and Ikpeze, (2008) [12] in Gezawa Agricultural Zones which was (1.10) and highest frequency occurrence was recorded in *Culex spp.* (78.19%) than in *Anopheles spp.* (21.81%) from the total sampling sites, which was not in agreement with the findings of Oguoma and Ikpeze, (2008) [12] where they detected lower frequency occurrence in *Culex spp.* Because *Anopheles* species tend to breed and thrive more during rainy season. The richness of the *Anopheles spp.* (0.49) mosquitoes was found to be lower than that of *Culex spp* (0.72), this is because *Culex spp* prefer pans and containers to oviposit lower to the ground and site C tend to be the most abundant with *Anopheles* mosquito because the artificial container was situated near a tree, since the mosquitoes prefer to oviposit near tree holes this is similar to studies conducted by (Chitra, 2014) [4]. Also, a plastic container is relatively preferred by *Anopheles* and *Culex* species, this is in line with the study by (Godwin *et al.*, 2005) [5].

5. Conclusion and Recommendations

This survey confirms the presence of potential breeding sites for both male and female *Anopheles* and *Culex* mosquitoes in Gadau Campus of Bauchi State University, The abundance and richness of the mosquitoes was high, hence the risk of transmitting diseases is very high.

The University management should organize awareness campaign to educate students on the dangers of mosquitoes bite and how to avoid mosquito bites at least once in an academic session.

Students should maintain proper hygiene by keeping the environment clean through proper disposal of cans of soft drinks which can harbor mosquito larvae. Potential breeding sites of mosquitoes should be treated during routine pest control treatment and proper cleaning of drainage system.

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7. References

1. Andreadis TG, Anderson JF, Vossbrinck CF. Mosquito surveillance for West Nile virus in Connecticut, 2000. Isolation from *Culexpipiens, Cx. restuans, Cx. salinarius* and *Culisetamelanura*. *Emerging Infectious Disease coms*. 2001; 7:670-674.
2. Bayer AH, the War on Mosquitoes. https:// www.research.bayers, 2016.
3. Borkent A, Grimaldi DA. The earliest fossil mosquito (Diptera: Culicidae) in mid-cretaceous Burmese amber. Annals of the entomological Society of America. ISSN 0013-876.:10.1603/0013-8746. 2004; 97(5):882-888
4. Chitra S, Ravindran K, Rajkuberan C, Janagaraj K, Sivaramakrishnan SA *et al* Survey Report on Baseline Data of Mosquito Distribution in Tree Holes of Discrete Ecosystem during Different Seasonal Patterns Academic Journal of Entomology. 2014; 7(2):70-75.
5. Godwin RA, Okogun JC, Anosike AN, Okere BEB. Ecology of mosquitos in midwestern Nigeria. Journal of Vector Borne Disease. 2005; 42:1-8.
6. Guy FR. Nirmala RA. Survey of Peri Domestic Mosquito Species of Jaffna Peninsula in Sri Lanka. Southeast Asian I Trop Med Public Health, Vol 22 No 4, 637–642 Hohnk Gox, Seb, 1991; 78:56-548
7. Iloeje NP. A new Geography of Nigeria. New Revised Edition. Longman Nigeria PLC, Ikeja, 2001.
8. http://www.ispub.com/journal/the_internet_journalof_parasitic_diseases/volume_4_number1 11/26/2009
9. Mulla MS, Jittawadee R, Wichai K, Apiwat T, Prakong P, Usavadee T. Field Trials with Bacillus sphaericus Formulations against Polluted Water Mosquitoes in a Suburban Area of Bangkok, Thailand. Journal of the American Mosquito Control Association. 1997; 13(4):297-304,
10. Olson Jimmy. Mosquito class notes, Texas A&M University. Medical Entomology Class, 2003.
11. Onyido AE, Ezike VI, Nwankwo EA, Ozumba NA. Public health implications of giant trees in the proximity of human dwelling: Tree-hole mosquitoes of Government Reservation Area of Enugu metropolis in south-eastern Nigeria. (2006) Page 140-143. In: Umoh, J. U (Editor), Proceedings of 3rd National Conference of the Society for Occupational Safety and Environmental Health. 8th - 11th November, Main Auditorium, Nnamdi Azikiwe University, Awka, 2006.
12. Onyido AE, Ozumba NA, Ezike VI, Chukwuekezie O. C, Nwosu EO, Nwaorgu OC, Ikpeze OO. *et al* Mosquito Fauna of a Tropical Museum and Zoological Garden Complex, *Animal Research International*. 2008; 5(2):852-858.
13. Onyido AE, Ezike Vl, Ozumba NA, Nwosu EO, Ukpeze OO, Obiukwu MO, Amadi ES. *et al* Crepuscular Man Biting Mosquitoes of a Tropical Zoological Garden in Enugu, South_Eastern Nigeria. The Internet Journal of Parasitic Disease, 2009, 4(1).
14. Rajesh K, Dhanasekaran TBK. Survey of Container Breeding Mosquito Larve (Dengue Vector) In Tiruchirappalli District, Tamil Nadu, India. Journal of Entomolgy and Zoology Studies. 2013; (6):88-91.
15. Spielman A, D`Antonio M. Mosquito: A Natural History of our most Persistent and Deadly Foe. New York: Hyperion. ISBN 978-0-7868-6781-3, 2001.
16. World Health Organisation. Indoor Residual Spraying; Use of Indoor Residual Spraying for Scaling up Global Malarial Control and Elimination; WHO Position Statement world health organisation, 2006.