



ISSN 2320-7078

JEZS 2014; 2 (4): 190-193

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Received: 28-07-2014

Accepted: 12-08-2014

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Human practices- a case in breeding of mosquito vectors in Ekwulobia, Anambra state Nigeria

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Abstract

Mosquitoes are associated with different breeding sites which are both natural and man-made. The survey of mosquito vectors and human practices that encourage their breeding was carried out in Ekwulobia, Anambra State, Nigeria. A total of one thousand, one hundred and eighty-two (1,182) mosquitoes were recovered from the sampled households of four quarters in Ekwulobia. According to the methods of collection were as follows; human bait (85), pyrethrum (102), sweep net (677), and suction tube for those in resting position (323). The mosquitoes sampled were identified by a specialist in the area at National Arbovirus and Vector Research Division, Federal Ministry of Health Enugu, Nigeria. The mosquitoes species involved were, *Culex quinquefasciatus* (69.9%), *Aedes aegypti* (18.1%), *Aedes albopictus* (6.4%), *Anopheles gambiae* (4.1%) and *Mansonia Africana* (1.2%). The abundance of mosquitoes in relation to sex were, females (81.8%) and males (18.2%). Considering the period of survey which was between June–October 2011 the relative abundance of mosquitoes were as follows, August – October collection, *Culex spp* was predominant (724) followed by *Aedes spp* (229) and *Anopheles* (32). In the sampling methods, sweep net was best for *Culex* and *Aedes* while human bait and pyrethrum were good for *Anopheles* and *Mansonia* which were found mostly indoors. Different human practices which favored the breeding of mosquitoes include; fermented cassava (489), farms (102), soak away pits (154), and earthen wares (77). The abundance of mosquito vectors in the four sampled quarters were; Ula (581), Agba (390), Eziagulu (163) and Abogwume (48). Owing to the abundance of mosquitoes in the study area, several preventive/control methods were used to avoid mosquito bites according to oral interview with some inhabitants., spray of insecticide, burning of mosquito coils, use of door and window screens, sleeping under insecticide treated nets, as well as use of herbs, which include, Lemon grass (*Cymbopogon citraus*), Rosemary (*Romarinus officinalis*), Mosquito plant (Citronella) and Neem (*Azadirachta*). This however suggests further study in mosquito surveillance in the area for its grass root control and related diseases.

Keywords: Ekwulobia, Human practice, Mosquito vectors, Breeding, sweep net, Human bait

1. Introduction

Mosquitoes though have worldwide distribution, but are more abundant in the Tropical countries of the world^[3]. They have different breeding grounds with collection of water, which may include tree holes, floor containers, street gutters, abandoned fish ponds, old tiers, forest canopy as well as swamps^[6].

In Western Kenya, the principal vectors of malaria; *Anopheles arabiensis*, *Anopheles gambia sensu stricto* and *Anopheles funestus* are predominant in environment with high humidity and rainfall^[2]. According to Mutuku et al^[5], the larvae of *A. gambia* are found in clear sun lit pools of water, roof prints, road side puddles, irrigation ditches, boreholes and burrow pits.

Different species of mosquitoes are associated with different breeding sites which are both natural and man – made. These are crab holes for *Culex*, *Aedes*, *Anopheles* and *Ocheratatus*^[1], floor containers which include cocoa husks, snail shells and vegetable debris; also for *Culex*^[10], street gutters; *Culicinia* and *Ocheratatus*^[10], to mention but a few.

With the level of development in Nigeria, and literacy among the populace, different breeding grounds for mosquitoes which are man- made abound. These include blocked drainage systems/gutters, cassava fermentation pots/drums, an activity which serve as source of food and income for some farmers, mass production of fish in concrete/wide mouth containers that serve as ponds cited everywhere without proper care, and above all the indiscriminate dumping of refuse , of different sizes, old tiers and discarded containers. The eradication of these practices among the

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inhabitants is very far to be achieved except with stringent measures by the government. This study however, is focused on the surveillance of mosquito vectors and human practices that encourage their breeding grounds in Ekwulobia, an urban community of Anambra State, Nigeria.

2. Materials and Methods

2.1 The study area

The study was carried out in Ekwulobia, an urban community in Aguata Local Government Area, Anambra State Nigeria. The town is located within latitude 6.33° N and longitude 7.08°E. It has a population of 500,000 people (Census, 2006). Ekwulobia is the major commercial city in Aguata, with several agro-based factories. The town is indeed a beehive of activities especially during the festive periods. The inhabitants of Ekwulobia are predominantly farmers, palm wine tappers, traders, civil servants and merchants who are typically Igbos and few immigrants.

2.2 Sample populations

Among the nine villages that make up the town, four villages were randomly selected for the study. The villages selected were Agba Ula, Eziagulu and Abogwume. Ethical consideration was obtained through letters to the heads of the communities and households involved in the study. Assessment of human activities in the villages was done and four households in each of the four communities were randomly selected for collection of indoor

mosquitoes.

2.3 Assessment of mosquitoes in their breeding sites

Mosquitoes were sampled using four methods for the adult stages. These were, pyrethrum knock down method for indoor resting mosquitoes between 6.00am to 8.00am once in a week in the selected households, use of human bait was between 5.00pm to 8.00pm involving 3 volunteers in each household. Sweep net was used to collect mosquitoes from refuse dumps, blocked gutters, soak away pits, fermenting cassava pots, and abandoned fish ponds at weekly intervals. Suction tube was used to collect mosquitoes in their resting position. The mosquitoes collected were isolated into vials labeled according to their breeding sites.

2.4 Identifications

The sampled mosquitoes were identified by a specialist in the area at National Arbovirus and Vector Research Division, Federal Ministry of Health Enugu, Nigeria.

2.5 Statistical Analysis

Data obtained were analysed using Microsoft Excel 7.0 programme. Statistical differences of data were analysed by Chi-square goodness of fit tests. P values < 0.05 were considered statistically significant.

3. Results

Table 1: The prevalence of mosquito species recovered according to the sampling methods from their breeding sites.

Species of mosquitoes					
Method of sampling	<i>Culex</i>	<i>Aedes</i>	<i>Anopheles</i>	<i>Mansonia</i>	Total
Human bait	21	48	12	4	85
Pyrethrum	11	50	27	8	96
Sweep net	501	168	7	1	677
Suction tube	294	26	3	0	324
Total	827	292	49	14	1,182

Among the various methods used in collection of mosquitoes, sweep net had the highest (677), followed by suction tube (324) while the least was human bait (85).

Table 2: The relative abundance of mosquito by sex in their breeding sites.

Breeding sites	Males	Females	Total
Fish pond	02	8	10
Fermenting cassava	80	409	489
Farm land	19	83	102
Discarded container	08	27	35
Lef axils	16	42	58
Blocked gutters	11	61	72
Abandoned tyres	10	28	38
Earthen ware	15	62	77
Refuse dumps	11	22	33
Soak away pit	39	115	154
Indoors	4	110	114
Total	215(18.2%)	967(81.8%)	1,182

In the results above, the females were predominant in the breeding sites as shown in fermenting cassava (409), soak away pit (114) and indoors within human enclosure (114), while in males the highest occurrence was from fermenting cassava(80) and soak away (39).

Table 3: The abundance of mosquito species caught on monthly basis within the period of survey.

Species of mosquito					
Month of survey	<i>Culex</i>	<i>Aedes</i>	<i>Anopheles</i>	<i>Mansonia</i>	Total
June	23	25	22	0	70
July	80	38	10	0	128
August	102	44	10	2	158
September	219	91	5	9	324
October	403	94	2	3	502
Total	827	292	49	14	1,182

The abundance of mosquitoes within the period of survey was more in the month of October (502), September (324). The least were recorded in June (70) and July (128) respectively. In species abundance, *Culex* occurred most (827) across the months and *Aedes* (292). Relative abundance was significant to the months ($P < 0.05$).

Table 4: The relative abundance of mosquito species according to human activities and their breeding sites.

Mosquito species						
Breeding sites	<i>A. albopictus</i>	<i>A. aegypti</i>	<i>A. gambia</i>	<i>Culex</i>	<i>Mansonia</i>	Total
Fish pond	0	3	0	7	0	10
Fermenting cassava	2	8	0	479	0	489
Farm land	6	35	3	58	0	102
Discarded container	2	12	0	21	0	35
Leaf axils	6	10	2	35	5	58
Blocked gutters	5	17	0	48	2	73
Abandoned tyres	8	15	4	11	0	38
Earthen ware	22	32	1	20	2	77
Refuse dumps	6	11	3	12	1	33
Soak away pit	5	51	0	98	0	158
Indoors	16	20	44	38	3	113
Total	78(6.6%)	214(18.1%)	49(4.2%)	827(69.9%)	14(1.2%)	1,182

In the table, *Aedes* and *Culex* occurred in all the breeding sites, with *Culex quinquefasciatus* occurring most (69.9%), followed by *Aedes aegypti* (18.1%), while the least was *Mansonia* (1.2%). The relationship between the breeding sites and species occurrence was significant, $P < 0.05$.

Table 5: The Distribution of mosquito vectors among the four quarters in Ekwulobia

Species of Mosquito					
Location	<i>Culex</i>	<i>Aedes</i>	<i>Anopheles</i>	<i>Mansonia</i>	Total
Ula	418	125	28	10	581
Agba	326	55	7	2	380
Eziagulu	64	88	9	2	163
Abogwune	19	24	5	0	48
Total	827	292	49	14	1182

In the distribution of mosquito vectors in the sampled quarters, Ula and Agba had the highest occurrence; 581 and 380 respectively, while Abogwune was the least; 48

4. Discussion

The eradication of malaria and its allied diseases transmitted by mosquito are not easy to come by, this is because of some human activities though encourage their breeding, but is more or less the source of livelihood for man. In the study carried out in Ekwulobia, the most mosquito vector worldwide recorded, which were *Culex*, *Aedes*, *Anopheles* and *Mansonia* were observed. These species are known for transmission of pathogens of various debilitate diseases such as *Wuchereria bancrofti* known for elephantiasis during heavy infection [11], *Aedes aegypti* and *Aedes albopictus* for Yellow fever. According to WHO [8], *Aedes albopictus* have been reported to be the most efficient malaria vector worldwide. Considering the results obtained in this study according to relative abundance of mosquito species, *Culex quinquefasciatus* (69.9%), *Aedes*

aegypti (18.1%), it could be said that individuals in Ekwulobia are susceptible to the diseases transmitted by these mosquitoes if investigated. Their abundance can be attributed to the human activities that encourage their breeding in the area. The role of soak away pits, fermented cassava and farm land as the major breeding sites is confirmed by the work of Iwuala [4].

The months of August to October recorded the highest number of *Culex* and *Aedes*, this probably indicates the peak of their breeding period which could be targeted in their control. The peak of rainy season supports pockets of dirty water with much pollution, this supports profuse breeding in *Culex* [7]. The effective way for mosquito vector sampling from their breeding sites is done with sweep net and suction tube, these will allow their being picked intact without dismembering them for easy identification. Anopheline are best collected using human bait and pyrethrum since they are indoor dwellers.

5. Conclusion and Recommendations

From the results obtained in this study, it can be concluded that elimination of mosquito vectors and their allied diseases is quite difficult to be desired, this is because of the level of illiteracy and poor hygienic practices in the rural communities. This will require much funding to bring the populace to the required state as obtained in developed world. If wishes were horses, one would recommend the following practices;

- Education of masses in the rural set up on the effect of their practices that encourage the breeding of these vectors which are detrimental to their health.
- Prevention of blocked drainage systems by dumping of refuse.
- Proper construction of sucker away pits to prevent influx of mosquitoes through the aerial ventilated windows.

- Planting of mosquito repellent herbs around homes, as ornamental plants such as; lemon grass, Rosemary, mosquito plant and a host of others.

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