

An Investigation of the Methods of Self-Protection against Mosquito Bites in Ogbaru Local Government Area of Anambra State, Nigeria.

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Abstract: This study on the self-protection methods against mosquito bites in Ogbaru Local Government Area of Anambra State Nigeria was carried out between January and July 2009. Ogbaru LGA is located by the banks of the River Niger and is over-flooded for the most part of the year. Iyiowa-Odekpe, Ogbe-Ukwu, Okpoko and Atani were the communities selected for the study. Two hundred structured questionnaires (50 per community) were used to collect the respondents personal data and their methods of self-protection against mosquito bites. All the respondents claimed they were bitten by the mosquitoes daily but differed on the frequency of bites per day. 42.1% of the respondents were unable to determine the number of mosquito bites they received in a day. Eleven different self-protection methods against mosquito bites were identified. Spraying insecticides in the houses and screening of doors and windows were rated 51-100% effective and were practiced by only 21.05% and 22.60% of the respondents respectively. Insecticide treated bed nets were rated 51-100% effective but were used by only 7.9% of the population. Employment of smokes from logs of wood and fresh herbs and putting of aromatic herbs on the windows, vents and corners of the house were effective but fraught with problems. The nature and variety of self-protection methods against mosquitoes deputed poverty and ignorance to appropriate methods of mosquito control. Suggestions were made for health education of the people on proper protective methods against mosquitoes and the government special assistance in the procurement of insecticide treated nets as well as environmental sanitation and modifications.

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1. Introduction

Mosquitoes (Order Diptera; Family Culicidae) are blood-sucking insects. They are ubiquitous in distribution, breeding in stagnant water pools found in both artificial containers and natural depressions on the earth's surface as well as in rock pools, tree holes and plant leaf axils (Service, 1980). They are strong fliers with long stylet-shaped proboscis for piercing the skin of their hosts and sucking blood. They hunt for their hosts both indoors and outdoors (Gordon and Lavoipierre, 1976).

Mosquitoes are viscous biters and their bites constitute biting nuisance, allergic reactions, skin irritations, scratching, restlessness and sleepless nights. (Amusan *et al.*, 2003, Onyido *et al.*, 2009a). Some bite during the day while others bite during the night or at both night and day periods. Through their blood sucking habits, they act as vectors of a variety of human pathogens including viruses, bacteria, protozoa and helminthic diseases. They transmit to man such deadly diseases as malaria, yellow fever, filariasis,

dengue and various forms of viral encephalitis (Ukpai and Ajoku, 2003). The anopheles mosquitoes especially, *Anopheles gambiae*, transmit malaria and filariasis. The aedes mosquitoes particularly *Aedes aegypti*, *A. albopictus*, *A. africanus*, *A. luteocephalus* and *A. simpsoni*, transmit yellow fever, dengue, haemorrhagic fevers and various forms of viral encephalitis. The culex mosquitoes particularly *Culex quinquefasciatus* are very important transmitters of filarial worms especially *Wuchereria bancrofti* which causes elephantiasis. They also transmit various forms of viral encephalitis (Onyido *et al.*, 2009b).

Mosquitoes also bite livestock and transmit some animal diseases like fowl pox disease of poultry, myxomatosis of rabbits, rift valley fever of sheep, encephalitis of horses and heartworm disease of dogs (Service, 1980).

All these diseases cause high death toll on both human and animal populations and lead to poor socio-economic development of many countries. Consequently various control measures have been

targeted against mosquitoes in order to control their populations, reduce their biting rates and disease transmission to both humans and livestock. Important control measures directed against mosquitoes include chemical insecticides, insecticide treated bed nets, screening of doors and windows with mosquito nets, drainage of poodles and filling of depressions and swamps (Ozumba *et al.*, 2009). Unfortunately due to poverty and ignorance most of these measures are restricted in use to the elites. The study therefore seeks to find out how people in rural communities especially the people of Ogbaru Local Government Area of Anambra State protect themselves against mosquito bites and disease transmission.

2. Materials and Methods

Study Area

Ogbaru is one of the 21 Local Government Areas of Anambra State, South-East, Nigeria. Ogbaru is bounded to the north by Asaba in Delta State, to the east by Onitsha in Anambra State and to the west by the River Niger. It is located between latitudes 5^o and 6^o25'N and longitudes 7^oE and 8^oE. The vegetation of the area are mostly rainforest and derived savanna vegetation with annual rainfall ranging from 2000mm - 3000mm. It has two marked seasons. The dry season which comes up from November to March and the wet season which comes up from April to October. Ogbaru is located in the trough of River Niger basin. It is flooded for most part of the year with water-logged terrain which makes it a suitable breeding ground for different species of mosquitoes. The people of Ogbaru are mostly fishermen, farmers, civil servants and businessmen. The population of Ogbaru is about 10,000 with Okpoko having the highest population of about 3000 people. The study communities were Atani, Iyiowa-Odekpe, Ogbe-Ukwu and Okpoko. The four communities were selected because of their accessibility in most periods of the year.

Questionnaire Administration

The distribution of the questionnaire was done at Iyiowa-Odekpe, Atani, Okpoko and Ogbe-Ukwu communities. A total of two hundred questionnaires (50 per community) were distributed but only one hundred and ninety were properly filled and returned. Some of the questionnaires were distributed at the various markets located in the four towns while others were distributed through house visits. Some of the people were not co-operative but were enlightened on the purpose of the study. The illiterate ones among the respondents were interviewed and helped in filling their questionnaire. However care was taken to avoid providing clues to the answer of any of the questions. The questionnaire sought for information on the

personal data of the respondents and the various methods the people used to protect themselves from mosquito bites.

Herbs Collection and Identification

The herbs identified as mosquito repellents were collected with the help of the respondents. The herbs were identified with the help of a botanist, Dr. R.N. Okigbo, of the Department of Botany, Nnamdi Azikiwe University, Awka.

3. Results

The frequency of mosquito bites on the people of Ogbaru LGA is shown in table 1. Seventeen people (8.95%) claimed that they were bitten once daily by mosquitoes. Twenty-five people (13.16%) claimed they were bitten twice daily by mosquitoes, 26(13.68%) claimed they were bitten 3 times daily, 42(22.11%) claimed they were bitten above 3 times daily and 80(42.11%) said they did not know the number of times they were bitten by mosquitoes. All the respondents claimed they were bitten by the mosquitoes daily but varied in the frequency of mosquito bites.

Eleven different methods of self-protection against mosquito bites were identified from the four communities (table 2). These were covering oneself with wrapper 28(14.74%), wearing of long sleeve shirts and trousers 6(3.16%), robbing kerosene 1(0.53%), putting nets on doors and windows 43(22.6%), sleeping under insecticide treated nets (ITN) and non-treated nets 11(5.80%) each, spraying of insecticides in the rooms 40(21.05%), burning mosquito coil 12(6.32%), using smoke from logs 8(4.21%), putting fresh leaves or herbs on windows 27(14.21%) and placing orange peels on top of a lighted lamp 3(1.58%). Screening of doors and windows with mosquito nets 43(22.60%) was the most practiced method followed by spraying of insecticides inside the houses 40(4.05%) and covering oneself with wrapper 28(14.74%).

Table 3 shows the effectiveness ratings of the self-protection methods against mosquito bites. Out of 190 respondents, 139(73.2%) scored the various methods above 50%, 29 people (24.56%) scored 51-80% for putting nets on the doors and windows, 40 people (28.9%) scored 51-100% for spraying insecticides inside houses, 11 people (7.9%) scored 51-100% for use of insecticide treated bed nets, 10 people (7.2%) scored 41-60% for covering oneself with wrapper, 24 people (17.3%) scored 51-100% for using botanicals (scent leaf, bush tea etc), 12 people (8.6%) scored 61-90% for use of mosquito coil, 8 people (5.8%) scored 61.90% for using smoke, 2 people (1.4%) scored 61-70% for putting orange peels on top of lighted lamps and 3 people (2.2%) scored 51-100%

for rubbing kerosene. Among these methods, spraying of rooms with insecticides was considered most effective by the people followed by the screening of windows and doors with nets and the use of botanicals on the vents.

In table 4 six respondents (22.22%) rated the method of putting scent leaf (*Ocimum gratissimum*) on the windows and corners of their rooms, 41-100% effective, 11 respondents (40-74%) rated using the leaf

of bush tea (*Hyptis suaveolens*) 51-100% effective, 6 respondents (22.22) rated using lemon grass, *Cymbopogon citractus* 41-70% effective and 4 respondents rated using neem leaf, (*Azadirachta indica*), 41-100% effective. From the results, the rate of effectiveness of the different herbs varied but the bush tea, *Hyptis suaveolens* (40.7%) was the most widely used.

Table 1: Frequency of mosquito bites on the people of the four different communities of Ogbaru LGA.

	Communities					
	Iyiowa-Odekpe	Okpoko	Ogbe-Ukwe	Atani		
Once daily	2	3	7	5	17	8.95
Twice daily	8	3	10	4	25	13.68
Three times daily	5	3	5	13	26	13.68
Above three times	6	12	14	10	26	22.11
Not known	20	20	22	18	80	42.11
Total	41	41	58	50	190	100

Table 2: The various methods of self-protection against mosquito bites in the four communities of Ogbaru LGA, Anambra State.

		Communities					
		Iyiowa-Odekpe	Okpoko	Ogbe-Ukwu	Atani		
1	Covering oneself with wrapper	11	3	8	6	28	14.74
2	Wearing long shirts and trousers	-	1	2	3	6	3.16
3	Rubbing kerosene	-	-	1	-	1	0.53
4	Screening doors and windows with nets	11	11	11	10	43	22.60
5	Sleeping under net without insecticide	5	3	1	2	11	5.80
6	Sleeping under insecticide-treated net	4	3	3	1	11	5.80
7	Spraying insecticide inside the house	12	10	10	8	40	21.05
8	Burning mosquito coil	2	4	3	3	12	6.32
9	Using smoke from smouldered leaves & logs	1	2	2	3	8	4.21
10	Putting herbs on windows and vents	4	6	7	10	27	14.21
11	Putting orange peels on lighted lamp	-	-	2	1	3	1.58
	Total	50	43	50	47	190	100

Table 3: The effectiveness of the different methods of self-protection by the people of Ogbaru LGA, Anambra State.

	Effectiveness rating							
	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%		
Putting nets on doors and windows	13(7.60%)	9(5.26%)	8(4.68%)	12(7.02%)	-	-	29	20.9
Spraying insecticides	-	3(1.75%)	8(4.68%)	5(2.92%)	21(12.28%)	3(1.75%)	40	28.8
Use of insecticide treated nets	-	1(0.59%)	-	1(0.59%)	-	9(5.26%)	11	7.9
Covering oneself with wrapper	15(8.77%)	10(5.85%)	-	-	-	-	10	7.2
Use of botanicals (scent leaf, bush tea, lemon grass)	3(1.75%)	2(1.17%)	8(4.68%)	5(2.92%)	1(0.59%)	8(4.68%)	24	17.3
Use of mosquito coil	-	5(2.92%)	3(1.75%)	1(0.59%)	3(1.75%)	-	12	8.6
Using smoke	-	-	4(2.34%)	-	4(2.34%)	-	8	5.8
Orange peels on lighted lamp	1(0.59%)	-	2(1.17%)	-	-	-	2	1.4
Rubbing kerosene	-	1(0.59%)	-	-	1(0.59%)	1(0.59%)	3	2.2
Total	32	31	33	24	30	21	139	100

Table 4: Local herbs used as repellents and their perceived effectiveness by the people of Ogbaru L.G.A., Anambra State.

			Effectiveness Rating of the herbs (%)						
			41-50	51-60	61-70	71-80	81-100		
<i>Ocimum gratisimum</i>	Scent leaf	Nchuanwu	1	1	-	3	1	6	22.2
<i>Hyptis suaveolens</i>	Bush tea	Ogwuanwu	-	1	2	7	1	11	40.74
<i>Cymbopogon citrates</i>	Lemon grass	Achala isioma	1	-	5	-	-	6	22.22
<i>Azadirachta indica</i>	Neem leaf	Dogon yaro	1	-	-	3	-	4	14.85
Total			3	2	8	14	-	27	100%

4. Discussion

All the respondents in the study indicated that they were always bitten by the mosquitoes daily but differed on the frequency of bites per day. Ogbaru Local Government Area is located on the banks of River Niger and is therefore over-flooded by the river

in most parts of the year especially during the wet season. The regular flooding of the area makes it waterlogged with water pools around most homes. These water pools and swamps form excellent breeding grounds for various mosquitoes species which bite the people. Earlier WHO (1996) noted that the abundance

of mosquitoes in an area is due to the availability of their breeding sites. These mosquito breeding habitats vary from large and usually permanent water collections such as fresh water swamps, marshes, rice fields and burrowing pits (Igbinsosa, 1989 and Mafana *et al.*, 1998). Service (1980) also observed that unpolluted ground water pools are excellent breeding grounds for *Anopheles gambiae* mosquitoes. It is therefore likely that the intense mosquito bites in the area is associated with the ecological conditions in the area especially water-logged terrain and favourable tropical temperature, rainfall and relative humidity that encourage rapid development of the mosquitoes.

About 42.1% of the respondents in the study could not determine the number of mosquito bites they received in a day but only noticed they were bitten through the bite marks left on their bodies. Service (1980) observed that in nature, some people are more attractive to biting insects than others and consequently receive more bites but they may possess a high degree of immunity so that they do produce little or no reaction and are therefore largely unaware they have been bitten. In contrast, other people may receive relatively few bites but because of intense allergic reactions, they are more aware of being bitten. Service (1980) further stressed that in the alternative, a person not previously bitten by a particular insect may show little immediate or delayed reactions after the first few bites but thereafter due to sensitization bites, the person may produce firstly a delayed and then an immediate reaction. Then if the person becomes continually exposed to the bites of the insect, the person may develop immunity and show very little delayed reaction and finally no reaction. It is therefore likely that most of the respondents have natural immunity to mosquito bites and do not recognize when they have been bitten or have acquired immunity due to constant exposure to mosquito bites.

Eleven different self-protection methods against mosquito bites were identified from the respondents. The preponderance of a variety self-protections mechanisms against mosquito bites by the respondents is an affirmation of their claims of being bitten by the mosquito always and also an indication of the peoples efforts to protect themselves from mosquito nuisance and disease transmission. Apart from fleeting the houses with insecticides, screening of the doors and windows and sleeping under insecticide treated nets which are standard and harmless methods, other methods of self-protection against the mosquito bites could be said to be poor, ineffective and cumbersome to practice. This could probably be due to ignorance, poverty and lack of health education on the best-methods of protection against mosquitoes and mosquito-borne diseases (Okigbo and Igwe, 2007; Ozumba *et al.*, 2009). The use of mosquito nets to

screen the windows and doors is a commendable effort because it is effective, longlasting, environmentally friendly cost effective, available and protects the whole family. Olufemi *et al.*, (2008), in a similar study on the self-protection practices against mosquito bites among the students of tertiary institution at Olabisi Onabanjo University, Ago-Iwoye in Ogun State, Nigeria, observed that 92.4% of the students used mosquito nettings on their windows and doors. This could be encouraged among the people of Ogbaru LGA as it is one of the recommended methods of reducing mosquito-man contact (Gordon and Lavoipiene, 1976; Service 1980).

Insecticide-treated bednets which has been proved effective (Snow *et al.*, 1988, Sexton *et al.*, 1990) and adopted by the Roll Back Malaria Programme (RBM, 2000) was rated effective but used by only 7.9% of the respondents. This is not encouraging, perhaps due partly to the low coverage of the people by the net distribution agents of the government or in part because the people do not use it due to hot weather conditions (Sexton *et al.*, 1990).

Putting of fresh herbs on the windows, doors and corners of the house was rated 51-100% effective and used by 14.21% of the respondents Paalson and Jaenson (1998) recognized that certain tropical plants reduce mosquito biting activity when used as repellents but this needs repeated replacement because once the herbs get dry, they become ineffective.

Among the herbs used as repellents, *Hyptis suaveolens* (bush tea), a strongly aromatic annual herb (Okezie *et al.*, 1980) was rated 51-100% effective by 14.2% of the respondents who use it. This is a freely growing wild plant, easily available, effective and acceptable by the people. Wright (1975) observed that the aroma which exudes from the botanicals repel mosquitoes but once it gets dry, the leaf becomes useless as a repellent.

The use of smokes from logs of woods and fresh herbs was rated 61-90% effective and used by 4.2% of the respondents. Although this method is considered effective by the respondents, it is associated with some side effects including respiratory disorders and therefore needs to be discouraged (Okezie *et al.*, 1980).

Inspite of the large number of self-protection methods used by the people, most of these methods especially covering oneself with wrapper, rubbing kerosene and use of smoke are inadequate and even harmful to the body. Effective methods like sleeping under insecticide treated nets, fleeting the rooms with insecticide, screening of the doors and windows are standard methods that are highly recommended but are used by an insignificant percentage of the population. This could be attributed to ignorance, poverty and the high cost of these methods. It is therefore suggested

that health education to improve the peoples knowledge on mosquito nuisance and disease transmission and effective methods of controlling mosquitoes should be extended to the communities. Also because of the special water-logged terrain and swamps in the area, it might be necessary to help the people through a special programme of insecticide treated bednet distribution, environmental modification and sanitation.

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