Studies on the Prevalence, Knowledge, and Practices Toward Malaria in Owerri West Local Government Area of Imo State, Nigeria.

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Abstract

The present study was designed to assess malaria prevalence in cluster households, knowledge, and practices of people towards malaria, as well as the extent of coverage of Government's distribution of Long Lasting Insecticide Treated Nets (LLITN) using cluster samples in Owerri West L.G.A. of Imo State Nigeria. Ethical clearance for the study was obtained from the University Research Ethics Committee, Local Government Health authorities as well as from the heads of respective households used in the study. Malaria parasitemia was determined using rapid diagnostic test kit ((ICT COMBO, Core Diagnostic, U.K). Other data was collected using pre- tested questionnaires from the adults in each household sampled. Analysis of 16 household clusters revealed 25.7% prevalence of malaria. More males (27.5%) than females (24.3%) subjects investigated had malaria infection. Teenagers (10-19yrs) had the highest malaria prevalence rate and were followed by Children aged 0-9years. A significantly higher percentage (79.8%; $p<0.05$) of the households knew that mosquito bites transmit malaria. Other factors linked to malaria included drinking of dirty water (12.4%) and eating too much oil (8.9%). Fifty-eight percent of the households knew that insecticide treated nets can be used to prevent mosquito bite, while 3.4% of them reported to use such nets. Only 6.7% of the households had Long Lasting Insecticide Nets distributed by the State government. A highly significant percent (80.9%) ($p<0.05$) of the households did not have the LLIN. These results suggest that the cluster method could indeed serve to estimate the prevalence of malaria with reasonable precision and may also be used to demonstrate as well as predict the reduction in prevalence of malaria and most common diseases. The cluster method in addition, could be used to enhance awareness campaigns on malaria control especially with regards to the improvement in the distribution and actual utilization of the Long Lasting Insecticide Treated Nets in the study area.

Keywords: Cluster sampling, Malaria, Prevalence, Knowledge, Practices, Long lasting Insecticide Treated Nets

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1.0 Introduction

Despite the continued progress made so far towards meeting the Millennium Development goals on malaria control, the mortality and debilitating effect of malaria in Nigeria and other sub-Saharan African countries has continued to be of serious concern. According to the World Malaria Report (1), there were an estimated 216 million episodes of malaria and 655,000 malaria deaths in 2010. Of these numbers, approximately 174 million (81%) and 600,000 (91%) of cases and deaths, respectively were in the African Region (1). Malaria is holoendemic in Nigeria with greater intensity during the wet season than the dry season, and with fifty percent of the population experiencing at least one episode of malaria each year (2,3).

Previous reports of malaria burden in Imo State and in Nigeria at large were those done using selected groups. These groups among others include pregnant women attending antenatal, normadic migrants, school children, coastal dwellers, and out patients(4,5,6,7,8). No documented report has been made on the application of cluster survey in investigating malaria in Owerri West L. G. A. of Imo State, Nigeria. Cluster survey technique have been developed and used to determine vaccine coverage of populations. It has also been applied in the detection of poliomyelitis and

neonatal tetanus (9,10). This paper is the report of a study on the application of cluster sampling method in estimating malaria burden as well as the knowledge and practices of the study population towards malaria in parts of eastern Nigeria.

2.0 Materials and Methods

2.1 Study Area:

Owerri West Local Government Area of Imo State, south-eastern Nigeria located between latitude $5^0 31^1$ and $6^0 27^1$ and longitude $7^0 00^1$ and $7^0 05^1$ of the Greenwich meridian. The areas studied were rural communities with thick vegetation and a daily temperature of between 20^0C to 30^0C. The annual rainfall and humidity were relatively high. The inhabitants were predominantly farmers.

The study comprised of 16 randomly selected village clusters which are enumeration Areas as mapped out during the 2005 National census by the National Population Commission. One thousand, two hundred and sixteen persons made of 526 males and 692 females were sampled in 356 households .

2.2 Malaria test: Capillary blood samples were collected from finger-pricked blood and sole-pricked blood in infants between 0-12 months. On the spot (field) test for malaria was carried out using Rapid Diagnostic Test kit (ICT COMBO, Core Diagnostic, U.K) for detection of *Plasmodium falciparum* and pan malaria antigen Pf/Pan for non-*falciparum* species.

Heads of households, the caregivers as well as all adults aged 18 years and above in each house hold were interviewed using designed pre-tested questionnaires on Knowledge, and Practices towards malaria as well as on the coverage of distribution of LLIN by the State Ministry of Health.

2.3 Data analysis: Data collected were analyzed using descriptive statistics and variations were tested using *chi*-square. The significance level was fixed at $p<0.05$.

4.0 Results

4.1 Prevalence Of Malaria

The sex and age related prevalence of malaria is illustrated in table 1. A total of 1216 individuals were involved in the study and were tested for malaria parasitemia. Out of this number, 312 (25.5%) were positive for malaria by rapid diagnostic test. Though Rapid Diagnostic Test can detect previous infection, its ability to detect all stages of *Plasmodium* infection informed the usage of its results in the descriptive analysis of the study results.

Table 1: Prevalence of Plasmodium spp. parasite in Owerri West L.G.A by age and sex from RDT results

	MALE		FEMALE		TOTAL	
Age group Years)	**No. examined**	**No. (%) infected**	**No. examined**	**No. (%) infected**	**No. examined**	**No. (%) infected**
0-9	180	64 (35.6)	216	92 (42.6)	396	156 (39.4)
10-19	104	44 (42.3)	108	44 (40.7)	212	88 (41.5)
20-29	68	16 (23.5)	112	8 (7.1)	180	24 (13.3)
30-39	52	12 (23.1)	84	4 (4.8)	136	16 (11.8)
40-49	36	8 (22.2)	48	0 (0.0)	84	8 (9.5)
50-59	32	0 (0.0)	68	8 (11.8)	100	8 (8.0)
60-69	20	0 (0.0)	24	8 (33.3)	44	8 (18.2)
70-79	16	0 (0.0)	16	0 (0.0)	32	0 (0.0)
80-89	16	0 (0.0)	16	4 (25.0)	32	4 (12.5)
Total	**526**	**144 (27.5)**	**692**	**168 (24.3)**	**1216**	**312 (25.5)**

Male and Female subjects investigated had 27.5% and 24.3% prevalence rates, respectively. The difference in sex-related prevalence was not statistically significant ($p>0.05$). The highest prevalence (41.5%) was found in teenagers (10-19 yrs of age) and the lowest (0%) was in subjects aged 70-79yrs.

There was a significant difference in age-related prevalence ($p<0.05$) (Table 1).

Among the clusters investigated, *Plasmodium* infection was highest (44.0%) in Obegwu Okuku infecting 100 persons (cluster 1) while no person was infected (0%) in Umuokpo. There was no significant difference in malaria infection of individuals in the clusters sampled ($p>0.05$) (Table 2)

Table 2: Cluster prevalence of *Plasmodium spp*. parasite in Owerri West L.G.A. from RDT results

Cluster Name	Number examined	Number infected (%)
Obegwu-Okuku	100	44 (44.0)
Ohohii-Ohii	108	36 (33.3)
Umueju Umuoma	68	16 (23.5)
Umunnali Umuoma	68	8 (11.8)
Umuoyo Irete	108	12 (11.1)
Umuokpiri Orogwe	60	12 (20.0)
Oforola	76	16 (21.1)
Umuelem Ihiagwa	64	28 (43.8)
Umuanunu Obinze	104	40 (38.5)
Umuike Amakohia-Ubi	68	28 (41.2)
Umuerim Nekede	48	8 (16.7)
Okwu ext. Umuoma Nekede	92	16 (17.4)
Umuiwuala Okolochi	48	20 (41.7)
Umuchima Ihiagwa	100	20 (20.0)
Umucheche Emeabiam	52	8 (15.4)
Umuokpo	52	0 (0.0)
Total	1216	312 (25.7)

4.2 **Knowledge On Symptoms and Signs Of Malaria**

The result revealed that individuals in 248 (69.7%) of 356 households sampled in the clusters knew that fever is a major symptom of malaria. Other symptoms and signs that household clusters associated with malaria include feeling cold (21.3%), headache (41.6%), body weakness (21.3%), vomiting (12.4%) and loss of appetite (19.1%). The result showed that 4.5% of the household clusters did not know the symptoms and signs of malaria. Only 2.2% attributed seizure/convulsion and salty tasting palms to malaria. Households in cluster 3 (Umueju, Umuoma) showed a better understanding of symptoms of malaria (Table 3).

Table 3: Responses of participants in household clusters on symptoms and signs of malaria

Cluster Name	No. of House-holds	Fever	Feeling cold	Body weakness	Vomiting	Loss of appetite	Diarrhea	Headache	Pale eyes	Seizure/ convulsion	Joint/ body pains	Dizziness	Don't know
egwu-Okuku (40.0)	20 0	20(100)	8 (40.0)	8 (40.0)	0	4 (20.0)	0	4 (20.0)	0	0	4 (20.0)	8	
Ohohiii-Ohii (14.3)	28 0	28 (100)	8 (28.6)	12 (49.2)	12 (49.2)	4 (14.3)	0	0	8 (28.6)	8 (28.6)	12 (42.9)	4	
Umueju-Umuoma (28.6)	28 0	24 (85.7)	14 (57.1)	20 (71.4)	4 (14.3)	4 (14.3)	0	4 (14.3)	0	4 (14.3)	8 (28.6)	8	
Umunnali-Umuoma 0 0	24	20 (83.3)	0	16 (66.7)	0	4 (16.7)	0	4 (16.7)	0	8 (33.3)	16 (66.7)		

Umuoyo-Irete	24	8 (33.3)	4 (16.7)	12 (50.0)	8 (33.3)	4 (16.7)	0	4 (16.7)	0	0	8 (33.3)	8 (33.3) 4 (16.7)
Umuokpiri-Orogwe	20	12 (60.0)	4 (20.0)	4 (20.0)	8 (40.0)	0	0	0	0	0	12 (60.0)	0 4 (20.0)
Oforola	16	0		0	0	0	4 (25.0)	4 (25.0)	8 (50.0)	0	0	0 4 (25.0)
Umuelem-Ihiagwa	12	4 (33.3)	0	4 (33.3)	0	4 (33.3)	0	0	0	0	0	0 4 (33.3)
Umuannau-Obinze	28	28 (100)	0	8 (28.6)	8 (14.3)	0	4 (14.3)	0	0	0	16 (57.1)	0 0
Umuike-Amakohia-Ubi	24	12 (66.7)	4 (16.7)	8 (33.3)	0	0	0	0	0	4 (16.7)	16 (66.7)	0 0
Umuerim-Nekede	24	20 (83.3)	4 (16.7)	4 (16.7)	0	8 (33.3)	0	0	0	0	12 (50.0)	0 0
Okwu ext.-Umuoma-Nekede	24	8 (33.3)	0	12 (50.0)	0	16 (66.7)	0	0	0	4 (16.7)	16 (66.7)	0 0
Umuiwuala-Okolochi	16	12 (75.0)	12 (75.0)	4 (25.0)	0	0	0	0	0	0	4 (25.0)	0 0
Umuchima-Ihiagwa	24	8 (33.3)	4 (16.7)	8 (33.3)	4 (16.7)	4 (16.7)	4 (16.7)	0	0	4 (16.7)	16 (66.7)	0 0
Umucheche-Emeabiam	24	20 (83.3)	8 (33.3)	12 (50.0)	4 (16.7)	8 (33.3)	0	0	0	8 (33.3)	4 (16.7)	0
Umuokpo	20	12 (60.0)	4 (20.0)	4 (20.0)	0	4 (20.0)	4 (20.0)	0	0	0	4 (20.0)	4 (20.0) 0
Total	**356**	**248 (69.7)**	**76 (21.3)**	**149 (21.3)**	**44 (12.4)**	**68 (19.1)**	**16 (4.5)**	**24 (6.7)**	**8 (2.2)**	**40 (11.2)**	**148 (41.6)**	**40 (11.2) 16 (4.5)**

4.3 **Knowledge on Etiology Of Malaria**

The response on the knowledge of malaria etiology revealed that inhabitants in significantly high percentage (79.8% i.e 356/284) of the village clusters knew that malaria is transmitted through mosquito bite. Other factors linked to malaria included drinking dirty water (l2.4%), eating too much oil (8.9%), and stress (3.4%). Some households (3.4%) believed that malaria is infectious and about 11.2% of the households were unaware of the etiology of malaria (Table 4).

Table 4: Responses of participants in Household clusters on causes of malaria

Cluster Name	No. of House-holds	Mosquito bite	Too much oil	Drinking dirty water	Infectious food	Contaminated Harmattan	Stress environment	Cold/ Smoking	Dirty Alcohol/ Don't know
Obegwu-Okuku	20	20 (100)	8 (40.0)	4 (20.0)	0	0	0	0	0 8(40.0)
Ohohii-Ohii	28	28 (100)	12 (42.9)	4 (14.3)	0	0	0	4 (14.3)	0 0
Umueju-Umuoma	28	16 (57.1)	0	0	8 (28.6)	0	0	0	0 8(28.6)
Umunnali-Umuoma	24	16 (66.7)	0	4 (16.7)	4 (16.7)	0	4 (16.7)	0	0 4 (16.7) 4(16.7)
Umuoyo-									

Irete	24	20 (83.3)	0	8 (33.3)	0	8 (33.3)	0	0	4	(16.7)
0 0										
Umuokpiri-Orogwe	20	16 (80.0)	0	0	0	4 (20.0)	0	0	4	(20.0)
04(20.0)										
Oforola	16	12 (75.0)	0	4 (25.0)	0	0	4 (25.0)	0	4	(25.0)
04(25.0)										
Umuelem-Ihiagwa	12	4 (33.3)	0	0	0	0	0	4 (33.3)	4 (33.3)	0 0
Umuannau-Obinze	28	24 (85.7)	4 (14.3)	0	0	0	0	0	4	(14.3)
0 0										
Umuike-Amakohia-Ubi	24	20 (83.3)	0	0	0	0	0	0		
4 (16.7)	0	8(33.3)								
Umuerim-Nekede	24	24 (100)	0	4 (16.7)	0	0	0	0	4	(16.7)
0 0										
Okwu ext.-Umuoma-Nekede	24	16 (66.7)	4 (16.7)	8 (33.3)	0	0	0	0	4	(16.7)
04(16.7)										
Umuiwuala-Okolochi	16	12 (75.0)	0	0	0	0	0	0	0	
04(25.0)										
Umuchima-Ihiagwa	24	16 (66.7)	0	4 (16.7)	0	0	4 (16.7)	0	0	
0 0										
Umuchieche-Emeabiam	24	24 (100)	4 (16.7)	4 (16.7)	0	0	0	0	0	
0 0										
Umuokpo	20	16 (80.0)	0	0	0	0	0	0	4	(20.0)
0 0										
Total	356	284 (79.8)	32 (8.9)	44 (12.4)	12 (3.4)	12 (3.4)	12 (3.4)	8 (2.2)	36 (10.1)	4
(1.1)	40(11.2)									

4.4 **Knowledge about Protection Against The Mosquito Vector**

Approximately 58% of the households sampled in the clusters knew that insecticide-treated nets can be used to protect mosquito bite. Keeping environment neat, taking preventive medicine, spraying house with insecticides and burning of leaves had 21.3%, 12.4%, 11.2% and 2.2% household responses respectively as means of protecting against mosquito bite. Furthermore, 11.2% of the households did not know how to protect themselves from mosquito (Table 5).

Table 5: Responses of participants in household clusters on knowledge about protection against malaria

Cluster Name	No. of Households	Use of repellants	Mosquito smoking	Use coil	Avoid mosquito nets	Don't know	Spray house with insecticides	Burn leaves	Cut grasses	Don't drink dirty water	Avoid mosquito bite	Keep environment clean	Take preventive medicine	/drinking
Obegwu-Okuku	20	16 (80.0)	8 (40.0)		0	4 (20.0)	0	4 (20.0)	0	0	4 (20.0)	8		
(28.6)	0	4 (20.0)												
Ohohii-Ohii	28	24 (85.7)	4 (14.3)	4 (14.3)	0	8 (28.6)	4 (14.3)	0	12 (42.9)	0				
0 0	0													
Umueju-Umuoma	28	12 (42.9)	4 (14.3)	8 (28.6)	0	0	0	0	0	8 (28.6)				
0 0	0													
Umunnali-Umuoma	24	8 (33.3)	0	8 (33.3)	0	0	0	0	0	4 (16.7)				
0	4 (16.7)	8 (33.3)												
Umuoyo-														

Irete	24	12 (50.0)	0	0	0	0	0	0	8 (33.3)	0			
0 0	0												
Umuokpiri-													
Orogwe	20	16 (80.0)	0	4 (20.0)	0	0	8 (33.3)	0	0	4 (20.0)	0		
0	4 (20.0)												
Oforola	16	0	0	0		Okolochi	16	8 (50.0)	0	0			
0 0	0	0	4 (25.0)	4 (25.0)	0	0 0	4 (25.0)	0	4 (25.0)	0			
Umuelem-						0	0	0	4 (25.0)				
Ihiagwa	12	8 (66.7)	0	4 (33.3)	0	0 Umuchima-	0	0	4 (33.3)	0	0	0	
Umuannau-						Ihiagwa	24	12 (50.0)	0	0			
Obinze	28	24 (85.7)	0	4 (14.3)	0	0 0	0	0 4 (16.7)	0	[illegible]	0	0 0	0 0
Umuike-						Umucheche-							
Amakohia-Ubi	24	8 (33.3)	0	0		Emeabiam	24	16 (66.7)	0	0			
0 4 (16.7)	0	4 (16.7)	4 (16.7)	4 (16.7)	0	0	4 (16.7) 8 (33.3)	0	0	4 (16.7)	0	4	
Umuerim-						(16.7)	0 0	4 (16.7)					
Nekede	24	16 (66.7)	0	8 (33.3)	0	4 (16.7)	0	0	12 (50.0)	0	0	0	
Okwu ext.-						Umuokpo	20	16 (80.0)	0	0			
Umuoma-						0 0	0	0	0				
Nekede	24	12 (50.0)	0	0		0 0	0	0					
0 0	0	0	4 (16.7)	12 (50.0)	0	0	4 (16.7)						
Umuiwuala-						**Total**	**356**	**208 (58.4)**	**16 (4.5)**	**40 (11.2)**	**8 (2.2)**	**16 (**	

4.5 **Practice of Protecting Against the Mosquito Vector**

Only 3.4% of the households used insecticide treated nets in protecting themselves against mosquito bite. A total of 19.1% of households each either burn mosquito coils or use spray cans against mosquito. A significant ($p<0.05$) percentage (32.5%) of the households did not actively use any method to protect themselves. There was a relative reduction in infection rate among households that used some kind of protective measure against mosquito bite (Table 6).

Table 6: Responses of participants in Household clusters on means of protection against mosquito bites

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Cluster Name Net	None House House-holds	No. of coils	Otapiapia cans	Burning leaves	Spray on lamp	Burning	Put leaves		
Obegwu		20	4 (20.0)	8 (40.0)	0	4 (20.0)	4 (20.0)	0	4 (20.0)
Ohii		28	0	16 (57.1)	12 (42.9)	0	0	0	0
Umueju Umuoma		28	4 (14.3)	0	16 (57.1)	0	0	0	8 (28.6)
Umunnali Umuoma		24	8 (33.3)	4 (16.7)	4 (16.7)	0	4 (16.7)	4 (16.7)	4 (16.7)
Umuoyo Irete		24	4 (16.7)	4 (16.7)	16 (66.7)	0	0	4 (16.7)	0
Umuokpiri Orogwe		20	8 (40.0)	0	0	4 (20.0)	0	0	8 (40.0)
Oforola		16	0	4 (25.0)	4 (25.0)	0	0	0	8 (50.0)
Umuelem Ihiagwa		12	4 (33.3)	4 (33.3)	8 (66.7)	0	0	0	0
Umuannau Obinze		28	8 (28.6)	4 (14.3)	8 (28.6)	0	0	4 (14.3)	12 (42.9)
Umuike Amakohia-Ubi		24	0	4 (16.7)	4 (16.7)	4 (16.7)	0	0	16 (66.7)
Umuerim Nekede 8 (33.3)			24	4 (16.7)	0	12 (50.0)	0	0	0
Okwu ext. Umuoma Nekede		24	4 (16.7)	0	8 (33.3)	0	0	0	12 (50.0)
Umuiwuala Okolochi		16	4 (25.0)	8 (50.0)	0	0	0	0	4 (25.0)
Umuchima Ihiagwa		24	4 (16.7)	4 (16.7)	4 (16.7)	0	0	0	12 (50.0)

Umucheche Emeabiam		24	8 (33.3)	0	4 (16.7)	0	0	0	
12 (50.0)									
Umuokpo		20	4 (20.0)	8 (40.0)	4 (20.0)	0	0	0	8
(40.0)									
Total		356	68 (19.1)						
68 (19.1)	104 (29.2)	12 (3.4)	8 (2.2)	12 (3.4)	116 (32.5)				

4.6 **Availability and Usage Of Llins**

The result showed that inhabitants in only 6.7% of the 356 households sampled had used the Long lasting insecticide treated nets(LLIN) distributed by the government. A significant percent (80.9%) of households do not have LLIN and 4.5% of the households that had LLIN do not use it. Some of their reasons for non-use of available LLIN include: a) that it was not time yet to use the net, b) that the net was dirty/torn and not in the state to be used c) that inside the net felt too hot and thus they dis-continued sleeping under the net amongst other reasons. The house holds that had used the long lasting insecticide treated nets showed lower infection rates (Table 7)

Table 7: Responses of participants in Household clusters on availability and use of LLINs.

Cluster Name	No. of House-holds	No. (%) that use net	**No. (%) that don't use net** Causes hotness	Net is dirty /turned	waiting for right time	have net	No. (%) don't
Obegwu Okuku	20	0	0	0	0		20 (100)
Ohohii Ohii	28	4 (14.3)	0	4 (14.3)	0		20 (71.4)
Umueju Umuoma	28	8 (28.6)	0	0	0		20 (71.4)
Umunnali Umuoma	24	4 (16.7)	4 (16.7)	4 (16.7)	4 (16.7)		8 (33.3)
Umuoyo Irete	24	0	0	0	0		20 (83.3)
Umuokpiri Orogwe	20	4 (20.0)	0	0	0		16 (80.0)
Oforola	16	0	0	0	0		16 (100)
Umuelem Ihiagwa	12	0	0	0	0		12 (100)
Umuannau Obinze	28	4 (14.3)	4 (14.3)	4 (14.3)	8 (28.6)		8 (28.6)
Umuike Amakohia-Ubi		24	0	0	0	4 (16.7)	
		20 (83.3)					
Umuerim Nekede	24	0	4 (16.7)	0	0		20 (83.3)
Okwu ext. Umuoma Nekede		24	0	0	0	0	
	24 (100)						
Umuiwuala Okolochi		16	0	0	0	0	
	16 (100)						
Umuchima Ihiagwa	24	0	0	0	0		24 (100)
Umucheche Emeabiam		24	0	0	0	0	
	24 (100)						
Umuokpo	20	0	0	0	0		20 (100)
Total	356	24 (6.7)	12 (3.4)	12 (3.4)	16 (4.5)		288 (80.9)

Discussion

Findings from this study showed 26% malaria parasite infection rate amongst the study population. This finding brings out the actual picture of malaria prevalence in the study population which comprised of all the individuals in the households sampled without exclusion criteria. The prevalence rate observed is indicative of the rural nature of the study area which sustains the breeding of the mosquito vectors thereby enhancing as well as ensuring sustained transmission of the disease. This result however, is in contrast with that of Ukpai and Ajoku(11) who reported a high prevalence (76%) in Owerri municipal amongst out-patients attending clinics. Studies using out-patients are sometimes biased because they are focused on sick individuals who seek medical attention in the clinics thus explaining the very high prevalence. Our study however, was on apparently healthy individuals. Another significant difference in the findings may be as a result of the difference in the season of investigation as this work was conducted during dry season. This thus agrees with the postulation that malaria is season sensitive, with greater intensity in wet than dry seasons in Nigeria (12). The reduced prevalence rate amongst the rural populace despite all the limiting factors indicates that there is some impact of the malaria

intervention strategies in place in the State.

It was generally observed that more males (27.5%) than females (24.3%) were infected, though in some clusters more females were infected. This sex dependent prevalence supports Ukpai and Ajoku (11) who reported 78.0 % and 72.0% prevalence for male and female respectively. Although this difference is not statistically significant it may however reflect some differences in culture / life styles such as keeping late nights outside by some men, scanty dressing of being bare – chested during hot weather, which leaves a large body mass exposed to mosquito bites.

Results obtained from this study indicate that children and adolescents were mostly infected. This can be attributed to the playful attitude of this age group, dressing mode especially for the males which may expose them to mosquito bites as well as not having acquired enough immunity over the years to fight infection. According to World malaria report 2011, about 86% of the total global malaria deaths occur in children under the age of 5 years (1). For this reason, children and adolescents should remain a target for health care providers so as to check the mortality which usually results from high infection among them. The low prevalence found with increase in age may be as a result of acquired immunity by older persons following previous infections (13).

Malaria prevention and control rely mainly on effective mosquito control program. The Roll Back Malaria (RBM) initiative focuses on four major strategies which include prompt and effective treatment of all cases, presumptive intermittent treatment in pregnancy (14), environmental management to reduce vector population and provision of insecticide treated nets (ITN) (15). It is impossible to eradicate mosquitoes completely because of the cost implications especially considering the weak economy of countries with severe malaria burden (16). The alternative, therefore, is to control and reduce mosquito population as much as possible.

The knowledge and management of malaria seems to be poor in this study area as about 26% of the households neither knew the causative agent, the symptoms of malaria nor ways of controlling the malaria vector. This correlates with the reports of Oparaocha(12) and Idowu and Mafiana (6). Knowledge of symptoms and signs of malaria varied among the household clusters. The poor knowledge of malaria may be a hindering factor against any intervention program. This calls for attention to encourage the people to participate in organized programs like LLINs distribution by the government.

Inhabitants in significant percentage (79.8%) of households knew that mosquito transmits malaria. Considering their practices with regards to control of malaria, the number of household clusters where inhabitants knew that malaria could be controlled, using spray cans was most common followed by the use of 'Otapiapia' (locally made insecticide) and burning of mosquito coil. The high patronage of spray cans can be attributed to its availability and accessibility, as observed in a previous report by Oparaocha (12).

The most promising and yet most challenging of the WHO strategies is the provision and use of insecticide treated nets (ITN), which has been described as increasingly popular tool for malaria control (17). ITN is believed to be capable of reducing morbidity by 60% and mortality among children under the age of 5 by about 25% (18). However ITN acceptance -and use have been plagued by many factors including non-availability, high cost, lack of experience on how to use it and misconception as well as confidence or overconfidence in its efficacy. The fact that individuals in a reasonable percentage (58.4%) of households were aware that the use of mosquito nets protects against mosquito bite means that controlling malaria through LLIN distribution will be achieved if efforts are intensified.

This study revealed a low availability of long lasting insecticide treated nets (LLINs) among the people implying low distribution coverage by the government. The reason proffered by most of the households that did not have insecticide treated nets was their inability to know when the nets were distributed. Therefore, governments at various levels with their supporting partners like the Roll Back Malaria Group should involve the communities in the distribution of these nets in order to make more LLINs

available to the people.

Of the households that got nets during the distribution exercise, a reasonable number did not use them because of one reason or the other. The results from this study can serve as motivator towards intensifying the fight against malaria. The poor knowledge of people about malaria as also seen in the result of this study is of public health importance as it will truncate the goal of eradicating malaria. This is because the ignorance shown by the people will be a hindrance in their appreciating and participating fully in malaria control programs. As a consequence, we propose that any measure towards reducing the burden of malaria be focused on health education and public enlightenment especially in the rural and semi-urban centers.

In conclusion, we recommend the integration of household cluster sampling method in investigating the burden of malaria and other infectious diseases of public health importance as this will help in early detection of infections.

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